Towards Green Industry & Green Economy in Caraga

Caraga State University Research & Innovation 2016-2020
FOREWORD

R & D is an integral part of an academic institution upon which the basis of truth for both instruction and extension is fashioned. The Caraga State University (CSU) is an academic institution tasked by the government to undertake research and extension services, and provide progressive leadership in the fields of agriculture and environmental studies, fishery, engineering, forestry, industrial technology, education, law, medicine and other health related programs, information technology, arts and sciences and other related courses aside from its key function of human capital building through its instruction function. As a University with meager budget, it is confronted with the challenge on how it can effectively and efficiently address the pressing needs of the Caraga Region, particularly in poverty alleviation and sustainability of socio-economic development efforts. Through its four-fold function of instruction, research, extension and production, it develops curricula and programs that could bring development in the region. However, in research and development, so much still needs to be given attention to generate knowledge useful for technology generation and policy formulation.

The Caraga Region, situated in the northeastern part of Mindanao, is one of the regions in the Philippines with vast natural resources. It has the widest remaining dipterocarp forest, thus tagged as the 'Timber Corridor of the Philippines'. Likewise, it has rich mineral resources that lure a number of mining companies to do exploration and extraction. However, it has also the most delicate balance between natural resources and population since the rapidly expanding population in the region relies mainly on these resources, which may eventually cause the depletion of non-renewable resources. For the natural resources of the region to be utilized optimally for sustainable development, wise management of resources and education of the people are critical areas of focus in research to strike balance between sustainable development and natural resources conservation.

To address the issues related to sustainable development in Caraga Region and in Mindanao, the University crafted its own R&D Agenda 2016-2020, guided by the Philippine Development Plan and the Caraga Regional Development Plan. This R&D Agenda shall serve as the beacon in the conduct of R&D with the end view of providing information and technologies to the various stakeholders in the region.

ANTHONY M. PENASO, Ph.D.

President

Caraga State University Research & Innovation Plan 2016-2020
ACKNOWLEDGMENT

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The organizers of the training-workshop are also instrumental in the crafting of this Plan, without their constant reminders, gentle prodding and invaluable suggestions on how to develop the Plan, it would have been hard to imagine putting all the various information together. Hence, we commend the efforts of the organizers: Dr. Maricar S. Prudente, Dr. Soccoro E. Aguja, Ms. Carme Joy L. Almodal and the rest of the team. This is, of course, not also possible without the leadership of Dr. Gloria Jumamil-Mercado and her team at the Development Academy of the Philippines (DAP) that initiated this program. The new direction in the Philippine educational landscape is the working of the new leadership of the Commission on Higher Education (CHED). This new direction gives R&D a different meaning in the country. We, therefore, salute this meaningful and atypical initiative supporting the promotion of R&D in the Philippines.

We acknowledge the strong faculty force of the University and the administration for the critical review of the RDE Agenda. The partners who helped in providing the needed information at the local, regional and national levels; government and non-government sectors as well as our partners in the communities are also recognized. The inputs from Engr. Meriam M. Santillan, Engr. Alex T. Demetillo, Dr. Roly C. Daguil, and Engr. Jeffrey T. Delllosa are also acknowledged. The rural folks, the indigenous people, local government officials who are the target beneficiaries of the R&D efforts of CSU…they are the inspiration in crafting this R&D Plan.
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EXECUTIVE SUMMARY

The Caraga State University (CSU) is a state-funded academic institution mandated to primarily provide advanced education, higher technological, professional instruction and training in the fields of agriculture and environmental studies, fishery, engineering, forestry, industrial technology, education, law, medicine and other health related programs, information technology, arts and sciences and other related courses. It shall undertake research and extension services, and provide progressive leadership in its areas of specialization in the Caraga Region (RA 9854). Thus it is committed to contribute to the transformation of the socioeconomic well-being of the people by providing the needed R&D support addressing the pressing needs of the region, particularly on poverty alleviation, food security, and proper environmental management for sustainable countryside economic development. To attain this noble mission, the University needs to develop a sound Research and Development (R&D) Plan to be the basis for the smooth implementation and delivery of outputs, adhering to the development goals of the country and the region for eco-friendly and lasting inclusive economic growth.

The macro development agenda of the university is an offshoot of rigorous deliberation for the university's directions and aspirations considering its resources. In view of the university's responsibilities to Caraga Region and the challenges it may face in the future, it has laid down these R&D Agenda to streamline its research and development operations with respect to its mandates. Though still young and still learning, it has a forward-looking and focused R&D Plan. With inspired management and R&D-supportive policies, it is not impossible for the University to be productive and to soar higher.

The University recognizes that due to limited resources, the University needs to expand and nurture its linkages to pursue its mission. The need to improve its Infrastructure System is also crucial to R&D. The delivery of programs and services of the university for competitive academic and R&D performance has always been challenged by the lack of adequate infrastructure system. The university likewise believes in responsible management as a major factor to institutional success. In pursuit of making a difference through service, it aims to strengthen its management capability to institute the necessary mechanisms promoting greater accountability and to elicit active R&D participation of the faculty. Thus the Research Plan 2016-2020 can only be realized when all the ingredients have been put together.
CHAPTER 1
THE ENVIRONMENT OF CSU RESEARCH AND DEVELOPMENT

Background of the University Environment

Caraga Region, situated in the northeastern part of Mindanao, is one of the areas in the Philippines most threatened by Climate Change due to its location in the Pacific Seaboard. It has a Type 2 climate which favors the growth of tropical trees thus it has the widest remaining dipterocarp forest in the Philippines and a rapidly expanding planted Falcata and Mahogany forest (Forest Statistics, 2012). Due to the available wood supply mainly generated from planted forests, 10 large-scale integrated sawmills and veneer/plywood plants and 57 medium-scale wood processing plants operate in Butuan City and in bigger towns in the region. Thus the region is tagged as the 'Timber Corridor of the Philippines'.

The region is likewise regarded as the ‘Mining Hub’ of the country since it houses about half of the country’s registered mining companies due to its rich mineral resources (MGB 2012). There are 31 nickel and chromite mining companies, 5 large-scale gold mining companies and about a thousand artisanal and small scale gold miners operating in the region. The Surigao Provinces and the Province of Dinagat Islands house the most number of large-scale nickel and chromite mining companies. On the other hand, artisanal and small-scale gold mining are widespread in Agusan del Sur and Agusan del Norte.

In Agriculture, the region is 3rd in abaca production among the regions in the country (BAS, 2011). It has also the biggest oil palm (Elaeis guineensis Jacq.) plantation, with a reported 35,000 hectares in 2010 and growing every year. It has also a rich fishery grounds, particularly in the Surigao area, due to the location of the region at the northeastern tip of Mindanao. Aquaculture has become one of the livelihood sources for people in Surigao. The existence of Lake Mainit and Agusan Marsh also contribute to the fishing area of the region.

In addition, Caraga Region is also home to some of the unique ecosystems which have been developed into ecotourism destinations. These include the internationally known wetland, the Agusan Marsh, the pristine Siargao Islands Protected Landscape and Seascape (SIPLAS), Tinuy-an Falls which is dubbed as the ‘Niagara of the Philippines’, and the Enchanted River in Surigao del Sur among others. Hence, the Regional Development Council (RDC) identified Fishery, Agro-Forestry, Mineral and Ecotourism (FAME) as the regional banner program for socioeconomic development.

