Myanmar Bamboo Sector Competitiveness Study

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Acronyms and abbreviations

**BIF**: Business Innovation Facility

**CBI**: Centre for the Promotion of Imports from Developing Countries

**CBR**: Cost Benefit Ratio

**ERR**: Economic Rate of Return

**FAO**: Food and Agricultural Organisation

**FDI**: Foreign Direct Investment

**FIL**: Foreign Investment Law

**FOB**: Free on Board

**INBAR**: International Network for Bamboo and Rattan

**ITC**: International Trade Centre

**LIFT**: Livelihoods and Food Security Trust

**MAS**: Market Analysis and Strategy

**MRBEA**: Myanmar Rattan and Bamboo Entrepreneurs Association

**NES**: National Export Strategy

**PEA**: Political Economy Analysis

**SWOT**: Strengths, Weaknesses, Opportunities, Threats

**TOR**: Terms of Reference

**WFP**: World Food Programme

**WTTC**: World Travel and Tourism Council
1. Introduction

1.1. Study Terms of Reference

The objective of this competiveness study is to analyse Myanmar’s comparative and competitive advantage on the international market for high-value addition processed and manufactured bamboo. The study also examines how different business models could contribute to poverty reduction and to what extent.

1.2. Study approach

The study approach was designed around seven steps. Figure 1.1 provides an overview of the approach. The approach combined a review of literature and secondary data with a rapid sector assessment undertaken by a local and international multi-disciplinary team (including bamboo, agronomy, market value chains, environmental and economic expertise). In addition, a consultative workshop with businesses operating in the bamboo, timber and rattan sectors was undertaken to understand baseline conditions.

Figure 1.1: Overview of study approach

In brief the study approach comprised:

- **Baseline review**: setting out current knowledge of the bamboo sector and findings from the Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis, resource base review and field assessment of production and processing activity;

- **Market assessment**: a review of recent domestic and international market trends (supply, demand, prices and competitive advantage);

- **Primary analysis**: undertaking selected interviews with market players, gathering information to help gauge the extent of bamboo resources and economic activity;

- **Sector competitiveness assessment**: adopting Porter’s ‘diamond model’ of competitiveness to examine the current state and future potential of the Myanmar bamboo sector. This assessment draws on the review of the resource base, the SWOT analysis and market assessment to examine the comparative and competitive position of Myanmar; and

- **Intervention scenarios and poverty impact analysis**: an assessment of the potential economic impact of support to the sector and the pro-poor impacts that could arise. This analysis is based on a high-level financial and economic review of different business models.
The study was undertaken over six weeks from the end of October to mid December 2015. This only allowed for a limited consultation process and an initial examination of the resource base. The time available and limitations on travel pre-election also restricted access to a number of bamboo resource areas. As part of this review fieldwork visits were undertaken across Bago, Rakhine, Ayeyarwady, and southern Shan states; including the townships of Pinlaung, Minhla, Hlegu, Taikgyi and Kawmu.

Other limitations in conducting the assessment related to data quality. Secondary data on bamboo extraction is dated and domestic market data scant. International market data is constrained by a classification system that was recently introduced for bamboo (created in 2005 and used since 2007) that does not fully capture and isolate all bamboo products.

1.3. Report Structure

The report is structured as follows:

- **Section 2 - Background context**: sets out the background context to the bamboo sector, including a thumbnail sketch of bamboo in Myanmar and the international evidence base on poverty and environmental impacts of the bamboo industry;

- **Section 3 - Bamboo sector profile**: presents a profile of the baseline conditions for the bamboo sector covering an examination of the resource base and findings from the value chain and SWOT analysis;

- **Section 4 - Bamboo global market trends**: primarily examines the global product markets and market trends for bamboo products drawing on international trade data;

- **Section 5 - Competitiveness assessment**: provides an assessment of the sector’s competitiveness examining different aspects of what are considered to be important features to enable an industry to compete in international markets;

- **Section 6 - Economic and poverty impacts**: examines the potential economic and poverty impacts of an intervention programme to promote the competitiveness of the Myanmar bamboo industry;

- **Section 7 - Conclusions**: provides conclusions on the findings of this study and outlines recommendations to inform the development of the BIF Bamboo MAS.
2. Background context

2.1. Introduction

This section provides an overview of bamboo production in Myanmar. It then summarises the evidence on the link between the bamboo sector and poverty reduction and literature on how bamboo impacts on the environment.

2.2. Bamboo in Myanmar

Bamboo as a material in Myanmar primarily serves household consumers with general household goods (mats, panels, utensils) and the construction sector (with bamboo poles). In addition there are cottage industries based around handicrafts and bamboo shoots. There is also evidence of the industrial processing of bamboo (primarily panels, but with flooring emerging), although this is relatively small in scale. Generally, hardwood timbers (primarily teak) dominate the industrial processing sector (providing plywood, flooring, panels etc.) and hardwoods and rattan dominate the furniture sector. There is also small-scale food processing of bamboo shoots.

Making estimates of the economic scale of activity is difficult. Production, consumption and export data specific to bamboo material are difficult to determine. Much of the bamboo used in households is not transacted in the formal economy and exports of raw bamboo and edible bamboo shoots cross borders unrecorded.

The International Institute for Environment & Development (IIED)\(^1\) cites Forestry Department figures on bamboo production and its value in 2009 - 2010 as a harvest of 1,303,078,000 poles with an extremely low value of circa US$51,101, but accuracy of these figures is likely to be limited\(^2\). However, IIED also points to bamboo as a major sector for Community Forest Enterprise Development in two of the four areas studied, namely Ayeyarwady Delta and the Mandalay Region.

Figure 2.1 shows Myanmar’s recent export trends by product. For the period 2007 - 2014 the export data movement is quite sporadic, with the main bamboo export products being pulp, panels, raw bamboo and, to a lesser extent, bamboo furniture (although this reported value does include rattan products).

UN COMTRADE ‘mirror’ export data provides an insight into current trade patterns, but does need to be treated with some caution\(^3\). In 2007 total exports of bamboo related products from Myanmar were US$5.3m and this peaked in 2009 and 2011 at around US$12m due to peaks in pulp exports\(^4\).

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\(^1\) Kyaw Tint, Springate-Baginski, O., Macqueen, D.J., and Mehm Ko Ko Gyi (2014). Unleashing the potential of community forest enterprises in Myanmar, Ecosystem Conservation and Community Development Initiative (ECCDI), University of East Anglia (UEA) and International Institute for Environment and Development (IIED), London, UK

\(^2\) There are often discrepancies between the formal numbers and size of bamboo poles reported and the actual numbers harvested. The exchange rate is a historical rate based on figures from July 2010

\(^3\) Mirror data is export data based on the information collected by trading partners rather than the exporting country

\(^4\) In 2014 $2.7m of pulp of wood and fibrous material (category HS47 which includes bamboo pulp) was primarily exported from Myanmar to Japan (55%), and the balance to China, Korea and Thailand
By 2013 reported exports had fallen to US$3.5m and US$2.2m by 2014 underpinned by raw bamboo, pulp and furniture products. There were no reported exports of bamboo panels in 2014 based on the UN COMTRADE data.

2.3. Poverty Profile

Myanmar is the poorest country in South East Asia, ranking 150 out of 186 countries in the 2013 Human Development Index. Over 80% of poverty is concentrated in the rural areas of the country. This concentration is due to a number of factors including skills, land ownership, crops storage capacity, access to credit and poor infrastructure. A number of regions are affected by conflict and people living in these areas are amongst the poorest in the country.

The Political Economy Analysis (PEA) prepared by BIF notes that the relationship between poverty and geography is not completely clear, with a mixed picture emerging. The World Bank has noted that spatial distribution of poverty shows the majority of the poor live in the coastal areas, with Rakhine exhibiting the highest poverty rate (78%). One might expect that areas in the hills would also have high rates of poverty, due to conflict and marginalisation, but in fact they tend to be closer to the national average (approximately 40%). However, the statistics do not necessarily reflect where the greatest numbers of the poor live. For example, Myanmar’s central ‘Dry Zone’ has the lowest poverty rate of 29.5%, but as this is a heavily populated region the absolute numbers of poor people are high. In contrast, Chin has a poverty rate of 71.5%, but a lower absolute number of poor people due to the smaller population. Rakhine combines both statistical features: it has a high poverty rate and large numbers living in poverty. The Bamboo PEA also notes that the hilly areas to the East and on the borders of Thailand are relatively well off. Figure 2.2 provides an area based poverty profile based on a World Food Programme (WFP) food security assessment in 2014.

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6 Kim, Mariana: Rural poverty alleviation in Burma’s economic strategy: A comparative evaluation of alternative interventions to increase rural access to capital
7 A Political Economy of Analysis of the Myanmar Bamboo Sector, INTERIGTY, December 2015
2.4. Bamboo and poverty linkages

A number of studies have been conducted on bamboo’s potential with regards to poverty reduction, mainly in China. Overall, the studies see a positive correlation between a growth of the bamboo industry and poverty reduction. However, the measured impacts vary and the studies can come to substantially different conclusions.

For example, studies found farmers keep vastly different percentage shares of the overall profits of bamboo production. While one study, which looked at 10 townships in China, says that around 60% of the value of the product stays with the farmer\(^8\), another which looked at three counties in China ascertains that it was only 13% on average\(^9\). Further, the studies do not indicate that the bamboo industry is particularly empowering for women. This needs to be explored further within the specific Myanmar context.

All studies agree that the development of the bamboo industry, if done in the right manner, can help local farmers. However, again, the extent to which this helps the poor and poorest farmers is

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\(^8\) Nelson, Bryan: Can bamboo help save our forests and help end poverty?

\(^9\) Hogarth, N.J. & Belcher, B.: The contribution of bamboo to household income and rural livelihoods in a poor and mountainous county in Guangxi, China
contested. One study which looked at three counties in China found that it was either the richest or middle-income farmers who benefitted most from the development of the bamboo industry, both in absolute and relative terms. However, another study conducted in a different Chinese county found that while the richest farmers did indeed benefit most in absolute terms, it was the poor farmers that benefitted most in relative terms. Overall, it seems that different local circumstances and conditions can lead to different outcomes with regards to poverty alleviation.

Regardless of this, however, there are a number of aspects of bamboo production that are favourable to poor communities. Some parts of the bamboo production process – such as the harvesting or aspects of basket weaving – do not necessarily require higher levels of skill and can be done by casual labourers who might struggle to find other work. In addition, even if some skills are required – for example soil cultivation if a plantation is established – a lot of these will be known to farmers, as they are similar to agricultural processes. The sector also provides the opportunity to develop higher level skills as required in the processing of value added products. In addition to being an important source of income to the poor, as a ‘poor person’s timber’ bamboo provides for cost-effective rural and urban housing and housing goods. The poor are therefore engaged in the sector as both producers and consumers.

Moreover, the capital investments needed for the first stage of the bamboo production process – usually establishing a bamboo plantation – are relatively low, in particular compared to investments in timber. Similarly, the return on investment happens relatively quickly as bamboo stems grow and mature rapidly, bamboo has short rotation cycles and it can be harvested more frequently. All these characteristics give bamboo an advantage over timber when it comes to generating cash for farmers. Indeed, one study suggests that bamboo generates four to eight times more income per unit of land than Chinese fir plantations.

