

PART 1: EXECUTIVE SUMMARY

PROPOSAL RATIONALE

Mindanao State University - Tawi-Tawi College of Technology and Oceanography (MSU-TCTO)
MSU-TCTO Data Analytics and Modeling Center (DAMC)

THE STRATEGIC GAP

In March 2027, MSU-TCTO will welcome the return of its first DOST-SEI Foreign Graduate Scholar in Informatics and Data Science, having completed PhD studies at Hiroshima University, Japan, and research attachments at Hasselt University (UHasselt), Belgium. This represents a national investment in specialized human capital that requires matching institutional infrastructure to support the scholar's return to active research service at MSU-TCTO.

To fully leverage this advanced expertise, the University requires a high-performance computational research environment. The establishment of the Data Analytics and Modeling Center (DAMC) addresses a strategic gap in the University's research infrastructure, providing the essential tools to translate specialized scholarship into nationally significant research outputs, international scientific publications, and strategic development models for archipelagic regions.

THE PROPOSED SOLUTION: RESEARCH RESILIENCE

This proposal requests the inclusion of an allocation totaling **₱19,524,000.00** in MSU-TCTO's **Institutional Budget Proposal** submission to establish the **MSU-TCTO Data Analytics and Modeling Center (DAMC)** as a permanent institutional asset. The DAMC addresses a critical structural gap, as MSU-TCTO currently lacks the research-grade computing infrastructure necessary to support modern machine learning and Artificial Intelligence (AI) research.

Aligned with the **Philippine Development Plan (PDP) 2023–2028** and the **United Nations Sustainable Development Goals (SDGs)**, the Center directly addresses: **Quality Education (SDG 4)** by providing the foundational infrastructure for the forthcoming BS Data Science program and providing pathways for BS Mathematics and BS Statistics graduates to pursue advanced studies; **Affordable and Clean Energy (SDG 7)** via its hybrid solar infrastructure; **Decent Work and Economic Growth (SDG 8)** by creating high-value R&D jobs; **Industry, Innovation, and Infrastructure (SDG 9)** by providing specialized computational tools; **Reduced Inequalities (SDG 10)** by bridging the technical gap in archipelagic regions; and **Partnerships for the Goals (SDG 17)** through collaborations with national councils, regional ministries, and national and international research networks.

The Center deploys this enterprise-grade infrastructure within a **Research Resilience Framework**. By integrating an Enterprise GPU Server with an autonomous **15kW Hybrid Solar Power Plant (100kWh Storage)** and satellite internet, the Center ensures that MSU-TCTO can sustain competitive research operations independent of local utility limitations. This robust framework supports the scale-up of **University-led research projects** and an **active pipeline of R&D grant proposals** targeted at **national research councils (e.g., PCIEERD, PCHRD)** and **regional ministries**, ensuring a measurable return on investment for the institution from Year 1 of operation.

PART 2: FORMAL PROPOSAL

MSU-TCTO DATA ANALYTICS AND MODELING CENTER (DAMC)

FOR : **Board of Regents**
Mindanao State University System
Mary Joyce Z. Guinto-Sali, PhD
Chancellor, MSU-TCTO

THRU : **Financial Planning Committee**
MSU-TCTO

FROM : **Azman A. Nads**
Faculty Member (On Ph.D. Study Leave), Department of Statistics

DATE : March 23, 2026

SUBJECT : **Institutional Proposal for the Establishment of the MSU-TCTO Data Analytics and Modeling Center (Institutional Budget Proposal)**

I. OBJECTIVE

To establish a permanent computational research facility at MSU-TCTO that (1) serves as a hub for data-driven research for decision-making in archipelagic and island-province contexts; (2) provides the foundational infrastructure for a center of excellence in BS Data Science; (3) facilitates the acquisition of competitive national and regional research grants for the University; (4) connects MSU-TCTO faculty and students with **international research networks** to contribute to the global scientific community; and (5) operationalizes a nationally competitive research program in Informatics and Data Science through localized and expanded research foundations.

I-A. VISION, MISSION, AND CORE OBJECTIVES

Vision

A globally connected, resilient computational research center that supports rigorous research and practical data-driven solutions for the Philippines and the wider international scientific community.