With these resources and economic opportunities available, employment generation is increasing which lures people from other regions to come to Caraga. NCSB (2012) reported that Caraga has one of the highest population growths in the Philippines due to migration of people seeking for livelihood in the region. This renders the natural resource base of the region delicate inasmuch as the increasing population in the region relies mainly on these resources, which may eventually cause the depletion of non-renewable resources. This, therefore, poses tremendous challenge for researchers, planners and policy makers, considering that sustainable development is about striking balance between economic development and environmental conservation. For these natural resources to be utilized optimally for sustainable development, educating the people to engage in proper management of resources and formulation of evidence-based policies are critical areas for R&D. To ensure sustainable development utilizing the natural resources in the various local government units (LGUs) in the region, ICT-enabled governance is important. The Smart City, which is anchored on ICT-based planning, has become the trend in Europe. A smart city (also smarter city) uses digital technologies or information and communication technologies (ICT) to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more
effectively and actively with its citizens. Likewise, geomatics and spatial information to guide planners and implementors in disaster risk reduction, smart agriculture and smart urban planning are vital in the development of Caraga and the rest of Mindanao.

The Caraga State University (CSU) is a state-funded academic institution mandated to primarily provide advanced education, higher technological, professional instruction and training in the fields of agriculture and environmental studies, fishery, engineering, forestry, industrial technology, education, law, medicine and other health related programs, information technology, arts and sciences and other related courses. It shall undertake research and extension services, and provide progressive leadership in its areas of specialization in the Caraga Region (RA 9854). Thus it shall commit to contribute to the transformation of the social well-being of the people by providing the needed R&D support addressing the pressing needs of the region, particularly on poverty alleviation, food security, and proper environmental management for the sustainability of socio-economic development. To attain this noble mission, the University needs to develop a sound Research and Development (R&D) Plan which shall be the basis for the smooth implementation and delivery of outputs, adhering to the development goals of the country and the region for eco-friendly and lasting inclusive economic growth.

SWOT Analysis

To identify areas of focus in R&D as well as the strategies to implement the various programs, a SWOT Analysis was conducted to assess the internal and external environments. In the analysis of the internal environments, the major strengths and weaknesses, opportunities and threats were identified.

Internal Environment: Major Strengths and Weaknesses

Major Strengths

1) Stronger Faculty Force in the University

Every year, since 2005, the university sends faculty members for advanced studies in their fields of specialization/discipline. The Faculty Scholarship Committee prescribes that faculty-scholars must enroll in delivering institutions identified by the Commission on Higher Education (CHED) if within the country or in universities abroad. This practice helps ensure that the faculty scholars receive quality professional and research training when they return to the university. The period 2010-2011 was the most productive for the university in terms of returning faculty scholars. With the return of the faculty scholars trained in leading universities such as the University of the Philippines (UP), Ateneo de Manila University (ADMU), Visayas State University (VSU), Central Mindanao University and Mindanao State University-Iligan Institute of Technology (MSU-IIT), the delivery of the various academic services in CSU considerably improved. As of 2014, the University faculty is composed of 27% Ph.D. holders, 68% MS degree holders and only 5% BS degree holders, with Mathematics having the most Ph.D. holders, while Engineering has none (Fig. 1). Of these, 54% are aged 31 to early 40 years old which are among the most active researchers (Fig. 2). However, 34% of the faculty are in the 50s or over. Nonetheless, these are also the less active participants in research and innovation.
Fig. 1. Distribution of faculty members per college according to discipline and degree obtained, as of 2014

Fig. 2. Distribution of faculty members per college according to age and academic rank, as of 2014
In the last ten years, the faculty members started doing R&D in the areas of Agriculture, Mathematics, Environment and ICT from 2005-2010 (Fig 4). During these years, only a handful engaged in research because many are still on scholarship for MSc. and Ph.D. In 2010 onwards, the number of faculty who engaged in R&D increased considerably, with wider coverage of R&D areas. There are already faculty researchers in the area of Geomatics, Education, Mining and an increase in the number of researchers in the areas of Agriculture, Mathematics, Environment and ICT. A big leap in the number of faculty-researchers is noted in the areas of ICT, Environment and Mining. This is due largely to the capable returning scholars who packaged proposals and got funding from DOST and other funding institutions (GIZ, ADB).

Fig. 4. Distribution of faculty members according to number of years in R&D, as of 2014

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2) Environmental Science and Allied Fields as the University’s Banner Program

Aligning to the development issues and agenda in the region and in the country has also made the university RDE programs fine-tuned to the core of addressing the major barriers of sustainable development. The university has identified a holistic paradigm of delivering science–based interventions to influence today’s utilization of natural resources that are mostly non-renewable and to ensure sustainability of these resources for future generations and for reducing climate change
impacts. The University’s RDE model captures the elements to which the interventions are aimed to institute the desired changes in societies’ practices not friendly to the environment in particular.

The university believes that ensuring the environmental integrity and productivity could sustain socioeconomic development in the Caraga Region and the whole of Mindanao. With this belief, it is committed to impart to the region the science and technology on how the environment should be preserved without compromising economic development. This suited well with the goal of other agencies (public and private) thereby inviting them to join forces with the University to rally behind similar cause. The mounting interest on environmental degradation as the root cause of Climate Change has particularly made the University’s banner programs well assimilated to today’s concern not only in the region, in the country, but all over the world.

3) Expanding Linkages/Partnerships

The participation of the university constituents in various local and international human development activities (eg. short-term training, study tours, formal education) as well as in collaborative researches resulted to expansion of its linkages. Over the years, the University forged partnership with a considerable number of agencies across the country and with other nations. This has helped a lot in pushing further the frontier of the university in terms of capability building and facilities development to respond to pressing concerns in academic and R&D responsibilities. In fact, linkages have been credited in improving the status of the university. The major research and development projects of the University are funded by partners (eg. DOST-PCIEERD, DOST-PCAARRD, GIZ, DA-BAR, CHED, FFTC-ASPAC, NRCP). The list of international and national/regional agencies with which the university has established formal linkages is presented in Appendix 3.

Major Weaknesses

While some indicators point to the successful delivery of services, the University is still trapped by the vicious cycle of budget deficits every year. The limited budget allotted to the University is the root cause of some of the University’s major weaknesses:

1) Meager budget for R&D infrastructure and facility modernization

The meager budget results to unavailable funds for new buildings and even renovation of aging buildings and other facilities necessary in the conduct of quality R&D. The present stock of resources seems not to allow the university to provide easily the excellent services sought to backstop the flagship programs. To date, the university has very limited means for backstopping the growing demand for laboratories to house the increasing number of R&D facilities derived from previous funded R&D engagements. Housing these facilities and making these more useful in addressing the needs for knowledge generation and innovations are crucial to position the University as the S&T prime mover in Caraga Region and in Mindanao.

A number of science laboratory facilities are unavailable for faculty in the natural sciences and mathematics to embark on basic researches. Particularly, if the university is left on itself, the likelihood of performing those researches will be farfetched. The university thrusts in basic research is a competitive advantage, because such efforts can lead to the production of new products and technologies, which will eventually provide the university more markets for its knowledge products and services. On the other hand, innovations in the areas of Engineering, Geomatics and Information
Technology have started coming; however, laboratory space is always the challenge for researchers and innovators.

Current linkages are practically of little help to address the inadequacy of laboratories in the university; all the more with the limited government appropriation (GAA), which is the root cause of all current constraints. The dearth in budget coupled with the inability of the university’s resource generation to cope with the financial requirement of the desired academic services proves to be the biggest thing to hurdle ahead. However, with the growing confidence of funders in the University’s capacity, there are already alternative approaches through which the university can address the budget issue.

2) Transfer of trained faculty

The return of the faculty sent for graduate studies was reported to have enhanced the academic capability of the university. However, the physical and emotional support to the returning faculty who wish to engage in R&D is grossly challenged. The lack of scientific facilities required to put the newly acquired scientific training into actual use in R&D caused the ‘high spirit’ of many young and promising faculty members to dissipate. Conversely, this drives the faculty members to other SUCs and research institutions that can offer them the facilities supporting their passion in R&D.