Finally, because of its flexible use – from edible products to low-value products such as chopsticks to high value products such as furniture – bamboo producers can to a certain extent react in a relatively flexible way to market demand.

2.5. Bamboo and climate change impacts

Bamboo production can have a positive or negative impact on climate change in two ways: bamboo plants can themselves act as net carbon emitters or as a carbon sink depending on the context, and the manufacturing process for bamboo products can result in carbon emissions.

Overall, research and analysis on the carbon sequestration potential of bamboo has been limited. Bamboo plants naturally absorb carbon as biomass is added when they grow. Studies show that the biomass of a newly planted bamboo forest increases rapidly for first ten years of its life. If unmanaged, it then hits a plateau, but keeps on increasing if the forest or plantation is managed properly. Also, while the net carbon absorption capacity of trees declines once degradation sets in, this holds true to a much lesser extent for bamboo as even after harvest large parts of a bamboo’s biomass survive, particularly the root system. Most studies suggest that bamboo forests absorb at least as much carbon as most other forests if managed properly. Box 2.1 shows how the development of the bamboo carbon credit market in China is progressing and this provides a template for the industry.

Box 2.1: China bamboo carbon market

China is the first country that is sanctioning the issuance of bamboo carbon credits. A methodology for bamboo carbon credits was developed by INBAR, Zhejiang A&F University and the China Green Carbon Foundation. More than 50,000 tonnes of carbon certificates have been issued so far in voluntary markets and with China establishing the potentially biggest carbon market globally in 2017 this number is likely to increase.

10 Booth, Andrea: Potential of bamboo to alleviate poverty in rural China remains untapped: Expert
11 Van der Lugt, P. et al.: Environmental Assessment of Industrial Bamboo Products - Life Cycle Assessment and Carbon Sequestration
Thus far, the Chinese scheme only accepts credits which are generated in China. Myanmar would probably need to set up a carbon scheme of its own and link it to the Chinese one in order for its bamboo certificates to be tradable in China. However, it is important for the bamboo industry that China now has a methodology which is applicable. Pillars which are important include:

- The land on which the bamboo is planted needs to have been non-forested land since 2005 or off-forest land;
- Clear and stable tenure rights need to exist;
- Land should be expected to remain in its original state or expect to decline, with a carbon stock at a stable low level, in the absence of the project’s afforestation activities;
- The project should improve quality of life and living conditions for farmers; and
- The project will not result in displacement of households or villages.

*Source: Yiping, Lou et al.: Introduction to the Methodology for Carbon Accounting of Bamboo Plantation Projects*

The net benefit of bamboo’s carbon storage capacity depends strongly on the land that the bamboo is being grown on. If the bamboo is grown on land that used to be primary forest but was cleared for a bamboo plantation, the net effects with regards to carbon will likely be negative. If bamboo is planted on degraded land\(^\text{12}\), the net effect would probably be positive. However, even here, project developers need to look carefully as bamboo grown on degraded land might mean that local communities cannot use the degraded land for other activities such as agriculture, and move on to deforest somewhere else. This leakage would have to be taken into account.

There are currently no studies on the impact of climate change on forest ecosystems relevant to Myanmar, so the potential concrete effects would have to be researched. Research also needs to be conducted to truly understand the extent to which bamboo can sequester carbon, in particular examining different species and climatic conditions, as studies thus far have concentrated on China and Moso bamboo.

### 2.6. Bamboo and environmental impacts

One of the major positive environmental impacts of bamboo is that it can be planted on degraded or fallow land and soils which other crops and trees would not survive on. This is mainly due to bamboo's large rhizomes and extensive root systems\(^\text{13}\). Degradation is a cause of concern in Myanmar, increasing the benefit of this positive impact. Deforestation in Myanmar has been around 2% per year over the last five years (the third-highest rate worldwide). Bamboo rhizomes and root systems also help prevent future soil erosion and landslides. Bamboo improves soil quality and its falling leaves can return nutrients to degraded soils. Further, through its roots, bamboo removes pollutants from wastewater. Thus if planted next to a farm for example, it can filter the agricultural runoff, cleaning streams and groundwater.

Another positive impact of bamboo that could be very pertinent to Myanmar is the fact that it can take pressures off forest timber resources. Bamboo’s characteristics are similar to those of timber, and so its products can be used in similar ways. In China, bamboo is already taking pressure off the demand for timber.

Bamboo forests can be a habitat for a range of other species. Over 20 bird species depend on bamboo, as do other animals including elephants, deer and squirrel. Bamboo forest can harbour entire ecosystems of insects and provide shelter during extreme weather events.

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\(^\text{12}\) FAO Land degradation in south Asia: Its severity causes and effects upon the people...Land degradation is the temporary or permanent lowering of the productive capacity of land (UNEP, 1992b). It thus covers the various forms of soil degradation, adverse human impacts on water resources, deforestation, and lowering of the productive capacity of rangelands.

\(^\text{13}\) INBAR: Bamboo: A strategic resource for countries to reduce the effects of climate change
Finally, if processed properly, the vast majority of bamboo raw materials can be used in commercial products, in contrast with as little as 20% of trees being recovered in timber production14.

Negative environmental impacts from bamboo mostly occur if it is not managed properly and in particular if it is managed too intensively on plantations. Plantations, in particular monoculture plantations, can have a negative impact on biodiversity when compared to natural forests, but the impact of plantations on biodiversity really depends on the type of land on which they are established. A plantation established on natural forest land would have a negative impact on biodiversity whereas a plantation established on eroded land can help increase biodiversity again.

In addition, it is argued that monoculture plantations require ongoing human intervention (e.g. the use of fertilisers, herbicides and pesticides) that, in turn, can lead to decreased soil fertility and water pollution. It is also contended that intense management can increase bamboo species’ susceptibility to insects and disease.

While bamboo is credited with preventing soil erosion, if planted on a slope, it can cause slope failure due to its dense root mats, contributing to soil erosion in that area. Knowing the extent of fallow or deforested land requiring re-vegetation will be fundamental to ensuring the sustainable development of the sector.

The processing of bamboo raises issues around chemicals and examining the environmental consequences. The product that requires the largest amount of chemicals is bamboo flooring - this is due to the fact that glues need to be used as adhesives to laminate the bamboo strips together. Some adhesives contain resins such as urea-formaldehyde, which can have health impacts. However, there are non-toxic alternatives to this, and sustainably-minded manufacturers might use water-based adhesives which are solvent-free and non-toxic.

Finally, the expansion of an industry very often goes hand-in-hand with the expansion of infrastructure. Infrastructure is cited by USAID as one of the main drivers of deforestation in Myanmar, as an increase in the road network equates to increased access to natural resources. This reinforces the need to establish strong land use management alongside any sector strategy.

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14 Lobovikov et al: The poor man's carbon sink. Bamboo in climate change and poverty alleviation
3. Bamboo sector profile

3.1. Introduction

The section presents findings on the Myanmar bamboo resource base, considering species type, volume of resources and its geographical distribution. The market players in the bamboo value chain are also set out alongside an examination of current production and processing models, formal and informal rules, and supporting organisations. This information is primarily based on a rapid field appraisal undertaken with businesses and organisations in selected locations.

3.2. Bamboo resource base

Generally Myanmar has the correct fundamental conditions for a bamboo industry (see Box 3.1). The regional variations of topography, rainfall and land with high water tables provide an ideal climate for growing highly productive clumps of bamboo. Further, a reasonable road and water transport network suitable for the movement of edible shoots, poles and manufactured bamboo products is evident in many areas.

Box 3.1: Myanmar’s bamboo growing conditions

Rainfall

- West Coast up to 5000mm in the South. Suitable for most large clumping species if grown on elevated land as the root system will rot if submerged for any extended period exceeding two weeks.

- Central region reputedly 800mm. Most species suitable however the larger species will not grow to full size unless planted along a creek or river bank where residual water is available. Eastern ranges up to 1500mm depending on latitude. Suitable for most species, however juvenile plants may require watering if planted in the dry season.

- In general: tropical monsoon in the lowlands below 2,000 m (6,562 ft.); cloudy, rainy, hot, humid summers (southwest monsoon, June to September); less cloudy, scant rainfall, mild temperatures, lower humidity during winter (northeast monsoon, December to April). Climate varies in the highlands depending on elevation - the higher elevations are subject to heavy snowfall and bad weather, so are not suitable for commercial bamboo.

Soil types

- Moist soil types are acceptable except for any areas of pure sand or puggy low land clay.

- The most productive (big) species such as those in the Dendrocalamus genus tend to grow best in the wetter, well drained country. If grown in a swampy area where the soil is saturated for a period of more than two weeks the root system rots and the plant dies.

- Growing conditions in the Eastern regional region compares with Western Thailand and the Guangzhou and Guangxi provinces of China.
Bamboo resource base is widespread, with high quality resources in the North West and South and along eastern borders;

Resources to be found in poorest parts of the country (Chin state, although the quality of stock is unknown) and conflict areas (e.g. Tanintharyi and Kachin); however

Some resources are more difficult to access (for example Chinese border).

Sector activity is widespread across the country – activity serving the construction sector is to be found closer to urban areas;

Informal trading takes place across borders (China, India and Thailand) in particular, seeds, shoots and raw bamboo poles; and

Myanmar Rattan and Bamboo Entrepreneurs Association (MRBEA) members are spread across the country.

Source: MRBEA-BIF Bamboo Industry Development workshop 29th October 2015
As set out in the resource and activity maps above some of the best bamboo natural forests are located in more remote locations or conflict and post-conflict affected areas (e.g. Kachin and Tainintharyi). While private companies are active across these areas, non-extractive private sector investment from Myanmar tends to focus in stable areas offering more reliable infrastructure. This is summarised in Figures 2.1 and 2.2 and provides valuable insight to the current resource profile.

Table 3.1 shows the land size of the regions in which bamboo resource is concentrated. These figures indicate some 3.8m hectares of bamboo growing land, however a more recent view of the scale of bamboo resource nationally was estimated at around 2.1m hectares – a significant difference\textsuperscript{15}.

Table 3.1: Major locations for bamboo resource

<table>
<thead>
<tr>
<th>Regional location</th>
<th>Size of area (square km)</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bago East</td>
<td>5,969</td>
<td>1,545,963</td>
</tr>
<tr>
<td>Bago West</td>
<td>2,224</td>
<td>576,013</td>
</tr>
<tr>
<td>Rakhine State</td>
<td>5,059</td>
<td>1,310,274</td>
</tr>
<tr>
<td>Taninthayi region</td>
<td>1,800</td>
<td>466,197</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,052</strong></td>
<td><strong>3,898,447</strong></td>
</tr>
</tbody>
</table>

Source: Planning and Statistic Division. Forest Department, 2000

Yet another perspective is provided by the United Nations Food & Agriculture Organisation (FAO). In 2010 the FAO considered the overall trend in the area under bamboo forest in Myanmar to be reducing, though with a recent flattening since 2005\textsuperscript{16}. In 1990 the land area under bamboo forests was estimated at 963,000 hectares falling to 859,000 hectares by 2005 and remaining stable at this level until 2010. However, key informants also suggested that in some areas the amount of bamboo forest was increasing as it expands into deforested areas.