Mission

The DAMC provides high-performance computing infrastructure to advance research, graduate training, and inter-institutional collaboration in data science, machine learning, and AI at MSU-TCTO and beyond.

Core Objectives

- Conduct and support applied research in data science, machine learning, and AI with direct relevance to regional and national priorities across multidisciplinary domains, including public health, fisheries, biodiversity, governance, and other data-intensive research areas.
- Train graduate and undergraduate researchers through mentorship, thesis supervision, and capacity-building activities.

- Attract and implement research grants from national councils and regional ministries to sustain Center operations and expand its research portfolio.
- Build and maintain active collaborations with other SUCs, national agencies, BARMM ministries, and international universities.
- Serve as a shared computational resource for MSU-TCTO faculty, students, and authorized external researchers.

II. PROPOSED INFRASTRUCTURE

Table 1: Infrastructure Requirements

No.	Item & Specifications	Research & Academic Purpose	Est. Cost (P)	Service Life
1	Enterprise AI GPU Server Dual NVIDIA RTX 6000 Ada (96GB GPU Memory [VRAM]), 256GB Random Access Memory (RAM), 4TB Non-Volatile Memory Express (NVMe) Solid State Drive (SSD)	Primary computing engine for 24/7 high-intensity research in ML, LLM, and emerging technologies. Provides the specialized power required for advanced research in regional and national priorities across multidisciplinary domains (e.g., public health, fisheries, biodiversity, governance) that cannot be executed in standard university laboratories.	P1,500,000.00	7–10 Years
2	1x Advanced Modeling Station Apple Mac mini M4 Pro or latest, 64GB Unified Memory, 2TB SSD; inclusive of professional-grade 27" High-Definition monitor (non-Apple) and peripherals	High-end workstation for advanced research modeling, algorithm development, and performance benchmarking across diverse research themes (including public health, fisheries, biodiversity, and other data-driven fields) for university research projects and specialized technical workflows.	P290,000.00	8–10 Years
3	20x General Student Lab Stations Apple Mac mini M4, 16GB Random Access Memory (RAM), 512GB SSD; inclusive of 20x 24" High-Definition Monitors (non-Apple) and precision peripherals	Workstations supporting research projects in data science, ML, and emerging technologies. Available to supervised researchers and students for advanced coursework and training in AI applications for multidisciplinary domains—beyond standard lab capacities.	P2,600,000.00	8–10 Years
4	1x Administrative Workstation Apple Mac mini M4, 16GB RAM, 256GB SSD; inclusive of 24" High-Definition Monitor and peripherals	Dedicated terminal for Center administration, procurement coordination, and general office productivity for the DAMC personnel.	P130,000.00	8–10 Years

5	15kW Hybrid Solar Power Plant 15kW Panels, 100kWh LiFePO4 Battery, 20kW Hybrid Inverter; includes installation labor, marine-grade mounting hardware, and battery room construction	Ensures 24/7 autonomous uptime. Engineered for 3–5 days of energy autonomy during low solar yield. Includes specialized installation labor, marine-grade mounting hardware for coastal protection, and dedicated battery room construction.	P4,500,000.00	15–20 Years
6	Starlink Business & Networking Satellite Kit, 24-Port Switch, Server Rack	Guarantees connectivity for downloading ML models and accessing research databases.	P440,000.00	5–7 Years
7	Visual & Printing Suite High-Definition Laser Projector, Enterprise A3/A4 Laser Printer	Tools for thesis defense, workshops, high-volume documentation, and technical meetings.	P400,000.00	7–10 Years
8	Technical Retrofitting, Laboratory Configuration, CR & Pantry Specialized fit-out of the facility including technical partitions (two-room configuration), anti-static flooring, and biometrics	Specialized fit-out of the administratively assigned facility including technical partitions (two-room configuration), anti-static flooring, biometrics, precision electrical retrofitting, and the construction of a dedicated comfort room (CR) and pantry for research personnel. Required for manufacturer warranty compliance and in preparation for CHED COE application. The CR and pantry are essential for a facility designed for sustained 24/7 research operations with 21 or more personnel.	P4,500,000.00	20+ Years
9	Precision Climate Control & Dehumidification 2x 2.0 HP Split-type Inverter AC; Industrial-grade Dehumidifiers	Critical heat dissipation and humidity management for electronics in coastal environments. Optimized for the two-room partitioned configuration.	P400,000.00	7–10 Years
10	Operations, Maintenance, Consumables, Lab Essentials & Office Supplies Surge Protectors, 40TB RAID Backup, 3-Meter Professional Whiteboard, Water Dispenser, high-capacity toner kits, premium A4/A3 paper, and specialized laboratory climate-sensitive consumables	Daily operational tools for data redundancy, documentation, and lab occupational comfort. Includes essentials for multi-device connectivity, surge protection, high-volume academic printing/archiving, and operational endurance for research personnel during extended computational cycles.	P1,200,000.00	1–3 Years