**External Environment: Major Opportunities and Threats**

CSU is surrounded with opportunities brought about by the presence of agencies (both local and international) that invite RDE proposals and collaboration. For years, the University has partnered with these agencies to continually undertake R&D projects in the region that allowed the University to surpass resource constraints (Appendix Table 1 & Appendix 2). Some of these agencies have been tapped in the faculty development program as source of scholarships for overseas training along the agencies’ priority research and development agenda. The presence of these agencies has provided substantial leverage and confidence for the University to continue with its R&D pursuits.

The flagship program on Environmental Science and related fields has ushered in more opportunities for the University because of stronger identification with the environment and the increasing number of industries in the region that face environmental challenges. For the past five years, mining industries have grown considerably in terms of area covered, operation and productivity. Such growth is attributed to the open mining policy adopted among the government that invited mining companies to locate in the region. Along this aspect, the University has the opportunity to lead in environmental advocacy, co-implementing various projects with other agencies to pursue efforts to strike balance between economic development and environmental conservation. Moreover, the advent of Climate Change has resulted to growing concerns related to disasters such as floods and storm surges. Thus proper planning to ensure disaster risk reduction is another challenge. With GIS mapping using LiDAR data, more meaningful planning is feasible.

Brain drain is a major threat to the University. The issue is caused by the inability of the University to keep its talented faculty members by providing them the necessary research facilities and respectable laboratory space to comfortably work in their projects. The quality of the working environment and the sense of belongingness are among the major factors that can hold the personnel like a magnet. The current financial difficulty largely prevents the University from doing it. By not addressing it the soonest, greater impact will strike the University due to erosion of opportunities. Brain drain would have an adverse compounding effect to the confidence of the University to confront the inevitable competition with other academic institutions.
CHAPTER 2
PROCESSES IN SETTING THE CSU RESEARCH, DEVELOPMENT
& EXTENSION AGENDA

The Basis of the CSU RDE Agenda

Guided by its institutional mandate and its Vision, Mission, Goal and Objectives, the CSU Research and Development Agenda was crafted. The institution's research agenda is in consonance with the Philippine Development Plan (NDP), National Science and Technology Plan of the Department of Science and Technology (DOST-NSTP), National Higher Education Research Agenda of the Commission of Higher Education (CHED-NHERA), Caraga Regional Development Plan 2010-2016, Millennium Development Goals (MDG) and the regional and national priorities of government agencies such as the Department of Science and Technology (DOST), Department of Agriculture (DA), Department of Environment and Natural Resources (DENR) and the Department of Health (DOH). All R&D needs stipulated in the above-mentioned plans and programs were used as inputs and the foundation for the revision to come up with the Caraga State University RDE Agenda for 2016-2020.

In parallel to the national and regional development plans, the University identified the following agenda:

- R&D Program on Environmental Management & Eco-governance
- R&D Program on Mineral Resources Management & Responsible Mining
- R&D Program on Sustainable Agri-Fishery & Forest Resources Management
- R&D Program on Food-Related Product Design, Food Safety and Marketing
- R&D Program on Spatial Information and Geo-informatics
- Research and Innovation Program on ICT-Enabled Regional Development
- R&D Program on Renewable Energy and Alternative Technologies
- R&D Program on Mathematical and Statistical Computing
- R&D Program on Peace and Countryside Development
- Research Program on Regional Human Capital Development

Consultative meetings and workshops with the various stakeholders

Consultative meetings and workshops will be conducted among CSU faculty, staff, students, alumni, regional line agencies, industry, civil societies and other stakeholders to obtain inputs important in making necessary revisions on the CSU RDE Agenda 2011-2016. The revisions are intended to make the RDE Agenda consistent with the emerging development policies of the national government in the Information Age. The policy choices will be based on the series of development plans or priorities prepared by different National Government Agencies (NGAs) and Peoples’ Organizations (POs). The specific objectives of the meetings and workshops are:

a) to validate the identified needs in the Caraga Region for Science and Technology interventions;
b) to establish a system for technology transfer and the management of intellectual property; and
c) strengthen networking and community relations with industry, NGAs, POs, other Higher Education Institutions (HEIs) and other stakeholders
Participation of the various stakeholders in consultative meetings

Representatives from various sectors will be invited to join in the consultative meetings. This is intended to gain greater participation in crafting the University RDE Agenda, thereby making the RDE direction of the University more relevant to the needs of the region. Regional representatives from Government and Non-Government Agencies and various stakeholders will present issues and concerns related to the current programs and priorities in their agencies. The representatives likewise will provide a list of projects that require RDE to support the formulation and/or reform of policies and the development of S&T-based interventions to improve productivity in their sectors.

Strategic Planning

The University is yet to work hard for the strengthening of its research capability to build a credible track record for Caraga Region at least. It has to work from the inside by addressing what needs to be done to elicit the necessary enthusiasm and attitude from its faculty members to engage in research. While the process is indeed difficult to initiate, it has to take off for the necessary reforms to proliferate.

Conscious of the fact that resources available for research in the University are limited, obtaining external funding to finance R&D activities is indeed a wise decision. This can be done by hitting precisely the priority thrusts of funding agencies in which the possibility of strengthening research linkages in acquiring excellent research facilities and in producing commendable outputs become stronger.

In all these aspects, enthusiasm of the faculty for research is considered crucial. Sustaining this enthusiasm is necessary and must be secured by means of judicious benefits, incentives, tenure, reward system, logistical support and providing an atmosphere conducive for research and innovative efforts. Keeping the enthusiasm of faculty-researchers and innovators ablaze would also require more effective and efficient administrative support for the delivery of research services.
Chapter 3
Visioning and Strategy Formulation

A. Vision and Mission for University Research

Vision:

CSU as ‘The Research and Innovation Hub of Caraga’ supporting a socially-sensitive and inclusive economic growth in the area

Mission:

To generate knowledge, technologies and innovations supporting the lasting inclusive economic growth, peace and disaster-resiliency in Caraga Region

B. Objectives, Key Result Areas and Performance Measures

The Strategic Plan was developed by matching the strengths with opportunities, strengths and threats, and opportunities and weaknesses. Having identified the issues and concerns confronting Caraga Region, as well as after analyzing the strengths, weaknesses, opportunities and threats (SWOT), the RDE Agenda of CSU was formulated. The Plan is aimed at increasing quality performance in research; hence, the crucial point is on how to encourage faculty members to actively engage in research and innovation. At present, the University’s productivity in terms of researches published is only 12-15 papers, with 4-5 papers cited by other authors annually. This is based on the assessment done by CHED as basis for Normative Funding, which is way below considering the 130 faculty members (with 27% Ph.D. holders; 68% MS degree holders). Among the faculty members who are actively engaged in research are those aged 30-50 years old who are holding mostly MS degree holders. Sending these faculty-researchers to obtain their Ph.D. is critical inasmuch as these are the core of CSU RDE. The best strategy is to send them to Universities with a research culture to prevent erosion of RDE outputs and outcomes in the next 5-10 years. Hence, several areas have to be addressed in order to stimulate the interest of the faculty members in research and innovation and sustain their enthusiasm.

A dynamic environment is crucial in promoting research excellence. If the environment in the University is not conducive to analytical and innovative thinking, migration of capable but less motivated people most likely happens. Thus the administration has to review policies and provide the much-needed support to hold the capable faculty members, thereby preventing the so-called ‘brain drain’. The support that needs to be provided to prevent ‘brain drain’ can be in the form of providing laboratory space and research equipment for the capable faculty members to stay in the University. The principal reason why young and smaller SUCs cannot move forward in promoting R&D is the lack of research capabilities. For CSU, a number of young and budding researchers exist, thus a little effort to provide research facilities can make these faculty members stay.
Specific Strategies:

To achieve the Vision, Mission and Objectives of the University R&D Division, strategies were identified. The Strategic Plan matrix is shown in Appendix 2. The strategic plan is formulated, as follows:

1. **Capacitate faculty-researchers to attract external funding or research grants for excellent research facilities and outputs**

   Tap scholarship opportunities from national and international sponsors to build/enhance capabilities among faculty and other personnel doing R&D activities. The R&D Office and the Scholarship Committee shall work closely to determine the gaps in human resource capability to prioritize the specialized fields which are wanting.