Of the areas visited within Bago, Ayeyarwady and south Rakhine these were not assessed as providing natural forest bamboo of any quantity or quality. However, these areas do appear to provide good locations for bamboo plantations given the climatic conditions. It was also apparent that across the locations there is a significant amount of deforested or degraded land requiring re-vegetation (although no known data exists on the exact scale of such land). In addition, there was evidence of overharvesting. Species sighted while transiting the provinces of Yangon, Ayeyarwady, Bago and Shan (lower) are set out in Box 3.2.

Box 3.2: Species sighted during field visits

- *Bambusa vulgaris, vulgaris var. wamin, vulgaris var. vittata, burmanica*
- *Cephalostachyum pergracile*
- *Dendrocalamus; asper, brandsii (two types), calostachys, textilis, strictus*

\textsuperscript{15} A presentation by Anug Zaw Moe from the Forest Research Institute in Yezin in 2014

Whilst there remains uncertainty about the scale and accessibility of natural bamboo forests, there is scope to establish commercial bamboo farms by planting a selection of productive species that adapt to the local environment. Many areas of the country are suitable for growing/supporting commercial bamboo plantations, particularly in the states along the Andaman Sea. In contrast, the natural forest resource base in Tanintharyi state is regarded as being of a higher quality and density – although historical data indicates it is the smaller of the major bamboo growing locations.

Based on the secondary data review, discussions with businesses and the field visit an initial assessment of the commercial viability of species is set out in Table 3.2. This indicates that the poles, pulp and handicraft markets are well served by current species. The shoots market is also served well by a smaller number of species. This is consistent with the export data set out in Section 2, which showed Myanmar being currently active in the export of raw bamboo, pulp and handicrafts. For shoots, business consultations indicated that bamboo shoots and poles are being exported across the border to Thailand.

**Table 3.2: Bamboo species and commercial applications**

<table>
<thead>
<tr>
<th>Commercial Species</th>
<th>Myanmar Name</th>
<th>Height M</th>
<th>Dia mm</th>
<th>Application</th>
<th>Ranking shoots</th>
<th>Ranking poles</th>
<th>Ranking weave</th>
<th>Ranking pulp</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bambusa arundinacea</em> (bambos)</td>
<td>Kya-khat-wa</td>
<td>25-30</td>
<td>10-15</td>
<td>Poles for splitting</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Mid</td>
</tr>
<tr>
<td><em>Bambusa polymorpha</em></td>
<td>Kya-thaung</td>
<td>10-20</td>
<td>7-15</td>
<td>Poles</td>
<td>Low</td>
<td>High</td>
<td>Mid</td>
<td>High</td>
</tr>
<tr>
<td><em>Bambusa tulida</em></td>
<td>Thaik-wa</td>
<td>10-15</td>
<td>10-15</td>
<td>Solid pole</td>
<td>Low</td>
<td>High</td>
<td>Mid</td>
<td>Very high</td>
</tr>
<tr>
<td><em>Cephalostachyum pergracile</em></td>
<td>Tin-wa</td>
<td>10-12</td>
<td>5-7</td>
<td>Poles</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus asper</em></td>
<td>Wai-net</td>
<td>20-25</td>
<td>10-20</td>
<td>Poles &amp; shoots</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus brandisii</em></td>
<td>Wabo</td>
<td>15-25</td>
<td>10-20</td>
<td>Poles &amp; shoots</td>
<td>High</td>
<td>High</td>
<td>Mid</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus calostachys</em></td>
<td>Wagyi</td>
<td>15-25</td>
<td>10-20</td>
<td>Poles &amp; shoots</td>
<td>Low</td>
<td>High</td>
<td>Mid</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus giganteus</em></td>
<td>Wabogyi</td>
<td>25-35</td>
<td>15-30</td>
<td>Poles, shoots, erosion</td>
<td>Mid</td>
<td>High</td>
<td>Mid</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus latiflorus</em></td>
<td>Wani</td>
<td>15-25</td>
<td>8-20</td>
<td>Shoots &amp; poles</td>
<td>Very High</td>
<td>High</td>
<td>High</td>
<td>Mid</td>
</tr>
<tr>
<td><em>Dendrocalamus membranaceus</em></td>
<td>Wa pyu</td>
<td>15-25</td>
<td>6-10</td>
<td>Poles &amp; pulp</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><em>Dendrocalamus strictus</em></td>
<td>Myin Wa</td>
<td>6-12</td>
<td>3-8</td>
<td>Pulp &amp; poles</td>
<td>Low</td>
<td>High</td>
<td>Mid</td>
<td>Very high</td>
</tr>
<tr>
<td><em>Gigantochloa apus</em></td>
<td>Wado</td>
<td>10-15</td>
<td>10-25</td>
<td>Poles</td>
<td>Low</td>
<td>Very high</td>
<td>Very high</td>
<td>Mid</td>
</tr>
<tr>
<td><em>Melocanna bacifera</em> (bambusoides)</td>
<td>Kayin-wa</td>
<td>10-20</td>
<td>8-12</td>
<td>Poles</td>
<td>Mid</td>
<td>Very high</td>
<td>Very high</td>
<td>High</td>
</tr>
<tr>
<td><em>Thyrostachys olivieri</em></td>
<td>Thana-wa</td>
<td>20-25</td>
<td>5-8</td>
<td>Poles</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><em>Thyrostachys</em></td>
<td>Hiyo-wa</td>
<td>20-25</td>
<td>5-8</td>
<td>Poles</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
There is evidence of current species being used for value-added bamboo products. Firms visited for this study are producing bamboo flooring using existing species. In one case their product is already being exported to Japan and another has interested international buyers for their trial flooring products.

3.3. Current production/cutting activity

The view of MRBEA is that construction and household use accounts for approximately 80% of output, with handicrafts and food bamboo shoots accounting for approximately 10% each. There was little known activity using bamboo material for higher value added industrial processing; although there were some companies exporting lower value processed bamboo products (for example split bamboo, bamboo incense sticks, charcoal and flower sticks). The field visits provided the opportunity to examine bamboo production and economic activity to gain greater insight into how the value chain currently operates; the main actors and business development issues.

Production bamboo is primarily sourced from government natural forests (some of which is designated as community forest and some privately owned) with an emerging plantation production model using government land under licence. Specifically:

- **Natural bamboo forests**: resources taken by family cutters/ harvesters, village group cutters/ harvesters, cutters/ harvesters, and Community Forest operating in private licensed forests; and
- **Bamboo plantations**: operated by enterprises, as well as Community Forest, although only one example of the latter was found during the fieldwork.

The field assessment enabled a better understanding of current production practices. The assessment highlighted that the primary issue for extraction from natural forests is resource management. Better resource management would lead to improved quality of the bamboo stock and a more sustainable resource.

### Table 3.3: Risks and issues identified during field visits

<table>
<thead>
<tr>
<th>Source of bamboo</th>
<th>Risks and issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural forest</td>
<td><strong>Overharvesting</strong>: several respondents pointed out to the need to go further every year to access good quality resource which indicates that, despite the fast growing rate of bamboo, the natural stock are being overharvested in certain areas. For example one company interviewed stressed the difficulties to access good quality resource for manufacturing boards in the absence of sustainably and systematically managed stocks. The indiscriminate harvesting of young poles is also an issue.</td>
</tr>
<tr>
<td>Bamboo plantation</td>
<td><strong>Site selection</strong>: planting on the gentler slopes would be easier than steeply sloping hillside.</td>
</tr>
<tr>
<td></td>
<td><strong>Planting risks</strong>: best practice is to plant out small plots initially and gradually expand the area. The risk associated in planting huge acres en-masse is the unproven viability of the planting material and adaptability to the local environment. Even though farm operators are probably looking for rapid establishment, it is prudent to establish say five</td>
</tr>
</tbody>
</table>
acres to determine the viability of the new plants in the local environment. Such plantings can be carried out at monthly intervals.

**Skills development:** existing staff not fully aware of care, maintenance and harvesting protocols should be supported with practical training courses.

*Source: BIF Myanmar Bamboo Resource Assessment 2015*

For commercial plantations these are expected to make a financial return for the investors, this being so a plantation must be professionally managed and maintained. The range of issues identified by companies interviewed by BIF indicates that training across a range of issues would be beneficial, including site selection and species selection, selection of quality rootstock, planting procedures, maintenance and weed control, initial thinning shoot and pole harvesting, and logistical system requirements.

In response to these issues being raised and discussed, a 2-day training was delivered by BIF to MRBEA members and other participants. This training was well received by the participants.

The productivity of bamboo harvesting is affected by number of factors. In particular the difficult terrain of Myanmar’s natural forest (often hilly), poor harvesting rotation method, and the limited use of capital equipment (be it chainsaws, elephants or the use of culm trolleys as is common in China). It is estimated that the average worker is able to extract twenty culms per day which rises to 29 if an elephant is used\(^\text{17}\). The picture opposite shows poles waiting to be transported. They show signs of being immature (harvested too early) and having high moisture content.

### 3.4. Current processing activity

The industrial processing of bamboo as a material is very limited. There is craft and low level processing activity related to bamboo shoots, handicrafts, household goods and, to a lesser extent, bamboo poles for construction. The main end markets and market players evident during the field visits are set out in Table 3.4 below.

**Table 3.4: Current spectrum of bamboo end markets**

<table>
<thead>
<tr>
<th>End market</th>
<th>Trading activity viewed on field visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction poles and splits</td>
<td>Traders operating as aggregators, transporting poles to cities and also splitting bamboo for the export market</td>
</tr>
<tr>
<td>Bamboo edible shoots</td>
<td>Cutters selling to local cottage industry enterprises for processing with retail outlets</td>
</tr>
<tr>
<td>Handicrafts</td>
<td>Established village level activity, many multi-generational firms some of which have exported products</td>
</tr>
<tr>
<td>Bamboo household</td>
<td>Company aggregators or villages employed in weaving bamboo products (e.g. bamboo mesh for walling and fencing), often undertaken to supplement their main activities</td>
</tr>
</tbody>
</table>

\(^{17}\) Discussion with a company CEO and other informants
goods  |  income source  
---|---
Pulp  |  Previously used to feed local paper mills, but now largely defunct (such activity was reported to have wiped out whole bamboo forest areas some of which are now being replanted with rubber)  
Flooring  |  Emerging factory looking to specialise in industrial processing for valued-added flooring market (both domestic and international markets)  

Much of the bamboo related economic activity takes place near the source, in particular handicrafts and shoot processing. The types of business models identified across the value chain during the field assessment can be summarised as:

**Table 3.5: Bamboo sector business models**

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Input Low Output (LILO)</td>
<td>Family owners of bamboo plot/ mixed bamboo and timber plot selling small or larger quantities of bamboo to individuals or traders</td>
</tr>
<tr>
<td>Company aggregators/ traders</td>
<td>Intermediaries organising harvesters/ cutters to source bamboo for sorting/grading and onward transporting</td>
</tr>
<tr>
<td>Handicraft community enterprises/ family enterprises</td>
<td>Small-scale private handicraft producers and community village enterprises primarily producing for the domestic market</td>
</tr>
<tr>
<td>Small manufacturing enterprises/ cottage industry</td>
<td>Sourcing and value added processing of food and timber substitute products</td>
</tr>
</tbody>
</table>

Figure 3.3 provides an overview of the timber value chain routing with raw bamboo ultimately passing through community aggregators or processing factories. Bamboo resources are predominately going via community aggregators or traders at present, with limited factory processing activity.

