



LONG TERM EVALUATION OF A MODIFIED WINDPUMP FOR DOMESTIC AND AGRICULTURAL APPLICATIONS

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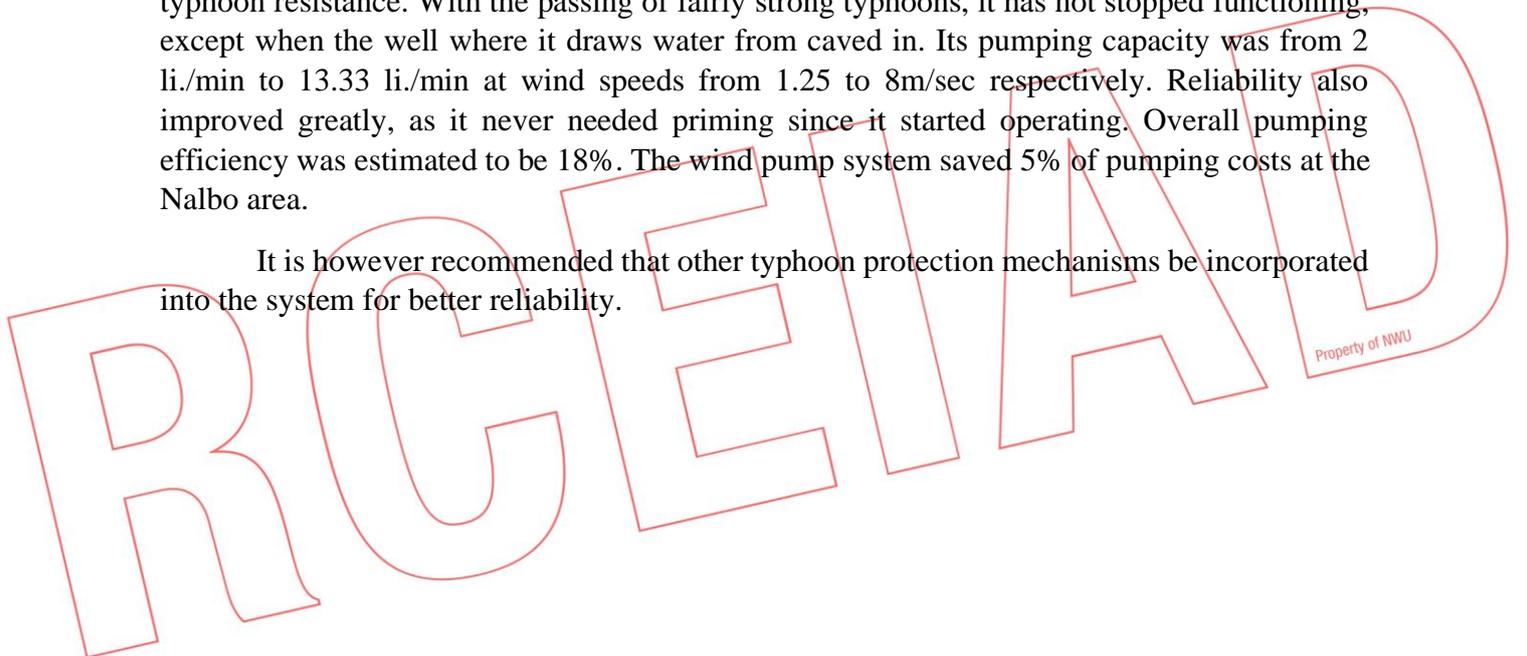
An eight-bladed, horizontal axis, vane type windmill for water pumping was designed, constructed and installed by a group of researchers led by Dr R.P. Bareng at the Nalbo area of Northwestern University in 2004. However, after operating for about a month, it was hit by a strong typhoon which destroyed some parts, rendering it in operational until it was rehabilitated with some modifications in 2007. The purposes of modification were to make it stronger against typhoons and to improve its reliability to pump water any time the rotor starts rotating.

The modifications included a change of rotor shaft bearing from pillow block to thrust bearings to prevent the rotor assembly from being pushed backward until the blade touches the perch. When this happens, the blades are ripped apart, as what happened when it was hit by a strong typhoon. Another modification was to make the angle of twist of the blades constant from base to tip, which was set at 30 degrees. The arm was also lengthened to 10.6 cm to give a longer pump stroke to improve pumping capacity.

To improve its reliability, a submersible pump replaced the suction type pump. This eliminated the frequent priming of the suction pump, which lost its prime every time there was a long lull in the wind.

Testing from July 2007 to the present showed great improvement in the windmill's typhoon resistance. With the passing of fairly strong typhoons, it has not stopped functioning, except when the well where it draws water from caved in. Its pumping capacity was from 2 li./min to 13.33 li./min at wind speeds from 1.25 to 8m/sec respectively. Reliability also improved greatly, as it never needed priming since it started operating. Overall pumping efficiency was estimated to be 18%. The wind pump system saved 5% of pumping costs at the Nalbo area.

It is however recommended that other typhoon protection mechanisms be incorporated into the system for better reliability.





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