   Collaboration can play a key role in the capability building of qualified personnel, for example through the co-supervision of Ph.D. students from other countries. The cost of research, especially in disciplines requiring specialized instrumentation or facilities, tend to make collaboration an imperative. Partnership with international institutes in the form of joint research projects, allow sharing of research facilities and major infrastructure, allowing access to research data and discoveries, and the linking of research centers and virtual networks. Issues, such as climate change transcends national borders and demand international collaboration which can enrich the capability of the University faculty-researchers.

**Action Plan**

a. Annual review of the human resource development program to capacitate faculty and staff to do research relevant to national issues in food crisis, poverty reduction and environmental degradation.

b. Strengthen linkages with sponsoring institutions on scholarships/fellowships for faculty-researchers training (either degree or non-degree).

c. Require faculty researchers to conduct basic researches in their discipline to come up with breakthrough projects and inventions for the development of new processes and products

d. Collaborate with mentors from established research institutions to improve research capability of faculty through actual research implementation

2. **Establish Research Institutes/Centers in Caraga Region**

   In the R&D arena, the principle “No man is an island” shall be adopted. Thus research teams will be created to work together in 1 program. This will be facilitated by establishing Research Centers. By creating Research Centers, R&D teams will be learning from one another and collaborations can improve R&D productivity. The team approach in R&D activities may encourage newcomers to engage in research while allowing the old researchers to learn new techniques and methods from the new ones, especially those who just graduated from their MS and Ph.D. degrees. This strategy is also aimed to encourage maximum participation in R&D activities to keep the Research Culture aflame.

   For RDE activities to respond to problems and technological and/or information needs of society, a multi-disciplinary research shall be adopted. This approach minimizes the span of time required to address multi-faceted problems, while optimizing the budget to carry out R&D activities.
**Action Plan**

- Establish the:
  
  a) Mineral Resources Management Research and Training Center (MinRes)
  b) Caraga Mechatronics and Robotics Research and Innovation Center (Mechtronics Center)
  c) Caraga Center of Peace and Development (CCPD)
  d) Caraga Center for Agricultural Research and Entrepreneurship (Caraga-CARE)
  e) Mindanao Center for Geo-informatics
  f) Food and Innovation Center (FIC)
  g) Center for Renewable Energy and Alternative Technologies (CREATE)
  h) Innovation and Technology Commercialization Center (ITCC)

- Revive the operation of the:
  
  a) Caraga Center for Environmental Studies and Management (CCESM) to be renamed as the ‘Center for Research in Environmental Management and Eco-governance (CRÈME)

- Re-focus the direction to Research and Innovation of the:
  
  b) Information and Communication Technology Center (ICT Center)
  c) Mathematical and Statistical Computing and Research Center (MSCC)

3. **Sustain the enthusiasm of faculty-researchers in R&D**

   Researchers require a place and scientific tools to do some critical thinking and apply the ideas using some tools. Equipped research laboratories connected to the Internet shall be provided to give researchers an atmosphere where they could think critically and act logically. Researchers shall be accorded 'flexi-time' to give them freedom to work in times when the mind is active and full of bright ideas.

   To sustain the enthusiasm of the faculty-researchers, provision of incentives and support in terms of travel grants to attend and/or present papers in scientific fora/gatherings, publication support and time release to efficiently work on their research through teaching load reduction.

**Action Plan**

a) Secure the tenure of qualified faculty-researchers by working out with DBM on providing more faculty plantilla items
b) Implement the provision of incentives & other fringe benefits as stipulated in the RDE Operation Manual and Consultancy and Contract Research Policy
c) Revise the Performance Evaluation System (PES) instrument to include research & extension performance of faculty members
d) Implement reward system for outstanding performance in research and innovation
e) Ensure adequate laboratory support for CSU RDE
f) Formulate and/or amend policies to be more conducive to the nature of work of faculty-researchers to enhance research productivity
4. Provide efficient and effective administrative support for research productivity enhancement

Hiring of faculty members shall also give emphasis on the research background and/or potential of the applicants for research and innovation. Hiring of personnel who have some backgrounds in research from universities and research institutions recognized for their prolific research and development outputs can greatly expand the researchers’ pool in CSU.

Support the endeavors and efforts of researchers to keep their interests in RDE ablaze. This can be in the form of facilitating procurement of supplies and materials, equipment and other important inputs in the conduct of the RDE activities.

Action Plan

a) Establish a foundation to handle research fund management & procurement system
b) Improve the library collection specifically subscription of research journals to sustain the knowledge support to CSU R&D system
c) Improve administrative support for efficient repairs and maintenance of laboratories and associated facilities
CHAPTER IV
THE RDE IMPLEMENTATION PLAN

In consonance with the institutional, regional and national R&D priorities of government agencies, the CSU R&D Framework was formulated. It presents the CSU Office of the Vice President for Research and Development (OVPRE) as the umbrella for all research, development and extension programs of the university. The office is created to oversee the research, development and innovations of CSU for sustainable management of the region’s natural resources towards improving livelihood, public health and socio-cultural aspects through the provision of basic knowledge, information, innovations and technology. With this framework, the CSU RDE Programs are aimed at addressing to the needs of the region through: utilizing and developing the lowland and upland resources sustainably; managing the mineral resources responsibly; developing and maintaining the natural endowments for ecotourism and for conservation; smart regional development planning using ICT; disaster preparedness using geo-informatics; upgrading human capacity through the understanding and appreciation of science and mathematics; and cultivating values and culture through basic and functional literacy programs and the appreciation of the socio-cultural backgrounds of every sector of society.

The Research, Development, Innovation and Extension Implementation Framework

The implementation framework is shown in Fig. 4. The various lines represent the interconnectivity of the different programs. These lines likewise show the interrelatedness and interdependence of the programs in terms of human resources, facilities, capability building and other relevant areas of collaboration. The semi-circular line connecting the various research and innovation centers to the innovation and commercialization center, market and the partners (e.g. industry, LGUs, other stakeholders) indicate the interrelationships of the various components in the system, while the uni-directional arrows signify the strong direction of the various Research and Innovation Centers to generate knowledge, technologies and innovations to support the achievement of socially-sensitive inclusive economic growth and disaster resiliency. The CSU Administration is linked with the various partners and the market is also shown to point out the feedback mechanism as part of the system. The open lines indicate the flow of information and feedbacks between the CSU Administration and partners and between the Innovation and Technology Commercialization Center (ITCC).
Fig. 5. Model of the CSU Research, Development, Innovation and Extension System
R&D PROGRAMS (2016-2020)

To actualize the vision and mission of the CSU-R&D, action programs have been identified. In attaining the objective of improving R&D productivity of the university to be at par with global standards, the action programs include the following:

a) Annual review of the human resource development program;
b) Strengthen linkages on scholarships/ fellowships for R&D workers training (either degree or non-degree);
c) Collaborate with mentors to improve capability of faculty through research implementation;

These programs have specific activities and tasks as well as resources necessary for the attainment of the objectives.