**Figure 3.3: Bamboo timber related value chain**

Box 3.2 provides more details on the role of the aggregator/trader in the value chain. Overall profitability is reported as being low, and in the case of the aggregator interviewed, profit margins are reportedly better on manufactured products and transport related services compared to bamboo poles.
**Box 3.2: Community aggregators Bago Region**

This is a community group leader aggregator/trader for around 100 members from the surrounding villages. This role arose from an initiative by the Forestry Department to organise individual farms involved in bamboo cutting to ensure better resource management. The business is located about 20 miles from the forest resource and employs around 150 people directly (including people working in the transport of bamboo and 50 in the manufacturing of bamboo mats and wall panels).

The group leader manages a 20,000 acre permit with the government which is renewed on a 5 year rolling basis. An annual fee (up to 5m kyats) and charge for extraction of 10 kyats per piece is made, with rights held to extract up to 800,000 pieces a year. The community aggregator also pays a small profit tax to the government. They currently harvest culms every 2 to 3 years.

The role played by the community aggregator is to collect poles from farmers (around 200 cutters within member families) and sell them on to wholesalers. He pays on average 150 kyats per pole to farmers and sells on at between 350 and 500 kyats per pole depending on the size (the larger size being 5 metres).

Cutting is undertaken by village members. The matting workers are from near Mandalay (in the dry zone) and are on site working from November - June. They migrate looking for work due to it being the dry season and are also regarded as being more skilled in weaving bamboo. The community leader pays workers primarily on a piece rate basis (for example 20 kyats a piece to load trucks) while skilled workers involved in weaving bamboo mats, for example, can earn 7,000 to 10,000 kyats a day.

This aggregator operates a transport fleet of seven trucks, selling on to wholesalers inclusive of transport costs. Generally business has been steady. Wholesaler mark-ups are reported to be in the region of 5 - 10 kyats per pole.

The edible shoots value chain is outlined in the Figure 3.4 below. This shows that currently the primary supply of bamboo shoots for processing is via shoot collectors. These cutters collect shoots and take them to nearby enterprises that process, package and wholesale/retail their produce.

**Figure 3.4: Edible shoots value chain**

In many villages and towns there are cottage industry shoot processors, receiving raw shoots from their supply chain (normally individual cutters) and then processing them for packaging and sale. Many will operate their own retail outlet in the market to sell on.
The picture in Box 3.3 shows a sample of the final product that is sold in the domestic market. Processed edible bamboo shoots are packaged for home use, which simply involves boiling the contents, providing a healthy meal that can be mixed with a range of foods.

**Box 3.3: Processing of edible bamboo shoots cottage industry**

There are numerous types of edible shoots available and they are normally sold per VIS (equal to 0.1.64 KG) at a price of US$0.98 per KG with a raw input cost price of around US$0.15. This processed product price can be contrasted with a fresh shoots market price of up to $1 per KG (in Yangon) or an export price for edible shoots of US$1.6KG Free on Board (FOB) from China or US$1.3/KG from Thailand.

Box 3.4 provides a sketch of one cottage handicraft business near the city of Pathein. This illustrates the range of skills involved and the challenges faced by what is a traditional segment of the bamboo market. The owner expressed an interest in support to upgrade the quality of their products to compete in the export and tourist markets.

**Box 3.4: Handicraft business**

This company is based in Pathein and specialises in the assembly and painting of bamboo umbrellas and table shades. The company is a fourth generation family handicraft business and, in the local area, there are three other similar competitor businesses. The bamboo is sourced from the local area through Bamboo Star – a trading company that has a natural forest ‘plantation’ near the cottage factory location. The community working in the forest area reported that they derived around 30% of their income from bamboo harvesting. However, it was getting harder each year as they had to go further into the forest to source good bamboo.

The handicraft business directly employs 7 people and its particular skill and added value is the painting of the umbrellas. The company receives component parts from the surrounding villages, and it is estimated that around 20 villages are involved in the supply of parts for the umbrellas – for example the cogs/folding mechanism.

The company mostly sells to wholesalers and retailers for the domestic market. The company has been involved in exporting its products but has had problems in meeting quality standards and regulations. A particular high-value product is the supply of garden table shades for hotels. They also supply monks with ornate umbrellas and table shades. Demand is described as steady, but they are experiencing problems getting rattan raw materials and its price is increasing.

The use of bamboo as a substitute wood material for value added products is limited in Myanmar. However, it is evident from discussions with MRBEA members that this changing, with some members viewing bamboo as an opportunity to innovate or diversify their businesses.

One company interviewed for this report was established in 2012 and is selling bamboo slats and bamboo flooring. The company, based in Bagan, operates a bamboo plantation in Shan state. It has a contract with a Japanese company to supply bamboo flooring and is the only Myanmar bamboo flooring company listed on AliBaba.com.

Another example is a young company formed as a joint venture with Taiwanese investors led by a charismatic and energetic woman with a clear vision. The company is focusing on bamboo flooring,
initially for the domestic market, but ultimately with a view to exporting (Japan being one target market). Box 3.5 provides a summary of the company.

**Box 3.5: Value added processing**

The company has established a near source processing company in Shan state and employs around 26 people there, with 7 people employed at its finishing factory in the Yangon Industrial Zone.

The company is currently testing the market, but believes there is strong local demand for its product as it is of better quality than imported Chinese bamboo flooring. The company is looking to export in due course, but wants to be sure it has an effective integrated supply chain with good quality control. This is to ensure that when it enters international markets it can capture price premiums and also add maximum value in Myanmar.

The company management recognises many challenges in achieving its aims. These include poor natural forest resource near its production facility, productivity of bamboo cutting in natural forests, power supply and access to technical equipment to ensure moisture levels are controlled through the supply chain.
3.5. SWOT analysis

Figure 3.5 summarises the SWOT analysis. The findings presented are based on the views of private sector participants expressed at a bamboo sector workshop and the field analysis.

**Figure 3.5: Summary of SWOT analysis**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Significant land available to develop bamboo plantations (vacant and degraded land)</td>
<td>• Knowledge of the stock of bamboo across the country is uncertain</td>
</tr>
<tr>
<td>• Significant variety of bamboo species and commercially relevant species (with the exception of the Moso species)</td>
<td>• Some high quality stocks in remote and/or conflict affected areas</td>
</tr>
<tr>
<td>• Low labour costs (relative to China and other competitor countries)</td>
<td>• Lack of market access, technology access and finance combined with poor regulation</td>
</tr>
<tr>
<td>• River system provides for low cost transport in some areas</td>
<td>• Infrastructure poor (in particular roads and power grid system)</td>
</tr>
<tr>
<td>• Port access (for some areas and is good in comparison to other countries, e.g. Laos)</td>
<td>• Not easy to acquire land and the price of land is increasing</td>
</tr>
<tr>
<td></td>
<td>• Land use policy (zoning) not yet approved</td>
</tr>
<tr>
<td></td>
<td>• Unclear land rights (country wide, esp. Kachin state)</td>
</tr>
<tr>
<td></td>
<td>• Tax policy does not support sector development</td>
</tr>
<tr>
<td></td>
<td>• Current market focus is on low value added construction uses, handicrafts and cottage industry food processing</td>
</tr>
<tr>
<td></td>
<td>• Forest fires and wild elephants destroy farms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Opportunity to influence government policy and promote afforestation and appropriate role of plantations</td>
<td>• Cost of labour and electricity increasing</td>
</tr>
<tr>
<td>• Timber can be replaced with Non-Wood timber (Bamboo)</td>
<td>• Forest cover rapidly decreasing</td>
</tr>
<tr>
<td>• Growing domestic demand from the construction sector, especially bamboo poles for scaffolding</td>
<td>• Climate change is making some areas hotter and drier and is already affecting bamboo stocks</td>
</tr>
<tr>
<td>• Bamboo housing for disaster relief and local low cost housing</td>
<td>• Natural disasters</td>
</tr>
<tr>
<td>• Export markets for bamboo products include US, Brazil, Australia, South Africa; also Japan and Taiwan (but high quality demanded)</td>
<td>• De-forestation due poor enforcement and weak forest law (lack of staff)</td>
</tr>
<tr>
<td>• Carbon credits is an opportunity to explore</td>
<td>• Biodiversity loss with monoculture bamboo plantations</td>
</tr>
<tr>
<td>• Can support diversified employment; in cultivation, processing and manufacturing</td>
<td>• More innovative products by competitors/ ability to offer lower prices (backed by government support in particular China)</td>
</tr>
<tr>
<td></td>
<td>• Increasing pressure on bamboo resources because of a rising demand for poles for low value applications</td>
</tr>
</tbody>
</table>

*Source: Bamboo Industry Development Workshop 29th October 2015 and Bamboo field analysis*
4. Bamboo global market trends

4.1. Introduction

This section considers both domestic and international market demand conditions gathered from secondary market data and consultations. It also sets out information on changing global demand patterns and EU market demand.


Figure 4.1 details recent international demand for bamboo related products and produce. This shows the relative size of each export market and the performance over a period that was initially dominated by the international financial crisis.

The data is subject to limitations due to the international classification system not fully capturing or isolating all bamboo related products. The section focuses on processed bamboo and by-products.

Figure 4.1: Global bamboo exports 2007 – 2014

Source: INBAR dataset based on UN COMTRADE data

Overall the bamboo market (including woven bamboo products) was worth US$1.620bn in 2007 and by 2013 recovered to US$1.711bn – before dipping to in 2014 to US$1.369bn. Excluding woven products the market size was US$1.147bn in 2007 and slightly lower at US$1.025bn in 2014. The
expectation of the size of the global bamboo market before the financial crash was that it would more than double by 2017 (the projection included domestic and international demand)\textsuperscript{18}.

More specifically the following trends are noted:

- After woven goods the two largest product markets are bamboo flooring and shoots accounting for US$620m or 45% of the market (61% of the market if woven products are excluded);
- Bamboo shoot exports grew through the period from 2009, although slowed in 2014;
- All bamboo product markets were affected by the financial crisis during the period 2007 to 2009;
- Post 2009 a number of markets have struggled to get back to pre-recession levels in particular woven products, furniture, veneer panels and paper articles - the woven bamboo market has been in decline since 2009; and
- The pulp market has shown steady growth from a relatively small base in 2007.

If the bamboo market is split into the four main product categories of raw bamboo, food, processed bamboo, and by-products (excluding woven products) the value and shares were 4%, 19%, 68%, 9% respectively in 2007 and 7%, 27%, 57% and 9% in 2014. The food (shoots) market has been growing its share relative to other segments driven by global population growth and known health attributes of bamboo\textsuperscript{19}.

At a more detailed level the changing composition of product markets is reflected in the pie charts below Figure 4.2 (excluding woven products, furniture and seats). They show declining shares for furniture, panels and paper articles; increasing shares for shoots, flooring, raw bamboo and pulp; and stable shares for charcoal.


\textsuperscript{19} INBAR Bamboo and Rattan Sector Review 2012
Whilst the growth of the market appears to have slowed in 2014 discussions with local businesses provides evidence on active interest from overseas buyers for Myanmar bamboo products. For example Japanese traders have expressed an interest in supplies of charcoal and bamboo pellets. Japan is actively interested in Myanmar as a supplier of bamboo flooring as evidenced by two companies that were interview for this report evolving business relationships. Further, the Australian market has an appetite for bamboo poles if they can be supplied at a particular price point.

