VANUATU
SHELTER CLUSTER
Coordinating Humanitarian Shelter and Settlements

Shelter Cluster Vanuatu

Market Assessment – Building materials

Earthquake 24

Shelter Cluster Vanuatu
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Market Assessment Study: Hardware and Building Products for Earthquake Recovery in Vanuatu

1. Introduction

On December 17, 2024, Vanuatu experienced a devastating 7.3-magnitude earthquake centered near its capital, Port Vila. The disaster resulted in at least 14 fatalities, over 210 injuries, and extensive damage to infrastructure, including homes, hospitals, and commercial buildings.

The United Nations estimated that approximately 116,000 people, nearly a third of Vanuatu's population, were directly affected by the earthquake. The economic impact is substantial, with direct damages estimated at US$197 million, equivalent to 17% of Vanuatu's 2023 GDP.

A critical component of the recovery process is the availability and accessibility of hardware and building products necessary for rebuilding infrastructure and housing.

The UNDP Structural Engineer, Terry Lancashire, was requested to undertake a rapid hardware market assessment survey. This was conducted in cooperation with the Vanuatu Red Cross, identifying Vanuatu Red Cross Shelter Cluster preferred hardware suppliers as the target.

The survey is not comprehensive but was undertaken to inform Shelter Cluster stakeholders of potential recovery packages and the availability of common building materials and hardware supplies in the current market in Vanuatu. It assesses supply capabilities, demand projections, and potential challenges.

2. Pre-Earthquake Market Overview

Before the earthquake, Vanuatu's construction industry relied heavily on imported building materials due to limited domestic production. Commonly used materials included:

- **Cement and Concrete Products:** Primarily imported from countries like Australia and China.
- **Timber:** While Vanuatu possesses forest resources, a significant portion of high-quality timber is imported to meet construction standards. It is the authors opinion that the majority of the timber is imported from New Zealand and it is generally treated to a durability hazard rating of **"H3.2" in treated timber** refers to a hazard class, indicating the timber is suitable for above-ground, weather-exposed applications, or where moisture entrapment is a concern, typically treated with Copper Chrome Arsenate (CCA), but also suitable for non-structural ground contact in some cases, ensuring long life and minimal maintenance.

  Design solution will need to be resolved to address this supply issue with typical house construction methodologies relying on timber posts with an embedment in the ground to provide stability.

- **Steel and Metal Products:** Entirely imported, with applications in structural frameworks and roofing.
- **Steel reinforcement:** Steel reinforcement size and grade varied – 6 mm and 10 mm non-structural grade and Y12,Y16 , Y20 deformed bars were also available. the actual grade of the deformed bar needs to be confirmed.

- **Plumbing and Electrical Supplies:** Sourced internationally, adhering to global standards large and varied stock is available.
- **Hardware Tools :** A large and varied array of miscellaneous hardware products , power tools and hand tools is available.

Local production was limited to small-scale operations producing items like bricks and basic carpentry materials and quarry products. Concrete batching plants were observed but are unlikely to be used in shelter recovery efforts The market was characterized by a few dominant suppliers, with distribution networks concentrated in urban centres, particularly Port Vila and Luganville.

A durability hazard rating H3.2" in treated timber is not considered suitable for embedment in the ground. Timber posts embedded in the ground are typical of the modality of construction for a number of the DUAP Vanuatu Housing Construction Typologies assessed in the UNDP HBDA.

Collar protection with higher cement content concrete for timber posts embedded in the ground needs to be introduced to typical building practices in Vanuatu. Strong consideration of increasing the embedment depth of embedded posts from 50cm to 75 cm is recommended.

3. Post-Earthquake Demand Surge

The earthquake has precipitated a demand that is hard to quantify for building materials, driven by the need to reconstruct. Full demand load will not be revealed until reconstruction activity starts in the Port Vila red Zone:

- **Residential Buildings:** Thousands of homes are damaged or destroyed, necessitating extensive rebuilding with financial support from Shelter packages.
- **Commercial Structures:** Significant damage to businesses requires reconstruction to revive economic activity.
- **Public Infrastructure:** Schools, hospitals, and government buildings need urgent repairs to restore essential services.

A surge in demand does not appear to have strained existing supply chains now, there does not appear to be any material shortages, but there have been reports of increased prices.

4. Supply Chain Challenges

Several factors have exacerbated supply chain disruptions:

- **Port Infrastructure Damage:** The earthquake inflicted significant damage on Port Vila's infrastructure, this may hinder the importation and distribution of materials.
- **Transportation Network Disruptions:** Damaged roads and bridges may impede the movement of goods within and around Efate. Supply chains to other islands have not been examined. Tropical cyclone season may disrupt sea lane logistic in the future.
- **Increased Global Demand:** Simultaneous reconstruction efforts in other disaster-affected regions may heighten global demand for construction materials, leading to supply constraints.
- **Currency Fluctuations:** Depreciation of the Vanuatu vatu may make imports more expensive, impacting the affordability of materials. This is an issue not examined in detail

5. Product Availability

Two products the UNDP- Structural Engineer has been able to identify is the local availability of the Pryda New Zealand range of products or equivalent (Mitek) . Examples are :