Another program is the establishment of research centers addressing the regional banner programs of Caraga Region. These include the Mineral Resources Management Research & Training Center (MinRes), Caraga Mechatronics and Robotics Research & Innovation Center (Mecha Center), Caraga Center for Peace and Countryside Development (CCPCD), Caraga Center for Agricultural Research and Entrepreneurship (Caraga-CARE), Food Innovation Center (FIC) and the Caraga Center for Research in Environmental Management and Eco-governance (CRÈME). Previously approved R&D Centers (eg. ICTC, MSCC) which have been regarded as ordinary centers will be revived to generate more knowledge and/or innovations. These R&D centers will be the focal points for the integration of various disciplines to address multi-faceted problems/issues confronting the major economic drivers of Caraga Region and nearby provinces.

To entice the young and budding faculty-researchers to stay in the University, provision of tenure and adequate training will be done. In addition, incentives and other fringe benefits stipulated in R&D Manual will be provided. A mechanism to do this will be integrated in the Performance Evaluation System (PES) that specifically includes research & extension performance of faculty in the evaluation. Ensuring the availability of adequate laboratory support for R&D is also seen as another ‘magnet’ that can hold these trained, young and budding faculty-researchers. The weak system in managing research funds and procurement of scientific equipment needs to be addressed. Establishing a foundation is viewed to be the answer to this problem. Subscription of research journals is also a need that must be addressed to sustain the knowledge support to RDE.

The implementation of these action plans will be a continuation of the existing Research and Development Thrusts of the University. The action plan is presented in Table 1. The programs are presented as follows:

R&D Program on Environmental Management & Eco-governance

RDE efforts on water shall be directed towards appropriate watershed and wetland management, effective and efficient water management, water treatment technologies and water budget studies to optimize the use of available safe water. RDE activities on the environmental and conservation, preservation and management shall focus on finding better ways of managing non-renewable natural resources (land, water, minerals, and biodiversity) for sustainable economic development. Specifically, it shall look for possible solutions to the environmental alterations...
resulting from climate change in order to minimize hazardous environmental effects and reduce natural and human-induced disasters/risks.

The Center for Research in Environmental Management and Eco-governance (CRÈME), Faculty of Environmental Sciences and the College of Agricultural Sciences and Natural Resources (CASNR) are the lead conveners. The collaborators are the faculty-researchers from the: College of Arts and Sciences (CAS); Information Technology and Engineering Departments of the College of Engineering and Information Technology (CEIT); College of Education (CE) and CSU-Cabadbaran Campus.

R&D Program on Mineral Resources Management & Responsible Mining

The R&D program shall focus on: socio-cultural and economic aspects of mining; mining technology; geological aspects; material science and value-addition to minerals; environmental issues on mining; basic literacy for mining communities; and science and mathematics education for would-be miners. Research projects shall be directed towards finding solutions to contamination due to mining and rehabilitation of mined-out areas to benefit humankind. Restoration of the ecosystem to support biodiversity and natural cultural heritage shall also be another focused area for research and innovation.

The Mineral Resources Management Research and Training Center (MinRes) will be the lead convener. The collaborators are the faculty-researchers from the: College of Engineering and Technology (CEIT), College of Arts and Sciences (CAS); Natural Resources Management Department and the Agricultural Sciences Department of the College of Agricultural Sciences and Natural Resources (CASNR); College of Education (CE); and CSU-Cabadbaran Campus.

Research Program on Sustainable Agri-Fishery & Forest Resources Management

The R&D program shall focus on: socio-cultural aspects of agriculture and forestry; agricultural development technology such as sustainable and organic agriculture; sustainable development of wood-based industry; environmental issues on agriculture and tree farming including the studies on conservation of agrobiodiversity; literacy for upland farming and wood-based communities; and science and mathematics education for would-be agriculturalists and foresters. Research and innovations shall also include the use of ICT resources for smart and precision agriculture and forest management. The promotion of Good Management Practices (GMP) to promote food security and food safety shall be part of the program.

The Center for Agricultural Research and Entrepreneurship (CARE) and the College of Agricultural Sciences and Natural Resources (CASNR) is the lead convener. The collaborators are the faculty-researchers from the: College of Arts and Sciences (CAS); Information Technology and Engineering Department of the College of Engineering and Information Technology (CEIT); College of Education (CE); and CSU-Cabadbaran Campus.

R&D on Food Innovation and Packaging

The R&D program will center on development of new products, utilization of lesser-known food sources into marketable products, value adding of traditional foods and food safety. Studies on primary and secondary post-harvest handling and development of postharvest technologies, packaging for food safety and for marketing will also be among the focus under this program.

The Food and Innovation Center (FIC), Faculty of Food and Beverage Department of CSUCC and the College of Agricultural Sciences and Natural Resources (CASNR) are the lead
The collaborators are the faculty-researchers from the: College of Arts and Sciences (CAS); Information Technology and Engineering Departments of the College of Engineering and Information Technology (CEIT); College of Education (CE) and other Colleges of CSU-Cabadbaran Campus.

**R&D Program on Spatial Information and Geo-informatics**

The R&D program will focus on cutting edge technology in image processing, digital photogrammetry, remote sensing, satellite-based global positioning, geographic information systems, LiDAR-based mapping, surveying and digital mapping. Geo-informatics will involve work in land development, construction surveying, hydrographic surveying and spatial data analysis. The R&D program will also include design, development and operation of systems for mapping information about the land, the oceans, natural resources and manmade features. The outputs will be an important input in environmental management planning, investment planning, disaster risk reduction planning, and strategic agriculture and forestry development planning among others.

The **Center for Geo-informatics and the Geodetic Engineering Program** will be the lead conveners. The collaborators are the faculty-researchers from the: College of Engineering and Technology (CEIT), College of Arts and Sciences (CAS); College of Agricultural Sciences and Natural Resources (CASNR); College of Education (CE); CSU-Cabadbaran Campus.

**Research and Innovation Program on ICT-Enabled Regional Development**

Information and communication technologies (ICT) change the way government and non-government entities conduct transactions, delivering public service and making innovation available and accessible. Recently, the global community is promoting the Smart City. A smart city (also smarter city) uses information and communication technologies (ICT) to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens (World Bank, 2015). Through ICT, the connectivity has brought market information, financial services, health services and other needed information to remote areas to support local development to change people’s lives and revolutionize management of projects and local resources for development.

The **Information and Communication Technology Center (ICT Center) and Information Technology Program** shall be the lead conveners. The collaborators are the faculty-researchers from the: College of Engineering and Technology (CEIT), College of Arts and Sciences (CAS); College of Agricultural Sciences and Natural Resources (CASNR); College of Education (CE); and CSU-Cabadbaran Campus.

**Research and Development Program for Renewable Energy and Alternative Technologies**

The RDE projects will focus on the development of new energy sources from renewable energy such as solar energy and from wastes of animals and biomass for green energy. This will also find ways to develop strategies and methodologies to use lesser-known plant and animal species for production and utilization of alternative clean and environment-friendly fuels. Using recent technologies, efficient use of available energy shall also be a target to maximize energy utilization.

The **Center of Renewable Energy and Alternative Technologies (CREATE) and the Agricultural Engineering and Electrical and Electronics Engineering Programs** shall be the lead conveners. The collaborators are the faculty-researchers from the: College of Engineering and
Research Program on Mathematical and Statistical Sciences Development

The R&D program shall focus on: development of mathematical theories; socio-cultural aspects of mathematics appreciation; science and mathematics teaching strategies; social, ecological and economic applications of mathematics and statistics; modelling to predict future phenomena in agriculture, wood-based industries, mining industry and ecotourism; and mathematical applications to ICT and Engineering.

The Mathematical and Statistical Computing Center (MSCC) and the Mathematics Department of the College of Arts and Sciences (CAS) and the Mathematics Education Program of the College of Education (CE) are the lead conveners. The collaborators are the faculty-researchers/extension workers from the: College of Engineering and Information Technology (CEIT); College of Agricultural Sciences and Natural Resources (CASNR); and CSU-Cabadbaran Campus.