4.3. Competitor landscape

The leading exporter of bamboo products is China. Table 4.1 shows for selected product markets the shares of China and the relative position of Myanmar and other countries. China dominated the flooring, edible shoots and veneer panel markets with highly significant shares in all other selected markets.

As outlined in Section 2 Myanmar’s exports were predominately in the pulp, raw bamboo and veneer panels markets and by 2014 these had fallen to a value of US$2.2m. The table shows that internationally Myanmar’s export activity registers in these markets – market shares being 11%, 1% and 0.6% respectively. It should be noted that edible shoots are widely reported to be exported informally across the borders, in particular to Thailand, so are thought to be underreported in trade data.

Of interest to this study is the performance of other developing countries and in particular, neighbouring Thailand and the Mekong countries (Vietnam, Laos, and Cambodia).

---

20 As indicated by Rattan and Bamboo Entrepreneurs Association members
21 Discussions with Bamboo Australia a bamboo importer of poles and edible shoots into Australia
22 These countries with the help of Oxfam developed a strategy in 2006 to target the growing bamboo market (see Marsh et al, 2006 Oxfam Hong Kong)
Table 4.1: Bamboo competitor landscape 2014

<table>
<thead>
<tr>
<th>Product Group</th>
<th>Product</th>
<th>Market value $m</th>
<th>China market share 2014</th>
<th>Other country share and commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed bamboo</td>
<td>Flooring</td>
<td>$324m</td>
<td>92%</td>
<td>USA and Netherlands 2.8 and 2.5% respectively, Vietnam 0.2% and Thailand 0.1%</td>
</tr>
<tr>
<td></td>
<td>Veneer panels</td>
<td>$111m</td>
<td>74%</td>
<td>USA and Netherlands 7% and 5.4% respectively, Vietnam at 0.8% and Myanmar 0.6% (down from 1.3% in 2013)</td>
</tr>
<tr>
<td>Bamboo edible</td>
<td>Edible shoots</td>
<td>$287m</td>
<td>85%</td>
<td>Thailand 4% and Netherlands 2% with Vietnam capturing 1% of the market</td>
</tr>
<tr>
<td>shoots</td>
<td>Poles</td>
<td>$94m</td>
<td>63%</td>
<td>Vietnam held 12% of the market, Thailand 2% and Myanmar 1%</td>
</tr>
<tr>
<td>Raw bamboo</td>
<td>Charcoal</td>
<td>$58m</td>
<td>52%</td>
<td>Netherlands 17% share and Nigeria 8%. Vietnam capturing 1% of the market. Laos registered a 0.2% share</td>
</tr>
<tr>
<td></td>
<td>Pulp</td>
<td>$10m</td>
<td>22%</td>
<td>Nigeria entered the pulp export market in 2014 and captured 49%, China’s share fell having been 43% in 2013. Myanmar captured 11% of the market, whilst Laos has lost market share over the period 2009</td>
</tr>
</tbody>
</table>

Source: ITC trade data 2015

Of all the Mekong countries Vietnam is performing best in class, and the other Mekong countries have yet to register any significant export activity. Whilst Vietnam remains specialised in woven products it has grown its world market share in raw bamboo materials consistently since 2010. It has also made progress in trading veneer panels, but appears to have fallen back in the export of bamboo flooring. Vietnam could provide an interesting comparator country for Myanmar as it shapes its bamboo market strategy. For edible bamboo shoots, after China, Thailand is the most dominant exporter. More recently Vietnam’s edible shoot exports have shown an upward trend – now at a quarter of Thailand’s market share.

4.4. Importer profile

Table 4.2 summarises the key importer countries for selected products. It shows the dominance of developed countries across all markets – the EU, US and Japan in particular. This suggests that any market strategy needs to consider enhancing trading ties with the major blocks – in particular in a post-sanctions world. However, exploiting the ASEAN single market will be vitally important to Myanmar, as well as building on established trading relationships held by existing businesses. MRBEA members also view Taiwan, South Africa and Brazil as markets of interest.
Table 4.2: Bamboo import profile

<table>
<thead>
<tr>
<th>Product Group</th>
<th>Import profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed bamboo</td>
<td>Processed and higher value products (panels and flooring): the EU, USA, Canada,</td>
</tr>
<tr>
<td></td>
<td>Australia and the Philippines are key markets</td>
</tr>
<tr>
<td>Bamboo edible shoots</td>
<td>Japan dominates the import market accounting for 58%; but the EU, Australia and Canada are also import markets for edible bamboo shoots</td>
</tr>
<tr>
<td>Raw bamboo</td>
<td>The USA and Europe account for a nearly half of global demand; although there are large buyers located closer to Myanmar including India and Japan</td>
</tr>
<tr>
<td>Bamboo by-products</td>
<td>Japan and the Middle East are key markets for charcoal and China, Germany and the USA import significant quantities of pulp</td>
</tr>
</tbody>
</table>

Source: ITC trade data 2015

4.5. Price trends

Export prices are shows in Figure 4.3 for main bamboo products based on the export weight ($/KG) and recorded as Free on Board (FOB). The data shows variable prices during the financial crisis. However, after 2011 all products have experienced more stable than rising prices, with the exception of flooring which has been traded more keenly over the last three years. Woven products and charcoal have seen strong price growth over recent years, with furniture having adjusted to a lower price level.

Figure 4.3: Bamboo price trends (US$/KG)

Source: INBAR based UN COMTRADE data
This data set provides the following benchmark prices for 2014 and recent relative price changes. The data suggests stronger demand conditions for raw timber and edible shoots with upwards price pressures.

Table 4.4: Recent price benchmarks for bamboo products

<table>
<thead>
<tr>
<th>Product</th>
<th>Price level and changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw bamboo</td>
<td>World average export price in 2014 was US$0.61/KG, up from US$0.51 in 2013</td>
</tr>
<tr>
<td>Bamboo edible shoots</td>
<td>World average export price of US$1.6/KG, China 1.65KG in 2014, up on the previous year’s price of US$1.54KG. China’s export price was US$1.6/KG and Thailand’s US$1.3 in 2014 (Thailand’s shoots are primarily exported to the USA and Australian markets)</td>
</tr>
<tr>
<td>Bamboo flooring</td>
<td>US$1.7/KG having in 2014 fallen back from US$2/KG in 2012 and US$1.84/KG in 2013</td>
</tr>
<tr>
<td>Bamboo veneer panels</td>
<td>China’s price per KG in 2014 was marginally below that of 2013 at US$1.7/KG compared to US$1.8/KG. Vietnam reported selling at US$1.94/KG 2014</td>
</tr>
<tr>
<td>Bamboo charcoal</td>
<td>The price spiked in 2013 at US$1.40/KG having traded at US$0.80/KG in 2012, but fell back to 1.01/KG in 2014</td>
</tr>
</tbody>
</table>

*Source: ITC trade data 2015*

In order to compete internationally knowledge of competitor prices is critical and regular interaction with buyers is essential. Members of MRBEA receive such price information on an informal basis and this is a valuable source of information that could be formally captured by the Association. Market forecast is also a valuable source of information to guide the development of individual business expansion or new market entry strategies.

4.6. EU Market

Between 2009 and 2013, European imports decreased moderately, amounting to €65 million in 2013. More specifically, after a minor increase in imports between 2009 and 2011, imports of value-added processed bamboo products decreased in 2013. Imports from developing countries represent more than 40% of the total import value.

Imports of value-added bamboo products are mostly directed to countries in North-West Europe, including the Netherlands, the UK, France and Germany (Figure 4.4).

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23 CBI (The Netherlands Centre for the Promotion of Imports from Developing Countries) Bamboo High Value Added Market Product Factsheet, 2014
Figure 4.4: Leading importers and destination of high value added bamboo €

Source: CBI Market Intelligence 2014 (based on Eurostat data)

The Netherlands is shown to be the primary target of bamboo products, accounting for 28% of total European imports.

Other factors that can increase margins will depend on particular bamboo’s properties. For the EU market the following attributes are considered important:

- Any unique characteristics of bamboo species;
- Five - seven years maturity rather than three - five years;
- Vertical grains are harder than horizontal;
- Strand-woven bamboo as it is much harder than vertical or horizontal grains;
- Natural colour rather than carbonised\textsuperscript{24}; and
- 6 - 9% moisture content as an industry standard.

To increase the price of bamboo products, the elements of aesthetics and design together with the material, are the most important. The quality of the bamboo is very important for a higher price; this is defined by features such as hardness, maturation time, grain patterns and colour. CBI report that premiums paid for bamboo products in Europe, especially with a sustainability certification, may be 10% of the product’s value.

Firms like Teragren (a leading US bamboo manufacturer) and Kangon (a Chinese flooring company) provide examples of good practice in the adoption of certification and sustainability principles.

\textsuperscript{24} AGG is focusing on carbonised bamboo flooring in response to consumer tastes in the Japanese market
5. Competitiveness assessment

5.1. Introduction

This competitiveness assessment of the Myanmar bamboo sector is examined analytically through Porter’s ‘diamond model’. The ability to compete in international markets depends on price competitiveness and/or product quality. A sustainable competitive advantage depends on securing a lower comparative cost structure or a differential strategy based on product quality where customers are willing to pay a premium for higher or more uniform quality, branding or service.

Porter set out that nations succeed in industries for which the national diamond is the most favourable. The diamond’s four corners identify: i) factor conditions; ii) demand conditions; iii) the presence of related and supporting industries; and iv) the firm strategy, structure and rivalry as key determinants of success. The fifth element in the model focuses on the role of government in influencing the development path of an industry.

Figure 5.1 illustrates this model in the context of the bamboo sector.

Figure 5.1: Application of the diamond model to bamboo sector

This assessment builds on the SWOT analysis, the baseline review and market analysis presented in earlier sections.
5.2. Factor conditions

5.2.1. Resource base

Historical information documents that Myanmar has significant bamboo assets within its forest land. Whilst there are indeed large areas with bamboo growing freely the initial field assessment found both a weakness in the density of bamboo and its quality (in terms of species and diameter/height observed). Local informants indicated that better quality is to be found in more remote locations and in conflict affected areas. A follow on field visit to Tannintharyi conducted after the elections provided confirmation of this.

Given the generally positive climatic conditions overharvesting and poor management have been identified as underlying causes for a poor bamboo resource supply. As one bamboo cutter stated ‘each year we have to walk further into the forest to find the bamboo’ a clear consequence of poor resource management. The fallow land observed during the regional field visits presents a real opportunity for Myanmar; there appears to large amounts of land to be reforested and bamboo can play a role long-term in rebuilding a more sustainable forest resource (Myanmar has lost 2% of its forest resource over the past years).

However, in the short term there is a potential constraint on the availability of higher quality bamboo resource to feed an emerging value-added processing sector of scale. It also highlights the vital importance of protecting what is in place alongside developing well-managed plantations. This is having real business consequences now for companies who report being unable to secure quality bamboo supplies.

5.2.2. Labour market

A key attribute that is attracting interest from foreign investors is the Myanmar labour market. With a high literacy rate and low labour costs the country is considered as having the foundations to develop and sustain an industrial base. A comparative survey in 2012 noted that Myanmar had the lowest wages in East Asia. MRBEA members quoted daily rates of US$10 day for bamboo day labourers in China compared to US$3-4 a day in Myanmar.