- Pryda NZ CYCLONE STRAPS – Product Code MPQHS6, QHS9
- Pryda NZ EZI STUD TIES - Product Code SST
- Pryda NZ MULTIGRIPS - Product Code MPMG, MG/S, MPMGL
- Pryda NZ CONCEALED PURLIN CLEATS – Product Code NPPC4, NPPC6, NPPC8, NPPC4/S, NPPC6/S, NPPC8/S
- Pryda NZ Pryda fasteners -Pryda 12G x 35mm Timber Connector Screws. Pryda 35 x 3.15mm Timber Connector Nails. 14G x 75mm Type 17 Hex Head Screws.
- Pryda NZ Z and U Nails -Product code 5mm Mild Steel Wire to AS2334-1980 or Stainless Steel 304
- NZ PRYDA BRACING ANCHOR (PBA) -Product Code PBA
- NZ STRAP BRACE AND MAXI STRAP -G550 or Stainless Steel 304 - 0.8 mm
- Maxi Strap is 50mm x 0.8 , Strap Brace 25 mm x 0.8
- Pryda 2 X WING NUTS, 2 X WASHERS, 2 X T-BOLTS, AND TENSIONER FOR G550 Z275 MAXI BRACE for tensioning
- Pryda 35 x 3.15mm Timber Connector Nails

Full range of Pryda-engineered and certified products are available here , another source is Mitek

https://www.pryda.co.nz/pryda-resources/

https://www.mitek.com.au/specifiers-and-codes/

Pryda/Mitek has developed over many years, load-certified timber connection building products that can be used in engineering solutions for both domestic and commercial building applications. Pryda is not the only company that has done this, I have used them as an example of one such company.

In the engineered application of DUAP and Vanuatu PWD typology model houses, the engineered strength capacity of all connections to determine a reliable load path is critical to be determined in both the design phase and the construction phase.

The disadvantage of both products is that they may be considered to be more expensive for community households struggling with recovery costs and the need for power tools to install the screws. However, a cost price check has revealed the cost of the MyTek cyclone straps available in Port Vila to be in the range VT135 – VT 215 so a community awareness campaign is encouraged for the use of these products.

The other important product is the Buildex range of screws and fittings. The capacity of screws in timber connections through a metal side plate is exponentially greater than common nailed joints. The capacity of a nailed connection through a metal side plate is twice that of timber to timber nailed connection.

6. Indigenous Building Materials and Techniques

In light of these challenges, there is a renewed interest in utilizing indigenous building materials and traditional construction techniques. Pacific communities have historically adapted their building practices to withstand natural hazards, using locally sourced, renewable materials such as timber, bamboo, pandanus, coconut palm, and coral stone.

In Vanuatu, traditional ni-Vanuatu engineering techniques have proven resilient against natural disasters. These methods, which incorporate local materials, are being reconsidered to address current rebuilding needs, offering cost-effective and culturally appropriate solutions.

Durability hazard rating H3.2" in treated timber available in Port Vila stores is not considered suitable for embedment in the ground. Timber posts embedded in the ground is typical of the modality of construction for a number of the DUAP Vanuatu Housing Construction Typologies assessed in the UNDP HBDA

H3.2 is for above-ground use: where timber is exposed to the weather or at risk of moisture entrapment.

Examples of H3.2 Timber Applications:

- **Exposed joists and decking**
- **Fence palings and rails**
- **Trellis**
- **Wall framing**
- **Cladding**
- **Handrails**

Concrete Collar protection with higher cement content concrete for timber posts embedded in the ground needs to be introduced to typical building practices in Vanuatu , for imported H3.2 Timber and for locally sourced timber for durability

7. Recommendations

To effectively address the hardware and building product needs for Vanuatu's earthquake recovery, the following actions are recommended:

- **Conduct Comprehensive Assessments:** Detailed evaluations of material requirements and local production capacities, especially locally sourced timber should guide procurement strategies.
- **Facilitate Import Logistics:** Repairing port facilities and streamlining customs procedures can expedite the arrival of essential materials. This is beyond the scope of this assessment.
- **Promote Indigenous Materials:** Encouraging the use of local materials and traditional building methods can alleviate supply shortages and preserve cultural heritage. For a rapid recovery, in urban and peri-urban contexts the promotion of traditional practices is unlikely to be effective for rapid recovery.

  For engineering design purposes for model houses, locally sourced timber should be carefully designed and the timber engineering code coefficients for “green” timber and “kiln/air dried” imported timber should be well understood, for both member design and joint design capacity.

- **Implement Price Controls:** Monitoring and regulating prices of critical materials can prevent exploitation and ensure affordability. In the commercial environment of Port Vila hardware stores, this is unlikely to happen. It’s also highly likely in the rebuild of the Port Vila commercial sector, contractors may direct import of building materials that will lessen the inflationary burden in the hardware sector.

8. Conclusion

The market assessment indicates that Port Vila currently has a strong supply of hardware and building materials necessary for earthquake recovery efforts.

The supply chain infrastructure remains functional, ensuring reliable access to essential construction materials. The availability of Pryda/Mitek and Buildex products presents an opportunity to enhance structural resilience in new construction and retrofitting projects.

However, considerations such as cost, accessibility for affected communities, and the integration of traditional and modern building techniques must be addressed to ensure a sustainable and inclusive rebuilding process.

Moving forward, continued monitoring of supply chains, price fluctuations, and material demand will be crucial for effective recovery and resilience-building efforts in Vanuatu.