Research Program for Peace and Countryside Development

The R&D program shall focus on: conflict resolution and just dealing with the various sectors of society; development support to various ethnic groups and disadvantaged groups in Caraga Region; observance of values, traditions, practices, mores among various sectors for sustainable rural development; development of education strategies for skills enhancement and livelihood program.

The Social and Languages Department of the College of Arts and Sciences (CAS) is the co-convener. The collaborators are the faculty-researchers from the: College of Education (CE), College of Engineering and Information Technology (CEIT); College of Arts and Sciences (CAS); College of Agricultural Sciences and Natural Resources (CASNR); and CSU-Cabadbaran Campus.

Research Program for Regional Human Capital Development

The R&D program shall focus on: socio-cultural studies of various ethnic groups and disadvantaged groups in Caraga Region; nurturing of appropriate values, traditions, practices, mores, etc for sustainable rural development; ecological and economic implications of indigenous knowledge system (IKS); development of education strategies and pedagogy for basic and functional literacy; and skills enhancement program. It shall also focus on developing instructional materials for in-school and out-of-school learning; and education towards disaster preparedness and emergency response in times of calamity.

The College of Education (CE) is the lead convener. The Social and Languages Department of the College of Arts and Sciences (CAS) is the co-convener. The collaborators are the faculty-researchers from the: College of Engineering and Information Technology (CEIT); College of Arts and Sciences (CAS); College of Agricultural Sciences and Natural Resources (CASNR); and CSU-Cabadbaran Campus.
<table>
<thead>
<tr>
<th>Objectives</th>
<th>KRA</th>
<th>Performance Indicators</th>
<th>Strategy</th>
<th>Action Program</th>
<th>Activities</th>
<th>Tasks</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Y1 Y2 Y3 Y4 Y5
<p>| To improve the research productivity of the university to be at par with global standards | Number of faculty-researchers sent to relevant research capability enhancement workshops and trainings | 20 23 26 29 32 | 1. Capacitate faculty-researchers capable to attract research grants | a) Annual review of the human resource development program to capacitate faculty and staff | Assess the Human Resource Development Plan (HRDP) | - Hire a consultant - Create a Committee to implement the HRDP - Conduct annual assessment of the HRDP | - Budget - Capable people - Time |
| | Number of scholarship/ fellowship availed by R&amp;D workers | 5 5 5 5 5 | b) Strengthen linkages on scholarships/ fellowships for R&amp;D workers training (either degree or non-degree) | Communicate to scholarship/ fellowship sponsors | - Hire a consultant - Assign a staff to write proposals for scholarships - Conduct annual assessment | - Budget - Capable people - Time |
| | Number of collaborative/ multi-disciplinary research conducted | 3 3 3 3 3 | c) Improve capability of faculty through engaging them with a mentor/s | Develop linkages with research institutions | - Hire a consultant - Assign a staff to write proposals for R&amp;D collaboration - Conduct annual assessment | - Budget - Capable people - Time |
| | Number of new spin-off projects | 1 2 3 4 5 | c) Propose for the conduct of spin-off projects on Responsible Mining R&amp;D | Link with research institutions (SMI of Australia, Mining Companies) for funding | - Hire a consultant - Organize the R&amp;D Teams - Proposal writeshop | - Budget - Capable people - Time |
| To modernize the research facilities to increase R&amp;D productivity | Operational R&amp;D Center | 1 | 2. Establish/ Revive Research Center in Caraga Region | a) Establish the Mineral Resources Management R&amp;D Center (MinRes) and Center for Geo-informatics | Implement the Responsible Mining Program | - Hire a consultant - Organize the R&amp;D Teams - Proposal writeshop | - Budget - Capable people - Time |
| | Upgrade and Modernize existing R&amp;D Center | 1 | b) Establish the Caraga Mechatronics and Robotics Research &amp; Innovation Center | Implement the Science, Mathematics and Engineering Development Program | - Hire a consultant - Organize the R&amp;D Teams - Proposal writeshop | - Budget - Capable people - Time |
| | Operational R&amp;D Center | 1 | c) Caraga Institute of Local Governance for | Implement the Program for | - Hire a consultant - Organize the R&amp;D | - Budget - Capable people |</p>
<table>
<thead>
<tr>
<th>Operational R&amp;D Center</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>Countryside Development</th>
<th>Regional Human Capital Development</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) Caraga Center for Environmental Management &amp; Eco-governance (CCESM)</td>
<td>Implement the Environmental Conservation &amp; Ecotourism Development Program</td>
<td>- Hire a consultant</td>
<td>- Organize the R&amp;D Teams</td>
<td>- Proposal writeshop</td>
<td>- Budget</td>
<td>- Capable people</td>
<td>- Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational R&amp;D Center</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>e) Caraga Center for Agricultural Research and Entrepreneurship (Caraga-CARE)</td>
<td>Implement the Sustainable Upland/Lowland Resources Development Program</td>
<td>- Hire a consultant</td>
<td>- Organize the R&amp;D Teams</td>
<td>- Proposal writeshop</td>
</tr>
<tr>
<td>Operational R&amp;D Center</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>f) Establish other R&amp;D centers</td>
<td>Implement the various RDE programs</td>
<td>- Hire a consultant</td>
<td>- Organize the R&amp;D Teams</td>
<td>- Proposal writeshop</td>
</tr>
</tbody>
</table>

To encourage the faculty members to actively engage in R&D

<table>
<thead>
<tr>
<th>Number of plantilla positions acquired based on the number of faculty retirees</th>
<th>6</th>
<th>6</th>
<th>6</th>
<th>6</th>
<th>6</th>
<th>Countryside Development</th>
<th>Regional Human Capital Development</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Sustain the enthusiasm of faculty researchers in the RDE of CSU</td>
<td>a) Provide tenure and adequate training to Qualified Faculty Researchers</td>
<td>Work out for additional plantilla items with DBM</td>
<td>- Write a proposal</td>
<td>- Deliberate with DBM</td>
<td>- Budget</td>
<td>- Capable people</td>
<td>- Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full implementation of incentives -(strategic)</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>b) Provision of incentives &amp; other fringe benefits stipulated in R&amp;D Manual</td>
<td>Improve the Reward System</td>
<td>- Review CSC PRAISE</td>
<td>- Revise the IRR for CSU-PRAISE</td>
<td>- Budget</td>
</tr>
<tr>
<td>(Revised PES instrument) Number of faculty with research component in their IPCR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>c) Revise the Performance Evaluation System (PES) instrument</td>
<td>Implement the RBPMS</td>
<td>- Adopt the RBPMS</td>
<td>- Adopt the SPMS</td>
<td>- Budget</td>
<td>- Capable people</td>
</tr>
<tr>
<td>(Available State-of-the-Art Laboratory Facilities) Number of faculty affiliated to a research center</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>d) Ensure adequate laboratory support for R&amp;D</td>
<td>- Provide annual budget for R&amp;D Facilities</td>
<td>- Strengthen industry-academe partnership</td>
<td>- Allocate annual budget for R&amp;D facilities</td>
<td>- Ensure proper care &amp; maintenance of R&amp;D facilities</td>
</tr>
<tr>
<td>Number of policies formulated and/or amended</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Reduced operating cost</td>
<td>Less 0.5 M</td>
<td>Less 1M</td>
<td>Less 1.5M</td>
<td>Less 2M</td>
<td>Less 2.5M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of journal subscriptions both printed and online</td>
<td>3000</td>
<td>4000</td>
<td>5000</td>
<td>6000</td>
<td>7000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Formulate and/or amend policies to enhance research productivity</td>
<td>Conduct regular policy review</td>
<td>- Conduct annual assessment of the effects of policies to R&amp;D productivity</td>
<td></td>
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</table>

4. Provide efficient and effective administrative support

a) Establish a mechanism to manage research funds & procurement system

Consider outsourcing for managing funds and procurement system for externally funded-research

- Create a Committee
- Conduct annual evaluation of performance

Conduct annual inventory

Conduct annual assessment of the effects of policies to R&D productivity

- Budget
- Capable people
- Time

4. Provide efficient and effective administrative support

b) Improve the library collection/subscription of research journals to sustain the knowledge support to R&D

Create a network with universities and research organizations to have free access of journals

- Require the Colleges/Academic Departments to list down journals for subscription
- Provide annual budget for journal subscription

- Budget
- Capable people
- Time
R&D Operating Procedures

Criteria for prioritization of researches

To prioritize funding and implementation, the OVPRE, CRC, and the Head of Research Centers shall constitute the body that will determine what projects to be implemented each year. The following criteria shall be the basis for prioritization:

a) The R&D program/project shall be within the priority areas as listed in the CSU RDE Agenda
b) The R&D program/project shall exhibit technical feasibility
c) The proponent/s shall manifest capability to carry out the program/project
d) The program/project shall exhibit the urgency and importance of the information/technology that shall be disseminated to the target area.
e) The program/project shall show practicability of timetable and budget.