The Government has introduced a Minimum Wage Law although it only applies to companies employing over 15 people. A flat rate of 3,600 Kyats a day has been established or US$2.8 a day.

The field assessment found that wage rates were generally at or above the new minimum rate. For bamboo cutters when paid on daily rate this was in the order of 4,000 - 5,000 kyats, for female processing factory workers 3,500 kyats, and for skilled workers and site supervisors 7,000 - 10,000 kyats a day. In most cases it was reported that skilled craft workers operating on piece rates would significantly exceed the minimum wage rate.

A particular issue raised by businesses interviewed was that it was getting harder to find labour. The difficulty was due to a range of factors including alternative jobs paying better wage rates (for example road construction) and the difficult nature of the work (in particular extracting bamboo culms from natural forests).

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26 A comparative survey noted that Myanmar had the lowest wages in East Asia with manufacturing workers receiving an annual salary of US$1,100 compared to US$1,478 in Bangladesh, US$2,602 in Vietnam and US$6,734 in China. Source: Jetro Survey 2012
27 The new minimum wage law took effect on 4 July 2013 but the rates were not set at the time. A rate higher than those finally proposed was expected
28 Using an exchange rate of 1,250 kyats to the dollar
This situation was leading to increasing wage rates being offered and businesses offering a broader incentive package to ensure labour being available. Employers report supporting communities and key workers through, for example, providing advance payments for seeds on their farms, again to ensure a regular and reliable supply of labour.

5.2.3. Infrastructure

As noted by the bamboo expert the road and river system provides the basic infrastructure to support the development of the bamboo sector. It is of course variable, but there are potential production sites many having benefiting from infrastructure constructed to support hardwood extraction.

For processing facilities access to affordable power is a particular constraint. The national grid system sells power at 100 kyats per KWh compared to 300 kyats/KWh where diesel is used (or has to be used as a back-up to poor availability).

Co-location of processing facilities near to the national grid network will be important to firm competitiveness, but this can work against near source processing and therefore potential pro-poor impacts. Near source processing is a feature of the Chinese model which has helped ensure benefits are captured by the poorest the rural poor. Production of bamboo chips and pellets can provide an opportunity for near source power generation etc.

5.3. Demand conditions

There are multiple domestic drivers for bamboo demand given the nature of the product and its ‘super-crop’ characteristics. In examining domestic demand for the range of core bamboo products there are three major factors: (i) construction sector activity, (ii) tourism growth, and (iii) and income growth and changing consumer tastes.

Population projections indicate a growth of 2.29m people to 2020. This represents the high growth scenario with the low growth scenario suggesting an increase of 1.4m people. These scenarios equate to a growth in the household population of between 318,000 and 520,000 based on an average household size of 4.4.

This will drive domestic demand within the construction and household sector, which is an important market for timber substitute bamboo products - although classical tastes in furniture may limit demand in this area (design aspects will matter here to compete with imported goods). In addition the demand for edible shoots is likely to rise in line with population growth, as is furniture products.

The contribution from tourism is also expected to be significant to future commercial construction activity. Myanmar was ranked 14th out of 184 counties in 2014 for its rate of tourism growth and its holds a ranking of Number 1 for growth potential to 2015. Visitor export revenues are expected to rise by 10% per annum from 2015 to 2025 based on an increase in international visitors from 1.3m to 3.3m over the period. This will drive capital expenditure (including hotel developments) from an estimated US$125m in 2014 to US$294m in 2025. Linkages to tourism and increasing visitors will be important to future growth of some sub-sectors in particular handicrafts, hotel developments and related construction. Design will play a role in selling to these markets too.

29 Marsh 2006
30 United Nations WPP projections (2015 Revision) are for high growth of 56.6m, medium 56.2m and low of 55.7. The 2015 population estimate is 54.3m
31 Myanmar Population Census 2014
32 The construction industry saw a compound annual growth rate (CAGR) of 11.5% during the period (2007–2011)
33 Based on discussions with CEO of Shwehmi Furniture, Yangon one of the leading makers of teak and hardwood furniture
34 World Travel and Tourism Council (WTTC), Travel and Tourism, Myanmar Economic Impact, 2014
The international bamboo market has experienced a slowdown in demand due to the recession. Prior to the financial crash it was expected that demand for bamboo products would rise driven by the growing recognition of its sustainability credentials as a wood substitute. Within the bamboo product mix a switching towards industrial processed goods was anticipated favouring products such as flooring, veneer panels and floorboards. The recession has slowed this transition, but the trend appears to be broadly the same, with growth in flooring, shoots and pulp. Compared to the pre-recession demand projections veneer panelling has performed less well.

The market analysis identified the major markets by value as bamboo flooring and edible shoots. In terms of market penetration Vietnam has demonstrated an ability to grow its share of the raw bamboo market and is a useful benchmark for Myanmar in the poles segment. Thailand provides a useful comparator in the edible shoots market. The developed markets are the primary importing countries, with Japan and the EU of particular interest on the food and the premium processed segments.

Discussions with emerging bamboo processors and traders identified that within the domestic market local wood flooring products are in demand and are preferred to imported produce. Whilst bamboo flooring is not yet being produced in any volume, initial market testing with local construction sector buyers has proved positive. An MRBEA member involved in the construction sector sees opportunities in the bamboo housing market, in particular for emergency relief/low cost housing to promote urban renewal.

5.4. Industry structure

The sector is currently dominated by traditional enterprises with aggregators and small-scale enterprises. Some of these companies recognise the need to innovate and improve quality, whilst more generally those involved in the extraction of bamboo there is an opportunity to improve resource management and productivity.

There are emerging enterprises looking at the opportunity to transform the industry, building on the experiences of China in particular. Many of these companies have a background in the timber, rattan and construction trades and recognise the potential of bamboo as an alternative and more sustainable material.

Many of the firms operate in a cooperative manner and MRBEA provides a good examples of cooperation through a company that a number of its members have set up together. At the same time there are new entrants to the market, foreign investor interest and other local companies assessing the opportunities presented by bamboo. These new entrants, or firms looking to diversify, already have exposure to many markets through wood and rattan and lengthy experience of trading overseas – they have managed to navigate their way through the period of sanctions. They have a good capacity, but do recognise their own weaknesses and are keen to access third party business and technical support.

Analysis of Myanmar’s trade data can provide a guide as to whether firms trading are competitive in different bamboo product areas. This is examined by way of Myanmar’s relative specialisation in

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35 Reference Marsh future demand profile work 2006
36 Discussions with a company CEO (October 2015) of a new market entrant into the bamboo flooring market
37 Kyaw Tint, Springate-Baginski, O., Macqueen, D.J., and Mehm Ko Ko Gyi (2014). Unleashing the potential of community forest enterprises in Myanmar, Ecosystem Conservation and Community Development Initiative (ECCDI), University of East Anglia (UEA) and International Institute for Environment and Development (IIED), London, UK
various bamboo related products, using a trade metric known as Revealed Comparative Advantage (RCA).\textsuperscript{38}

Based on existing trade Myanmar does have a comparative advantage in wood (HS\textsuperscript{39}44) products and to a lesser extent food produce (HS20) – with Revealed Comparative Advantage (RCA) indicators of 21 and 1.5 respectively. Whilst wood products are dominated by raw material exports, wood flooring (HS4409) shows a positive RCA of 4.0 and a positive trade balance. As bamboo is a wood substitute material this is suggestive that a competitive advantage could be achieved in value-added markets – moving beyond a focus on unprocessed bamboo material.

However, the main competitor, China, has developed efficient production and processing systems for bamboo – although its wage rate advantage is ebbing away. The competitor analysis shows China shoring up or growing its market share in many bamboo product areas including veneer panels, flooring, shoots and charcoal. Clustering of activity may enhance the competitiveness of the sector and this is often seen in China with many processing factories co-located.\textsuperscript{40}

5.5. Supporting institutions

5.5.1. Government

The Forestry Department is the main regulator for forest management. It provides permission for bamboo extraction rights (based on a yearly quota) to bamboo traders and collects forest revenue from bamboo traders. The Department collects revenue from bamboo cutters extracting from natural forests and issues permission for transporting bamboo outside townships. The Forestry Department issues permissions for selling forest related products including bamboo to wholesalers and retailers.

Beyond its rights and revenue collection role the Department also promotes sustainable management of forest resources – for example helping organise communities better to ensure better harvesting practices. Discussions with community forest leaders confirmed this service was being delivered by the Department. However, based on the sample of areas visited efficient harvesting is a major challenge and better practice bamboo resource management needs to be promoted.

5.5.2. Research and development

There is little in the way of R&D being undertaken in the bamboo sector, although the Forest Research Institute in Yezin, Nay Pyi Taw, is undertaking trials as part of the Myanmar LIFT programme.

Interestingly, emerging firms are undertaking their own R&D tests. For example, one company is testing different glues to use in processing their flooring (partly driven by the stringent demands of the Japanese market) and another is testing seedlings on its new plantation. But these firms have indicated that technical support is required for them to develop their businesses. They also point to the scope and level of support provided by the bamboo associations in China which includes strong R&D component. It is recognised that design is weak across the sector, but there is a high level of skills in craft and furniture sector (timber and rattan) to draw from.

\textsuperscript{38} The revealed comparative advantage of a specific country in the trade of a given industry’s products is measured by the industry’s share in the country’s exports relative to its share in world trade. If the index takes a value of less than 1, this implies that the country is not specialised in exporting the product (the share of that product in the country under review exports is less than the corresponding world share). Similarly, if the index exceeds 1, this implies that the country is specialised in exporting the particular product.

\textsuperscript{39} HS is the harmonised system used for recording international trade.

\textsuperscript{40} Based on knowledge and experience of the Bamboo Expert.
Companies that have managed to develop trade linkages to enter export markets have retreated due to being unable to provide consistent quality (as reported by bamboo handicraft and flooring firms). On the other hand there are examples of companies that represent best-in-class in the rattan sector trading in high value export markets – for example the company who are currently the country’s major exporter of rattan furniture. These companies show what is possible in Myanmar despite the many constraints.

**5.5.3. Access to finance**

Discussions with businesses in the MRBEA highlighted the difficulty of accessing finance capital for projects with a high dependency on their own financial resources. The investment cost of a small scale processing factory for bamboo is in the order of US$0.7m - $1.4m.

For those firms interested in investing in new plantations or processing facilities there was concern over the cash-flow requirements in the early years of any investment41. Nonetheless, there is willingness to invest own funds alongside other funding sources as was evident in discussions with some businesses.

The funding landscape is changing and there is the emergence of new financial support to SMEs provided by local banks and donors (for example the IFC42) in Myanmar. Another area of interest in relation to bamboo is the potential for green bank funding or projects although it may be that the minimum deal size will be a constraint. For example Infraco Myanmar sets its smaller investment project investment value at $3.5m43.

A key constraint recognised by companies interviewed for this report is having a well-developed business plan that can be taken to potential funders.

**5.6. Government policy**

**5.6.1. Land policy**

Government land policy reforms are leading to increased availability of land for economic development. In the case of bamboo, forest land is being made available for plantation development for example to members of the MRBEA. However, discussions with bamboo businesses indicate that there is a lack of consistency in the speed at which land is made available by the authorities and this is acting as a constraint on business investment44. For processing activity requiring land in urban areas the increasing price of land is a potential constraint, including enterprise zones.