11	Ergonomic Workstation, Storage & Lab Interior 10x Long Research Tables (2-pax), 1x Standard Admin Desk, 21x task chairs, secure lockers, and Lab-grade Anti-static Floor Carpeting	Specialized furniture and interior surfacing for 21 personnel, essential for occupational health. Anti-static carpeting is a technical requirement for protecting high-value hardware from electrostatic discharge (ESD).	P700,000.00	10–15 Years
12	Document Storage & Filing System Steel filing cabinets (4-drawer), bookshelves, and document lockers	Steel filing cabinets (4-drawer), bookshelves, and document lockers for research records, grant documents, and administrative files.	P195,000.00	10–15 Years
13	Conference & Meeting Furniture 1x rectangular conference table (8-pax), 8x conference chairs, and a presentation board	1x rectangular conference table (8-pax), 8x conference chairs, and a presentation board for research meetings, thesis defense panels, and inter-agency coordination.	P260,000.00	10–15 Years
14	Fire Suppression & Security Suite Electronic Clean-Agent Extinguishers, Professional Security IP Camera Suite	Essential protection for high-value hardware and 24/7 autonomous operations.	P325,000.00	10–15 Years
15	Structured Cabling & Signal Distribution Cat6a Shielded Cabling, Patch Panels, Managed AV Switching	Professional networking core required for high-speed local data transfer and LLM training.	P260,000.00	10–15 Years
16	Digital Engagement & Facade Suite Outdoor Smart Bulletin Board, 75" High-Definition Internal Display TV	External research dissemination and internal real-time monitoring of center computational tasks.	P494,000.00	7–10 Years
17	LLM Research & API Subscription Suite OpenAI, Anthropic, & Frontier Model API Credits (3-Year Block)	Access to proprietary frontier models for benchmarking, synthetic data generation, and comparative analysis.	P400,000.00	3 Years

18	Contingency Fund 5% of total direct project cost (P18,594,000.00)	Covers unforeseen price adjustments due to USD/PHP exchange rate fluctuations on imported hardware components (GPU server, workstations, solar inverter), variation in professional installation labor costs in a remote island province, and minor scope adjustments during procurement and fit-out.	P930,000.00	N/A
TOTAL PROPOSED BUDGET			P19,524,000.00	

The Center directly supports MSU-TCTO's research mandate by providing the computational foundation for growing research projects, inter-SUC collaborations, and international university partnerships, while positioning the institution to compete for grants from national research councils (e.g., PCIEERD, PCHRD) and regional ministries.

III. JUSTIFICATION

The national investment in the specialized doctoral-level expertise of MSU-TCTO's research personnel requires matching research infrastructure to be fully operationalized. The institution is receiving a nationally funded specialist whose productive deployment requires matching infrastructure.

Informatics and Data Science research, specifically the training of Large Language Models (LLMs) and the development of complex Machine Learning (ML) architectures, involves high-intensity computational tasks that require continuous, 24/7 server uptime. These processes often involve multi-day computational cycles that cannot be sustained on standard desktop computers or general-purpose office hardware. High-performance computing is an operational prerequisite for advanced research; without this dedicated infrastructure, the technical expertise acquired through international doctoral training cannot be functionally deployed to address national and regional challenges in a globally competitive manner.