Conduct of In-House and Other Research Reviews

Annual CSU-wide in-house review shall be conducted every 1st week of July. The purpose of the University-wide research review shall be to present accomplishments and findings of ongoing and completed researches from every college and research center. This forum shall also be the venue to determine possible complementation and integration of research findings of related studies. It is likewise the forum where identification of outputs with potential for commercialization be made.

Monitoring and Evaluation

Monitoring and Evaluation (M&E) shall be an integral component in the conduct and implementation of research, development and innovation projects in the university. In the project M&E, the route of the project proposal evaluation shall be followed. Thus for college-based research, development and innovation projects, M&E shall first be made by the College Research Committee (CRC). Reports of the said M&E at the college level shall be part of the college R&D documents, copies of said reports, however, shall be forwarded to the Office of the Vice President for Research and Extension (OVPRE). At the university level, the OVPRE shall conduct another M&E to ensure the smooth implementation of the projects in accordance with the objectives and principles of the university, and that ethical standards are observed in the conduct of the said projects. Reports of the M&E conducted at the university level shall be submitted to the President, with copies provided to the researchers and the college or research center where the researchers belong.

The OVPRE shall organize an M&E Team to conduct the periodic Monitoring and Evaluation (M&E) of ongoing projects. The criteria and Terms of Reference (TOR) for the evaluation shall be based on the standards as adopted by the University for Quality Assurance. Among the major functions of the team shall be as follows:

f) The team shall conduct monitoring and evaluation of the project’s activity implementation, fund utilization as well as resource generation (if applicable).

The team shall review semestral and annual reports (if applicable) which have been evaluated by the Research and Development Core Group (RDCG) and the VPRE.
h) The team shall focus on the project’s targets and accomplishments, including the financial equivalents of the target activities and the accomplishments.

i) Project visits shall also be done every quarter to actually see how the project runs.

j) The team shall conduct M&E on the basis of the M&E parameters anchored on the project objectives, activities and the targets submitted at the start of each calendar year. This is to ensure that the goals of the project are met.

**Ethical Standards in R&D**

For CSU R&D to be recognized in the science community, basic ethical standards shall be adopted in the conduct of R&D programs and activities. The following areas shall be given emphasis:

**A. Research outputs protected by Intellectual Property Rights (IPR) laws**

The university shall protect the rights of its research and innovation workers through ensuring that all projects shall be subjected to assessment by Intellectual and Technology Support Office (ITSO) for possible patentable outputs. The Intellectual Property Policy, approved by the Board of Regents (BOR), shall provide protection to any R&D output of the faculty-researchers. The IP Policy has been disseminated to the different colleges and copies of the same IP Policies were provided to the colleges as reference of the faculty-researchers and other staff such that transactions related to IP applications shall be facilitated. The Intellectual and Technology Support Office (ITSO) shall facilitate the application of IPR of the faculty-researchers utilizing the forms provided by TDTLO and the Intellectual Property Office of the Philippines (IPOPHIL) for all applications (Patent, Copyright, Trademark, and Industrial Design).

Prior to technical paper presentation, the researchers have to determine with the help of TDTLO, if there are patentable subject matter in the technology produced out of their researches before its publication. Patents and other forms of protection from the research outputs shall be determined at the start of the negotiations and shall be defined in the Memorandum of Agreement/Understanding/Cooperation.

**B. Mechanism to prevent plagiarism and other R&D malpractices**

Periodic seminar-workshops shall be conducted to educate researchers (both faculty and students) on research ethics. Researchers shall be made aware of plagiarism and other common malpractices such as fabrication of data and the corresponding penalty for persons committing these malpractices. Regular M&E shall also be conducted to ensure that ethical standards in the conduct of research are observed.

**C. Other provisions for ethical conduct of research, development and innovation**

The university shall abide by the Intellectual Property (IP) Policy approved by its Board of Regents (BOR). The Policy stipulates the ethical standards in dealing with partnerships and collaborations, consultancies, and other aspects of joint research and innovation. It likewise specifies the ownership of products, patents and other outputs of research and innovations following the ethics of equitable sharing among entities involved in the generation of such outputs.
**Incentives**

**A. Locally-Funded Researches**

Incentives shall be given to those who are directly involved in the University research system. This is to motivate and encourage faculty members to conduct researches. The incentives are as follows:

1. The VPRE, members of the R&D Core Group (RDCG) and College Research/Extension Committees shall be given credit load commensurate to the Full Time Equivalent (FTE) per semester.
2. Honorarium shall be given to the researcher(s) if provision for honorarium is stipulated in the approved budgetary requirements. However, for researches without provision for honorarium, the researchers shall be credited with the following:
   
   3.1. Research Study:  
   3 units credit – for Study Leader of stand-alone study
   
   3.2. Research Project:  
   6 units credit – for the R&D Project Leader
   3 units credit – for Project Team Members
   
   3.3. Research Program:  
   9 units credit – for the Research Program Leader
   6 units credit – for the Research Project Leader
   3 units credit – for Project Team Members

4. Incentives shall only be granted upon submission of required reports and other documents or evidences to the President passing through the CRC, RDCG and VPRE.

**B. Externally—Funded Researches**

For projects with provision for honoraria, the researcher/s shall be given honoraria based on the approved rates. In addition, the principal researcher/s shall be given credit units adopting the credits awarded to researcher/s conducting locally-funded researches. However, for those externally-funded researches where honoraria for researchers are not provided by the funding institution/s, only the credit units given to researchers under the locally-funded researches shall be provided as incentive. Incentives shall only be granted upon submission of required reports and other related documents to the President passing through the channel as stipulated in the route for submission of reports.

**Fiscal Management**

**A. For Locally-Funded Researches**

The project leader or study leader of the approved research shall request for materials and equipment in accordance with the procedures of the University. All fund disbursements shall be in accordance with the approved line item budget (LIB) for research project/s unless budget re-alignment had been approved. To keep track of the project expenses, the project leader shall keep a
copy of all financial transactions of the project.

B. For Externally Funded Researches

The funds shall be transferred to CSU or to a fund management body duly recognized by CSU as a research partner, or directly to the researcher/s, in accordance to the procedures set by the funding agency/ies. CSU or the fund management body or the researcher/s directly receiving research funds shall administer the funds in accordance to government accounting and auditing rules and regulations. All fund disbursement shall be in accordance with the approved budget for the research project(s). All research expenses shall be accounted for in accordance with the procedures set by the funding agency. To keep track of the project expenses, the project leader shall keep a copy of all financial transactions of the project.

REFERENCES

BAS. 2009. Agricultural Statistics, 2009. Published by the Bureau of Agricultural Statistics, Department of Agriculture, Elliptical Road, Quezon City.


