PROJECT PROPOSAL

I. PROJECT PROFILE	
A. Title of the Project	Design, Development, Test and Utilization of Bamboo (*Kawayan tinik and Patong*)-Laminated Tabletops for Student Desks and other Furniture
B. Proponent	Romblon State University, Office of the VPRED
C. Project Cooperators	Selected bamboo farmers with *kawayan tinik* and *patong* stands
D. Project Duration	1 year project implementation 2 years monitoring of outcomes
E. Total Project Cost	**PhP 976,236.00** DOST MIMAROPA - PhP 814,600.00 RSU – PhP 161,636.00
II. PROJECT PROPOSAL	
A. Rationale	Plastic armchairs are common school furniture. These armchairs are probably the cheapest furniture schools could buy at the moment but are not the best furniture for the students. One reason is that the arms are narrow and could not hold much that a student would need like laptops or large notes or ledger books. Second, the position either to the right or left puts the student in an awkward stance that could permanently ruin his/her posture. Third, it is hard to repair when broken and will lie in a trash heap forever. School desks in the past were made of solid wood. The desks in the Gabaldon Buildings were sturdy, with wide tabletops and allow students to have correct posture. Unfortunately, wood is hard to find now that is why manufacturers turn to alternative materials like plastic. Desks of metal and wood are now common too. Desks with legs made of steel and tops made of solid wood, plywood, particleboards and plyboards have found their way in classrooms. One alternative for table tops could be bamboo. Strips laminated into a plywood base could increase the thickness of the board thereby making it sturdy without so much expense. One half-inch plywood could be laminated with ¼-inch bamboo strips to get ¾-inch boards. Cost for this could be lower as the price for a ¾-inch plywood is more than double the price for ½-inch plywood. Mass production may be done to bring the cost further down. This research proposal intends to come up with bamboo-laminated boards that may be used in school desks. It also intends to determine the physical and mechanical properties of the developed boards to be able to get baseline data that may be used in other researches. Moreover, the research will test the finished product for durability, cost-effectivity and appropriateness as school furniture. Romblon has an undetermined area of bamboo stands. The material, however, is widely used for building houses and for furniture. Kawayan tinik and patong are used generally for the purpose. In Odiongan alone there are about 30 furniture makers that deliver their products to the furniture stalls at the market. Odiongan and San Andres have known plantation for Beema bamboo that was intended for biomass production for energy generation. The specie may also be used as parquet for floors. Recently giant bamboo

	(*Dendrocalamus asper*) is being introduced in Romblon.
B. Project Description	The research will come up with laminated boards for desks and other furniture. These laminated boards will be made using local bamboo species *kawayan tinik* and *patong.* These boards will be used to make student desks so as to comply with Executive Order 879 s. 2010 that states 25% bamboo material should be incorporated in the design of student desks and school furniture. Tests will be made for specimens in conformity with ASTM standards. Tests will also be made on the finished products to measure its strength and durability at DOST-FPRDI. Spin off will be made through the RSU school factory and will be utilized by different delivery units of RSU.
C. Objectives	The general objective of this research is to develop bamboo laminates for use as desktops, tabletops and other furniture. Specifically, it intends to: • design and develop bamboo plywood laminates from two bamboo species (*kawayan tinik* and *patong*) common in Romblon; • test the physical and mechanical properties of the developed bamboo laminates and compare these properties with standard plywood, plyboards or fiberboards of the same dimensions at DOST-FPRDI; • test the developed desks and tables for durability, cost-effectiveness and appropriateness as school furniture; and • generate 6 Ps (Product, Protection, People Services, Partnership ,Publication, and Policy).
D. Methodology	*Kawayan tinik* and *Patong*, two important species locally, will be used. Three-year old stands will be harvested for the purpose. Culms will be cut, sliced, treated, dried, thickness planed, applied glue on, arranged into parallel slices with a ½-inch plywood backing, then set in a hot hydraulic press. These processes will be conducted at the woodworking school factory of the RSU-CET. The output will be bamboo laminated boards made from the two species. These boards will be made into table tops for desks and office tables with metal frames. Finishing will follow to arrive at the completed product. Sample 1”x1”x14” specimens will be created for testing. The test will be adapted in conformance with the ASTM standards for testing clear wood specimens. The modulus of elasticity, force at elastic limit, stress at elastic limit, modulus of rupture, and maximum force will be evaluated and compared against the same properties for plywood, plyboards, and medium density fiberboard of the same dimensions. Samples will also be tested for their physical properties like density, specific gravity, moisture content, shrinkage and swelling. Tests will also be made for the final products. Product samples will be brought to the DOST-FPRDI Furniture Testing Laboratory and tested for stability, durability in accelerated tests and appropriateness as school desks and furniture. A benchmark test would be made for a desk and office table with plywood as tabletop. Cost analysis in producing the laminates will be made.
E. Business Plan	A simple cost analysis would show that if one will use ½-inch plywood at P1,000 each versus the ¾-inch plywood that cost P2,580 and add the PVC paper finish (P12.50), savings per tabletop will be P144. Cost of bamboo (P34/tabletop,tt), labor (P40/tt), chemicals (P15/tt), utilities (10/tt), finishing (P20/tt) would bring the price of bamboo-laminated boards to P119 per tabletop. This is way below