The selection of **Apple Mac mini (M4/M4 Pro)** hardware is a deliberate technical choice based on three primary factors: (1) **Unified Memory Architecture**, which provides the high-bandwidth throughput required for local data science prototyping and model inference; (2) **Industry-leading Performance-per-Watt**, which is mission-critical for maintaining operations under the Center's solar-powered framework; and (3) **Workflow Continuity**, as it aligns with international research standards and the established workflows of doctoral training programs.

The facility's resilient power design is engineered for a concurrent peak load of approximately 5.8kW, comprising the GPU server (1kW), 22 specialized workstations (1.3kW), High-Definition (HD) visual systems (0.5kW), and precision climate control (3.0kW peak). The **15kW solar capacity** and **20kW hybrid inverter** provide a substantial safety margin for simultaneous system startups and rapid battery replenishment. Crucially, the **100kWh LiFePO4 battery storage** provides several days of operational autonomy, ensuring that multi-day LLM training cycles remain uninterrupted even during extended periods of inclement weather and low solar irradiance (common in the archipelagic context of Tawi-Tawi). By leveraging the global open-source ecosystem (R, Python/PyTorch, and Linux), the Center minimizes recurring software licensing costs.

Budgetary and Operational Justification: The proposed budget of **P19,524,000.00** is a strategic estimation that accounts for current market volatility and **inflationary pressures** on high-precision imported hardware and specialized components. All item costs have been

revised upward to account for professional labor, delivery charges, and inflation on imported and specialized components. This total includes a **5% contingency fund** (P930,000.00) to cover unforeseen price adjustments due to USD/PHP exchange rate fluctuations on imported hardware components (GPU server, workstations, solar inverter), variation in professional installation labor costs in a remote island province, and minor scope adjustments during procurement and fit-out. Crucially, the estimates include **professional labor costs** for the expert installation of the hybrid solar power plant, precision electrical and anti-static retrofitting, and the structured networking required for server-grade operations. This ensures that the facility is not only equipped with high-durability hardware but is also technically certified and operationally ready.

IV. IMPLEMENTATION TIMELINE

- **Institutional Budget Proposal Cycle:** Inclusion in the University's national budget submission to the DBM.
- **Q4 2026:** Commencement of **Early Procurement Activities (EPA)** per DBM Circular Letter No. 2018-8 (Bidding for 2027 infrastructure conducted prior to budget approval).
- **Q1 2027:** Awarding of contracts, laboratory renovation, and system integration.
- **March 2027:** Official inauguration and activation of continuous computational research capacity.

V. CONCLUSION AND INSTITUTIONAL IMPACT

V-A. OPERATIONAL LEADERSHIP AND INSTITUTIONAL CONTINUITY

The DAMC is designed with a multi-tiered leadership and operational structure to ensure long-term sustainability and institutional growth. The Center's continuity is anchored by a permanent technical and administrative team, independent of any single researcher. To ensure technical and operational longevity, the Center is supported by:

- **Directorship:** The Center shall be led by a Director with specialized doctoral-level training in Informatics, Data Science, or a related computational field. The Director provides the strategic research vision, ensures the high-performance operationalization of the facility, and facilitates international and inter-agency research collaborations.
- **One (1) Technical Operations Specialist:** (Degree in IT, Computer Engineering, or Computer Science) responsible for high-performance server maintenance, network management, and solar power plant optimization.
- **One (1) Research Associate:** (Bachelor's degree in Statistics with a Master's degree in a related field) responsible for technical research coordination, data quality oversight, and inter-agency project management.
- **One (1) Administrative Assistant:** Responsible for general administrative operations, clerical support, and procurement coordination within the Center.
- **Founding Research Personnel:** The Center's technical research workflows and the initial grant pipeline will be operationalized through the return-service of doctoral personnel specialized in Informatics and Data Science, ensuring the institutionalization of advanced research methods from Year 1.

This structure ensures that the DAMC functions as a permanent institutional asset. As the planned BS Data Science program is established and matures, the facility will accommodate additional faculty researchers, graduate assistants, and international collaborators, evolving into a distributed hub of technical capacity for the University.