Forest Statistics. 2012. Annual Forest Statistics. Published by the DENR, Elliptical Road, Quezon City.


### Appendix 1. SWOT analysis of CSU Research

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td></td>
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</tbody>
</table>
|          | • Trained and qualified faculty to do research in varied disciplines or transdisciplinary researches | • Many of the faculty members who are capable to do research work have overloaded units in instruction  
• Many faculty members are assigned in different functions aside from instruction such as administrative and production functions.  
• Inadequate capability to fund RDE programs | • Strong linkage with some external funding agencies (PCARRD & IRRI) and capability to source out funds from other sources | • Delayed/long waiting period on research implementation due to reliance on external funding |
|          | • Environmental Science as a flagship program | • Bundied clock for faculty- researchers is counter-productive.  
• Limited RDE productivity in terms of packaged technologies | • Partnership with LGU & other GAs & NGOs in almost all areas  
• Supportive local and national political climate | • Brain drain (possibility of job migration among contractual faculty and lecturers with potential for research and extension) |
|          | • Weak Faculty support to the ES program | • Lack of research facilities/equipment – ex. Boat, 4wd utility vehicle, portable field equipment  
• No laboratory rooms and storage of research materials & equipment  
• Not supportive procurement system of research facilities/materials | • Wide laboratory field – the entire Caraga Region | • Other HEIs or organizations may go into research faster than CSU |
### Appendix 1. SWOT analysis of CSU Research and Innovation (continued)

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>• RDE Agenda and Operation Manuals are in place</td>
<td>• Weak influence over mining in the region due to the open mining policy of the government</td>
<td>• LGU code places importance on environmental management</td>
<td>• Policy on legalizing mining activities, which weakens the advocacy of CSU on environmental conservation</td>
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<tr>
<td></td>
<td>• Available internal funds for research capability building and scholarship</td>
<td>• Insufficient RDE internal fund</td>
<td>• Strengthened capability among faculty-researchers to package proposals for bigger external funding</td>
<td></td>
</tr>
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<td></td>
<td>• Existence of CCESM and CCARRD in the university</td>
<td>• Weak implementation of M&amp;E policies</td>
<td>• Broadened linkages in both GA’s and NGO’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Inclusion of research/thesis writing in the different curricular programs</td>
<td>• Inadequate library materials and minimal exchange of publications</td>
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<tr>
<td></td>
<td></td>
<td>• No university RDE journal</td>
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<tr>
<td></td>
<td></td>
<td>• Inadequate evidence of research utilization for institutional development</td>
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<tr>
<td></td>
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<td>• Guidelines and policies not well disseminated</td>
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</tbody>
</table>
Appendix 2. List of Linkages and Partners in R&D Programs

International

1. Minerals and Energy for Development Alliance (MEfDA) formerly the International Mining for Development Center or IM4DC
2. Sustainable Minerals Institute of the University of Queensland (UQ-SMI)
3. Food and Fertilizer Technology Center of Asia and the Pacific (FFTC-ASPAC), Taipei, Taiwan
4. National Pingtung University of Science and Technology (NPUST), Pingtung, Taiwan
5. National Biotechnology Center (BioTec), Bangkok, Thailand
6. Council of Agriculture of Taiwan (CoA)
7. Manila Economic and Cultural Office (MECO), Taipei, Taiwan
8. International Rice Research Institute (IRRI)
9. Wetland Link International – Asia (WLI-Asia)
10. German Technical Cooperation (giz)
11. University of Massachusetts (UMass)
12. Toyo University, Tokyo, Japan
13. Eight-Japan Engineering Consultants, Inc. Tokyo, Japan
14. E’s Inc. Nakano, Tokyo, Japan
15. Oklahoma State University
16. Griffith University, Queensland, Australia
17. Nanyang Polytechnic of Singapore
18. Hitachi GST

National

1. Department of Science and Technology (DOST)
2. Philippine Council of Agriculture, Forestry and Resources Research and Development (PCARRD)
3. Philippine Council for Health Research and Development (PCHRD)
4. Department of Agriculture-Bureau of Agricultural Research (DA-BAR)
5. Department of Agriculture-Agricultural Training Institute (DA-ATI)
6. National Research Council of the Philippines (NCRP)
7. Ilocos Agricultural Resources Research and Development Consortium (ILARRDEC)
8. Cagayan Valley Agricultural Resources Research and Development (CVARRD)
9. Central Luzon Agricultural Resources Research and Development (CLARRDEC)
10. Highland Agricultural Resources Research and Development Consortium (HARRDEC)
11. Southern Tagalog Agricultural Resources Research and Development (STARRDEC)
12. Bicol Consortium for Agricultural Resources Research and Development (BCARRD)
13. Western Visayas Agricultural Resources Research and Development (WESVARRDEC)
14. Central Visayas Consortium for Integrated Resources Research and Development (CV-CIRRD)
15. Visayas Consortium for Agricultural Resources Programs (VICARP)
16. Western Mindanao Agricultural Resources Research and Development Consortium (WESMARRDEC)
17. Northern Mindanao Consortium for Agricultural Resources Research and Development (NOMCARRD)
18. Southern Mindanao Agricultural Resources Research and Development Consortium (SMARDDEC)
19. Cotabato Agricultural Resources Research and Development Consortium (CARRDEC)
20. Commission on Higher Education (CHED)
21. Philippine Association of State Universities and Colleges (PASUC)
22. Philippine Agroforestry Extension and Research Network (PAFERN)
23. Philippine Rice Research Institute (PhilRice)
24. Institute of Electronics Engineers of the Philippines
25. Philippine Computing Society
26. Java Education and Devt. Institute
27. Microsoft, Philippines
28. Geodetic Engineers of the Philippines
29. Philippine Society of Agricultural Engineers (PSAE)
30. Philippine Society of IT Educators (PSITE)
31. Philippine Society of Mining Engineers
32. Institute of Electrical Engineers of the Philippines (IEE)
33. Philippine Institute of Civil Engineers (PICE)
34. Commission on Information and Communications Technology (CICT)
35. Manila Mining Corporation
36. Super Trade Enterprises
37. PHILSAGA, Inc.
38. Mindoro Resources Limited (MRL)
39. Mines and Geosciences Bureau (MGB)
40. Technical Education and Skills Development Authority (TESDA)
41. University of the Philippines-Diliman

Regional

1. Caraga Consortium for Agriculture, Forestry and Resources Research and Development (CCARD)
2. Caraga Health Research and Development Consortium (CHRDC)
3. Caraga Center for Environmental Studies and Management (CCESM)
5. Environmental Management Bureau – 13 (EMB 13)
6. Department of Agriculture Regional Field Unit 13 (DA-RFU 13)
7. Department of Environment and Natural Resources -13 (DENR 13)
8. National Economic and Development Authority-13 (NEDA 13)
9. Department of Health-13 (DOH-13)
10. Department of Social Works and Development-13 (DSWD-13)
11. Department of Tourism 13 (DOT-13)
12. Department of Interior and Local Government-13 (DILG-13)
14. Philippine Rice Research Institute-Agusan (PhilRice-Agusan)
15. Philippine Coconut Authority 13 (PCA-13)
16. Fiber Development Authority 13 (FIDA-13)
17. Hinatuan Mining Corporation (HMC)
18. Taganito Mining Corporation (TMC)
19. Platinum Group Metals Corporation (PGMC)
20. Surigao del Sur State University (SDSSU)
21. Surigao State College of Technology (SSCT)
22. Agusan del Sur State College of Agriculture and Technology (ASSCAT)
23. Surigao del Norte College of Agriculture and Technology (SNCAT)
24. Sandayong Foundation Inc. (SFI)
25. Agri-Aqua Development Coalition (AADC)