The PEA notes that whilst there are no legal barriers to the growth of the sector there is little that positively articulates specific support to the bamboo sector within currently policy and legislation45. It also notes that different firms experience different treatment depending on their size, sector of operation and personal networks of the business owner46. There is an opportunity to promote the use of virgin and fallow land (VFL law) for bamboo, as this is already identified in the master plan for the agricultural sector (2000) for agribusiness use.

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41 Issue raised in a meeting between BIF and a company respondent in, November 2015
42 In September 2014 Yoma Bank received a loan from the IFC to provide financial services to SMEs. In August 2015 the IFC announced a similar facility with the Myanmar Oriental Bank. The IFC will provide a $7 million convertible loan to help the lender expand financing for small and medium enterprises in urgent need of capital to grow their businesses and create jobs; IFC News August 19 2015 IFC Home
43 Meeting held between BIF and Infraco, December 2015
44 Key informant interview
45 A Political Economy Analysis of the Myanmar Bamboo Sector, INTERIGTY, December 2015 pp 33
46 Op cit, pp 30
At the community level land rights continue to be a problem and this affects community forest enterprise development. The PEA notes that there is confusion over the status of the land and ownership due to old and conflicting laws and this disproportionately impacts on smallholders, women and ethnic communities.

5.6.2. Trade policy

Discussions with local firms highlight the importance of achieving a trading environment similar to Thailand’s and neighbouring countries. However, the concerns are often not the formal tariff rate, but rather the trading processes and informal charges. For example, in Thailand only one certificate of release from the Ministry of Forestry is required to export in contrast with multiple fees and inspections in Myanmar – impacting their ability to compete effectively in international markets. Local businesses wish to see the full adoption of ASEAN processes and similar practices of neighbouring forestry departments.

5.6.3. Foreign direct investment

A new Foreign Investment Law (FIL) was passed in 2012 to encourage exports, develop capital-intensive extractive industries, improve technology, create employment and skills transfer. The law includes incentives (for example land leases of up to 70 years and five year income tax exemptions), guarantees around nationalisation and provides for land leases. Generally, the new FIL is viewed as a positive step with the first wave of inward investment being focused on the garment manufacturing and tourism sector. Other sectors are expected to follow.

In discussions with business informants it was apparent that external investors are actively considering the bamboo sector. Examples include Taiwanese and Thai interests in bamboo processing and external investor interest in the pulp and green energy markets.

5.6.4. Tax and customs

Discussions with businesses highlighted that the nominal tax and duties per se are not the primary issue. Rather the procedures and informal charges are where problems arise and discouraged trade and investment. The issues raised focus on the length of processes and the extraction of informal charges along the way, which businesses report can add 10 - 20% to costs and affects business competitiveness. A particular issue is the lack of duty claw back on materials as an input to processing sector, for example chemicals for bamboo processing. This constraint affects other industries and needs to be addressed by government.

5.7. Summary Assessment

The table below summarises the findings from the preceding analysis.

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47 The Report Myanmar 2014, Oxford Business Group
48 Whilst the maximum tariff rate is 40% and the minimum is 0%, customs tariff rates on imports of machinery, spare parts and inputs generally range from 0.5 %to 3% Customs duty is zero rated for all the goods to be exported from Myanmar
<table>
<thead>
<tr>
<th>Porter's conditions</th>
<th>Factors</th>
<th>Key findings</th>
<th>Recommendations/ opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource base</td>
<td></td>
<td>The existing bamboo resource base is poorly managed with overharvesting impacting on its sustainability and the supply of mature bamboo of good quality for valued-added processing. Company aggregators are important agents of change to reach significant numbers of farmer beneficiaries to improve resource management. Extraction of higher quality resources from conflict affected/remote areas will need to be managed carefully. The information on the extent and quality of bamboo resource is weak and needs to be improved to inform sector planning. Information on environmental and climate change impacts of bamboo show that context matters in terms of achieving positive net environmental benefits.</td>
<td>Pilot bamboo resource management training materials for dissemination through Company aggregators/traders and plantations. Fallow land presents an opportunity to develop a more sustainable commercially oriented supply of bamboo to the processing industry. There is a need to accelerate land use planning on fallow land to encourage investment in bamboo plantations. Undertake joint impact research with MRBEA and others on the use of fallow land to develop new bamboo stocks.</td>
</tr>
<tr>
<td>Labour market</td>
<td></td>
<td>Whilst labour wages are relatively low, these rates are rising driven by increasing competition for labour. Therefore a key issue in developing a competitive bamboo sector will be the productivity of labour. China provides the best country comparator to learn from (including near source processing, plantation efficiency and waste minimisation). Skills training needs to be increased (e.g. on planting and harvesting techniques) working through identified agents of change (aggregators/traders and plantations). Pilot appropriate use of equipment (e.g. chain saws/bamboo trolleys/H&amp;S) to improve production efficiency and worker well-being.</td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
<td>Road infrastructure is variable but provides an adequate basic infrastructure. The availability of low cost power is more problematic, in particular for the development of a processing industry. The river system presents an opportunity for more sustainable approach to the movement of raw bamboo material, especially Full use of bamboo material can assist firms in reducing power costs and should be promoted (bamboo waste minimisation). Examine the case for designating state/regional based bamboo clusters. Enabling the emergence of strong area based supply chains.</td>
<td></td>
</tr>
</tbody>
</table>
for Kachin state, as long at the bamboo can be transported to the factory gate at the right price point.

<table>
<thead>
<tr>
<th>Demand conditions</th>
<th>Domestic</th>
<th>Domestic demand conditions are generally favourable. With continued population/ household growth and a decade of strong tourism growth forecast.</th>
<th>Promote the value of bamboo as a sustainable material. Pilot BIF Tourism (quality of handicrafts) and Garments linkages (use of bamboo as an alternative material). Examine introduction of a low cost housing pilot initiative working with MRBEA, the construction sector and government.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>International</td>
<td>Myanmar has been losing international market share and has seen a decline in its export performance. In contrast to Myanmar’s current level of exports at US$2.2m the bamboo industry is a huge market opportunity (with international trade of US$1.3bn).</td>
<td>Pilot intervention with emerging value-added processors. Use the local market to help develop competitive products.</td>
</tr>
<tr>
<td>Industry structure</td>
<td>Firm rivalry and cooperation</td>
<td>The MRBEA demonstrates that players in the sector recognise cooperation can help develop the foundations for a new sector and better business environment. There are limited exports of bamboo products and these have been declining. But at the same time there are new investors moving into the sector. RCA data analysis does not provide direct evidence of a natural comparative advantage, but the data shows that wood and food processing are current areas of specialisation for Myanmar.</td>
<td>Joint working to promote bamboo material to wood processors and consumers. There is an opportunity to build on the skills and competitiveness of ‘best in class’ timber and rattan enterprises. There is a need to improve productivity in production and processing. Clustering of activity may enhance the competitiveness of the sector (this is often seen in China with many processing factories co-located).</td>
</tr>
<tr>
<td>Supporting institutions</td>
<td>Government (Forestry Department)</td>
<td>Government land policy reforms are leading to the increased availability of land for economic development. But there are private sector concerns about implementation of policy.</td>
<td>Need to promote transparency in the allocation of land working with Government stakeholders.</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>Firms recognise the importance of design and being able to innovate (for production and processing). This is an area of weakness. In order to access value-added markets innovation including design is essential and in particular to secure Japanese, EU and US market penetration.</td>
<td>Integrate design and technical innovation as part of the MAS. Examine the technical properties of bamboo to help the promotion of products. Supply chain linkages should be promoted with Myanmar designers currently resident overseas to help build local service demand.</td>
</tr>
<tr>
<td>Access to finance</td>
<td>To take the sector forward project and risk finance will be required, although some businesses may seek funds through joint venture equity partners. Access to market and business planning services is required to facilitate growth.</td>
<td>Provide facilitation business support to pioneer business to develop their business plans. Test the appetite of financial institutions (in particular co-funded banks) to fund.</td>
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<td>---</td>
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<td></td>
</tr>
<tr>
<td>Government policy</td>
<td><strong>Land policy</strong> A lack of transparency and clear procedures for accessing land is currently constraining private sector investment in the sector.</td>
<td>Land zoning and the identification of bamboo plantation investment areas should be explored with government to encourage investment in new bamboo supply.</td>
<td></td>
</tr>
<tr>
<td><strong>Trade policy</strong> ASEAN single market agreements will remain critical over the next five years.</td>
<td>Call for continued reform of the soft infrastructure supporting trade facilitation in the MAS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FDI</strong> There will an acceleration of interest from investors in a range of markets. This is expected to spread beyond construction and tourism in the new post-election environment. Key markets include Japan (shoots, flooring and energy), the EU (value added flooring) and India (raw bamboo). But many firms already have existing trading connections and relationships which should be fully exploited.</td>
<td>Develop a structured programme to facilitate market linkages with international buyers (working with associations and trade bodies). Facilitate the identification of partner investors in the processing sector (wood, food and material diversification).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tax and customs</strong> Lengthy procedures and informal charges are identified as impacting trade and investment. Tax policy is not fully supportive of encouraging the local processing sector (e.g. tax on chemical inputs for bamboo flooring).</td>
<td>Promote the case for a review of duty claw-back arrangements on inputs for exports.</td>
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<td></td>
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</tbody>
</table>
6. Economic and poverty impacts

6.1. Introduction

This section provides a high-level assessment of the economic and poverty alleviation impacts of the typology of production and processing enterprises outlined in Section 3. The risks and opportunities provided by each business model and the impact on the environment are also considered.

At a strategic level the intervention choices for the MAS could be seen in terms of future sector scenarios. Broadly these scenarios could entail:

- ‘Business As Usual’: the bamboo sector remains low key in the National Export Strategy, the construction sector is the primary driver of demand with increasing demand for tourism related handicraft products, firms looking to supply higher level processed bamboo products struggle to do so due to poor quality resource base and lack of support services. Local firms are at risk of failure and imports of valued added produce rise to meet increased domestic demand. The bamboo resource is poorly managed and becomes increasingly unsustainable; the poor are negatively affected as is the environment;

- ‘Organic development’: support is provided to current private sector players with an interest in the bamboo sector. Facilitation services are provided to the MRBEA members and others firms. The focus is on ‘will-skill’ deficit of firms entering the plantation market and value added manufacturers targeting the domestic market to build the bamboo sector organically, the initial export market focus is on edible shoots and raw bamboo. A strong public-private partnership is developed to signal a change how Myanmar manages its natural resources, to provide a sustainable bamboo plantation approach to underpin the development of a new industry. Bamboo waste is minimised; and

- ‘Innovate and compete’: targets support to valued-added processing export markets, and the comparative advantage of the country evident in the wood flooring sector – the focus is on promoting quality and material innovation. With international joint venture support the demand for larger plantation investment is likely and integrated supply chains. CSR and resource management principles are not expected to be at the forefront under this scenario, although this will vary by investor.

Each of these scenarios entails different type of support to the development of the sector. The BAU scenario primarily focuses on Forestry Department support to the sector, with the private sector seeking to promote the sector with limited external support. The two intervention strategic scenarios are more facilitative; helping the private sector to grow. These scenarios may well vary in their pro-poor, conflict sensitive and environmentally impacts.