V-B. COST-BENEFIT ANALYSIS AND NATIONAL/REGIONAL IMPACT

The P19,524,000.00 capital investment is expected to generate returns across three dimensions:

1. **National and Regional Research Grant Acquisition:** Positions MSU-TCTO to secure projects from national R&D councils (e.g., PCIEERD, PCHRD) and regional ministries. A successfully funded grant that offsets the capital investment represents a measurable return within the project period.
2. **Institutional Development:** Supports the forthcoming BS Data Science program, improves SUC Leveling, and targets CHED COE status.
3. **National and Regional Contributions:** Provides data-driven insights and evidence-based models for fisheries, public health, and biodiversity that contribute to national baseline datasets (BFAR, DOH, DENR) and regional governance in coordination with **national agencies, BARMM ministries, and international research partners.**

V-C. DISTINCTION FROM THE PHILIPPINE DIGITAL INFRASTRUCTURE PROJECT (PDIP)

This proposal may be evaluated alongside or compared to the Philippine Digital Infrastructure Project (PDIP), the P16.1 billion flagship initiative of the Department of Information and Communications Technology (DICT). The distinction is fundamental: the PDIP provisions broadband connectivity infrastructure (fiber backbone, middle-mile and last-mile networks). This proposal provisions **specialized AI research infrastructure**, equipment that the PDIP is neither designed nor budgeted to cover.

Specifically, the Enterprise AI GPU Server (Item 1) requires dual NVIDIA RTX 6000 Ada graphics processing units with 96GB of GPU Memory (VRAM), hardware with no equivalent in any existing MSU-TCTO facility and no counterpart in standard ICT provisioning. This machine is purpose-built for training large-scale machine learning models, a task that standard office computers and ICT-provisioned desktops cannot perform. The 15kW Hybrid Solar Power Plant (Item 5) is likewise outside the scope of general ICT. It is research resilience infrastructure that protects sensitive computing hardware from Tawi-Tawi's documented grid instability and ensures that multi-day model training tasks are not disrupted by local power failures.

In summary, this proposal addresses a specialized research computing gap that the PDIP does not cover. The two are complementary investments: one provisions national broadband connectivity, while the other equips MSU-TCTO with the computational tools required to conduct advanced data science research and graduate training.

V-D. FINANCIAL SUSTAINABILITY

The DAMC is designed for long-term operational continuity without requiring recurring institutional subsidies. Sustainability rests on three pillars:

1. **Research Grant MOOE as Primary Operating Revenue:** Active and pipeline research projects funded by national research councils (e.g., PCIEERD, PCHRD) and regional ministries carry Maintenance and Other Operating Expenses (MOOE) budgets that

cover cloud computing, consumables, and hardware maintenance. Recurring satellite internet fees will be absorbed by active grant projects, ensuring no additional institutional appropriation is required beyond the initial capital outlay.

2. **Solar Infrastructure Eliminates Recurring Utility Costs:** The 15kW Hybrid Solar Power Plant eliminates electricity as a recurring operational expense. For a facility running 24/7 high-intensity computing, this represents the single largest cost avoided annually, ensuring operational continuity independent of grid tariff increases.
3. **Open-Source Software Stack Eliminates Licensing Fees:** The Center's research workflows are built entirely on the open-source ecosystem (R, Python/PyTorch, Linux), with zero recurring software licensing costs. Proprietary frontier model API credits will be renewed through active research project MOOE allocations.

Beyond financial sustainability, the Center is institutionally anchored through its role as a regional hub for data-driven research. Its role in supporting the forthcoming BS Data Science program and regional governance ensures that the Center remains a permanent and active institutional asset of MSU-TCTO.

By approving this **₱19,524,000.00** allocation under Institutional Budget Proposal, MSU-TCTO ensures that the expertise developed abroad is operationalized from Day 1 of the facility's activation, generating research outputs, grant income, and institutional capacity for the University and the Bangsamoro region.

Respectfully,



AZMAN A. NADS

Faculty Member, Department of Statistics
College of Mathematical Sciences, MSU-TCTO
(On PhD Study Leave, DOST-SEI FGS and APDP Grantee)

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