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<tr><td></td><td>the savings so the operator could still save the amount due to replacement of raw material used (P25/tt). These assumptions were based on facts that the bamboo could be cut for 15 pieces for the needed laminate length and split at 8 pieces per cut. It was also assumed that a single laborer could process 2 culms per day. Even if the operations would breakeven there are still many ways where the project would be advantageous. A highly renewable resource is used, dependence on wood for furniture is reduced, additional livelihood for farmers is created and more aesthetically designed school furniture may be enjoyed by students.

The research will be spun off to the RSU-CET woodworking school factory or to any taker especially from the furniture industry. But before this would be spun off, intellectual property for patent, utility model, industrial design (whichever will apply) will be made first. Spinning off will be governed by the technology transfer manual of the university, if existing. Otherwise, the school factory will be utilizing the design and process for the benefit of the university. The researchers may be allowed to share profits from operations as defined by the IGP manual of the university.</td></tr>
<tr><td>F. Activity Schedule</td><td>The following timetable will be followed:

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<tr><th rowspan="2">Activity</th><th colspan="2">2020</th><th colspan="4">2021</th><th>2022</th></tr>
<tr><th></th><th>3Q</th><th>4Q</th><th>1Q</th><th>2Q</th><th>3Q</th><th>4Q</th><th></th></tr>
<tr><td>Consultation and meetings</td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Project proposal preparation</td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Project proposal review</td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Revision, approval and MOA signing</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Fund release</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Procurement of equipment and supplies</td><td></td><td>x</td><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Implementation</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Completion & report preparation</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>Generation of 6 Ps</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>Liquidation</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>Report presentation</td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td></tr>
<tr><td>Monitoring</td><td></td><td></td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td></tr>
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Monitoring and evaluation would be made by the PSTC so that the performance objectives may be assessed.</td></tr>
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<tr><td>G. Budget Breakdown</td><td>The following line-item-budget would be followed for the project:

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<tr><th>ITEM</th><th>DOST-GIA (P)</th><th>RSU (P)</th></tr>
<tr><td>Personal Services
Honorarium for researchers (@P1400/day x 2 days/ week x 2 weeks/month x 12 months x 2 researchers)</td><td>134,400</td><td>91,636</td></tr>
<tr><td>MOOE
Travel
Representation, training & meeting
Transport Cost
Supplies & Materials
Test Fee (FPRDI)</td><td>
13,200
12,000
15,000
70,000
52,000</td><td>
60,000

10,000</td></tr>
<tr><td>Equipment Outlay
1 unit Pole Cutter/ Bamboo Cut-Off Saw w/ one extra blade
1 unit Bamboo Slicer w/ one extra blade
1 unit Thickness Planer</td><td>
50,000

238,000
230,000</td><td></td></tr>
<tr><td>Existing equipment and facilities at the WSF</td><td></td><td>(2,200,000)</td></tr>
<tr><td>Total</td><td>814,600</td><td>161,636</td></tr>
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The RSU counterpart would be travel of faculty to present the paper and office supplies for preparation of manuscript, reports and liquidation.</td></tr>
<tr><td>H. Project Management</td><td>The research will be implemented by the Office of the Vice President for Research, Extension and Development in cooperation with faculty from the RSU-CET. The PSTC Romblon would collaborate with the regional office in the purchase of equipment and in other aspects of project implementation.</td></tr>
<tr><td>I. Expected Output</td><td>Products. The products that would come out from this research will be the laminated boards that will be used for desks and tables with corresponding specifications as per tests conducted. The documented production process will also be one product so that spinning off of the technology will be facilitated.

People. One master’s degree graduate will be considered for this research. This will come from a faculty co-operator of this research and this will also open opportunities for bamboo farmers in the province.

Places and partnerships. Partnerships with FPRDI for similar project will be made. Industry partners in the furniture sector will also be tapped.

Publication. At least one paper for publication in a Scopus- indexed journal will be considered. Another knowledge product that could be copyrighted is the documented process for producing the bamboo laminates.

Protection. An application for patent, utility model or industrial</td></tr>
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	design, whichever is applicable, for the protection of intellectual property will be made. *Policy*. Once implemented and spun off, a policy for using bamboo as reforestation specie for the national greening program will be lobbied in the local governance.
J. Monitoring and Evaluation	Monitoring and evaluation will be made by the DOST PSTC Romblon. M&E will be centered on project deliverables as listed in the expected output.

Prepared by:

BILSHAN F. SERVAÑEZ
VPRED, RSU