6.2. Enterprise models

The purpose of the business model impacts assessment is to be able to consider the scale of impact of proposed interventions as part of the development of the Bamboo MAS. The enterprise typologies set out earlier in the report included:

- **Low Input Low Output (LILO):** family owners of bamboo plot/ mixed bamboo and timber plot selling small or larger quantities of bamboo to individuals or traders;
- **Company aggregators/traders**: intermediaries organising harvesters/cutters to source bamboo for sorting/grading and onward transporting;

- **Handicraft community enterprises/family enterprises**: small-scale private handicraft producers and community village enterprises primarily producing for the domestic market; and

- **Small manufacturing enterprises/cottage industry**: sourcing and value-added processing of food and timber substitute products.

Each of these enterprises (or processing typologies) primarily source raw bamboo material from natural forests, but the plantation production business model is emerging and is regarded as essential in developing a more competitive bamboo processing sector.

6.3. Impact assessment

A high-level impact assessment has been developed for each of the selected enterprise models based on information garnered from enterprises during the field work. The assessment for each enterprise model examines production yields and the income/expenditure of operations to estimate (i) jobs per hectare and (ii) net income per hectare.

The impact profile using these two metrics is set out below. It illustrates the relationship between the different business models and the jobs intensity (jobs per hectare based on the integrated supply chain effect) and the income potential (income per hectare from income to labour).

Figure 6.1 shows that the plantation and value-added business models have greater job density and income per job impacts compared to lower processed goods. The processing factory shows higher return per employee that the plantation model, although the plantation model has a higher jobs density.

**Figure 6.1: Economic impact by enterprise model**

By definition the income to labour is a metric that illustrates the pro-poor impact of the enterprise model. The assumption is that urban and rural beneficiaries have equally pro-poor impact weighting; as do low and higher skilled labour.
However, there will be a need to consider interventions based on a number of criteria and as outlined in the PEA analysis, social need and economic opportunity may not coincide. The PEA recommends a mixed model supporting small plantations and Community Forest Enterprise. The routes to supporting Community Forest Enterprise could be through small plantations or Company aggregators as potential agents of change.

Table 6.2 illustrates the scale of direct impact from working with a mix of enterprise models. The assumption is that the ‘agents of change’ for the sector are: (i) existing Company aggregators like Sie Seinn, (ii) emerging small plantation enterprises such as the Company 1 Company and, (iii) emerging bamboo processors such as Company 2.

**Table 6.2: Indicative direct programme impact**

<table>
<thead>
<tr>
<th>Indicative programme outputs and impacts (USD)</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agents of change assisted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantation enterprises</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Company aggregators / traders</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Processing factories</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Direct enterprises assisted (no.)</strong></td>
<td>3</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td><strong>Scale of output</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production land (HA)</td>
<td>65</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>Raw bamboo produced (MT)</td>
<td>999</td>
<td>3,998</td>
<td>3,998</td>
<td>3,998</td>
<td>3,998</td>
</tr>
<tr>
<td><strong>Public investment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot and follow-on programme</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
<td>300,000</td>
</tr>
<tr>
<td><strong>Gross benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incremental sales value ($ of which)</td>
<td>0</td>
<td>363,773</td>
<td>1,145,284</td>
<td>1,361,149</td>
<td>1,901,139</td>
</tr>
<tr>
<td>Poles ($)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>333,125</td>
</tr>
<tr>
<td>Shoots ($)</td>
<td>0</td>
<td>0</td>
<td>53,966</td>
<td>269,831</td>
<td>485,696</td>
</tr>
<tr>
<td>Value-added products ($)</td>
<td>0</td>
<td>363,773</td>
<td>1,091,318</td>
<td>1,091,318</td>
<td>1,091,318</td>
</tr>
<tr>
<td>Direct jobs supported (FTE)</td>
<td>94</td>
<td>402</td>
<td>402</td>
<td>402</td>
<td>402</td>
</tr>
<tr>
<td>Supply chain beneficiaries (No.)</td>
<td>100</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Carbon benefit (MT)</td>
<td>2,925</td>
<td>11,700</td>
<td>11,700</td>
<td>11,700</td>
<td>11,700</td>
</tr>
</tbody>
</table>

Based on the profile of business assists (the targeted ‘adopters’) set out in the table above over 5 years cumulative incremental sales are estimated at $4.7m. The Cost-Benefit Ratio (CBR) is estimated at 1.82 with an Economic Rate of Return (ERR) of 51% (using a 12% discount, a value-added to sales ratio of 0.5 and assuming US$1.5m of public investment spread evenly over the programme period).

That is a direct gross return of $1.8 for every dollar invested excluding any ‘adaption’ and ‘expansion’ benefits being taken into account. The annual additional sector sales of US$1.9m in 2020 are

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49 The first year includes sunk investment costs incurred in developing the MAS
assumed to be exports. This sales export value can be compared against US$2.2m of bamboo exports achieved in 2014.

If the estimated carbon benefits are incorporated arising from new plantations using vacant land and adopting best practice principles the ERR increases to 56%\(^{50}\). The number of direct beneficiaries is estimated at 1,402 in year with a unit cost per direct beneficiary assisted is US$1,070.

Scaling-up is anticipated to arise from the copying of business models by firms in the wood flooring sector, or by new market entrants (most likely though joint ventures as is already evident in the value-added bamboo market). Crowding-in can also be catalysed once pioneers have confirmed the business and their markets.

These estimates are gross impacts and consideration of the displacement of activity markets will need to be made during MAS design and implementation.

6.4. Opportunities and risks

The businesses interviewed across the sector included many firms willing to take risks and expand their activities into the bamboo market. A small number of firms are already actively investing in the bamboo sector, whilst others with lower risk appetites are waiting to see how well lead firms do. But the majority of firm activity remains focused on traditional markets.

**Box 6.1 Company strategy case example**

This is a young, innovative and forward-looking company willing to set the standards for the bamboo industry and to promote the development, professionalisation and rationalisation of the utilisation of bamboo in Myanmar. The company was recently awarded 200 acres (on two sites near Yangon) by the Government on a 40-year lease basis for a bamboo plantation and processing project.

The plantation was started in 2015. One of the sites has natural bamboo inventory that could be used for the plant. The company recently incorporated a new member that was granted a large concession of bamboo forest by the Government. Company 1 is now in the development stage on its two plantation sites having completed planting new seedlings.

The company’s strategy aims to acquire up to 1,000 acres of land with a short term market likely to be on the production and export of bamboo shoots and poles. This approach reflects their assessment of investment risk and the need to build a positive cash flow for the business. Thereafter they will consider taking on more risk, for example exploring products such as flooring, bamboo housing and agro-processing. Given the investment required they see the availability of finance a potential constraint. Further, they are aware they need to develop a credible business plan which sets out a clear governance and management structure. Presently, the business has a large number of investors supporting the development of the business in ‘development project’ like manner.

Given the experience of other countries in trying to expand and diversify in the bamboo market, in particular the higher value end, it is important to be cautious and to fully assess the risks. China remains dominant and a very tough competitor.

There are more significant barriers to entry for product areas that require higher levels of processing and this indicates that caution be applied in entering new markets that require significant capital.

\(^{50}\) The carbon benefit of one hectare of land is conservatively estimated at 45MT.
expenditure. Beyond traditional and cottage industry products, the edible shoots and poles markets face lower risks. Opportunities in the canning sector for edible shoots should be explored, in particular in the Dawei area.

Another product with a both domestic and export market potential is bamboo housing (see Box 6.2) and is one that a number of countries have explored. The housing market has a strong pro-poor impact potential for the most vulnerable in Myanmar.

**Box 6.2: Bamboo housing**

There are three main types of bamboo housing: (i) traditional houses which use bamboo culms as a primary building material; (ii) traditional bamboo houses, in which a bamboo frame is plastered with cement or clay; and (iii) modern prefabricated houses made of bamboo laminated boards, veneers and panels.

Experts estimate that over one billion people live in traditional bamboo houses. These buildings are usually cheaper than wooden houses, light, strong and earthquake resistant, unlike brick or cement constructions. New types of prefabricated houses made of engineered bamboo have certain advantages. They can be packed flat and transported long distances at a reasonable cost. They are better designed and environmentally friendly. Bamboo materials are widely available and can be cultivated at a low cost.

In Colombia, a country with a tradition in bamboo architecture, the unique properties of Guadua bamboo are recognised by the Colombian authorities and laid down in a national bamboo building code, of particular importance for earthquake prone areas.

*Source: NL Agency Ministry of Economic Affairs 2013*

There are complementary opportunities to be explored with the other BIF sectors; garment and tourism. In the textiles sector there would be an opportunity to examine a crossover R&D project with the BIF garment sector initiative (testing the use of bamboo as an alternative material and the potential as a niche Myanmar product). Further, in the handicrafts sector there is an expressed need to improve the quality of products which could be linked to the BIF tourism initiative (see Box 3.3).
7. Conclusions and recommendations

Country comparative advantage

Myanmar has extensive natural forest bamboo resources (although the volume of resource is not certain) and a wide range of species (although again it is not clear how extensive commercial species are) which, combined with relatively lower wage rates, affords the country a comparative advantage. Moreover, the availability of secondary forest and degraded land presented an opportunity to bring land back into use on a more sustainable basis. However, the re-use of land still ran risks of being poorly managed and therefore having potential harmful effects on the environment and the poor.

Rules

The policy and regulatory environment is generally regarded as poor, although progress has been made over recent years. The major concerns raised relate to (i) land use, rights to land, speed at accessing land for economic use and the increasing price of land, (ii) informal taxes on doing business impacting on cost competitiveness with tax policy acting as a brake on investment in the processing sectors, (iii) poor enforcement of the use of natural forests and poor management of natural bamboo resources, and (iv) although improving there is an inadequate recognition at a policy level of the potential role of Non-Wood forest resources.

Supply and demand

The supply of bamboo is presently geared to low value-added and local markets and inefficiently harvested. Participants stated that there is growing domestic demand for bamboo in the construction industry and as a substitute material for timber. There is also growing interest from export markets in the potential of Myanmar to supply bamboo chips for energy use (for example Japan driven by its energy strategy) and overseas investors (for example Taiwan in the flooring market). MRBEA members have been examining the potential opportunity for a number of years and are now starting to invest in the sector.

Supporting institutions

More support is being requested by the sector. In terms of exploiting the opportunities associated with bamboo participants noted three areas where support was required (i) access to finance, (ii) selection and adoption of technology/management of resources with R&D support, and (iii) gaining market access and establishing new markets for bamboo end uses. It is worth noting that many of the workshop participants were already active in the timber and rattan trade and had long standing experience of international trade in craft and furniture related products.

The overall conclusion is that Myanmar potentially has a comparative advantage in bamboo underpinned by its climate, the opportunity by virtue of its degraded land to develop efficient bamboo plantations, and relatively low labour costs. However, to turn these fundamental attributes into a sector competitive advantage there is work to be done. Existing activities are trapped in low-value added low profitability segments with dwindling accessible bamboo resources. Specifically the following conclusions and recommendations are set out for consideration by the stakeholders willing to support the development of the bamboo sector in Myanmar.

Big market, small player but significant potential

The domestic and international markets for bamboo products are significant with an international market currently valued at US$1.369bn and expected to grow. In contrast Myanmar’s
baseline recorded export trade in 2014 was merely US$2.2m. The value of the domestic market is not fully understood, but its future demand will be driven by population and urban development growth. The international bamboo market will continue to be driven by the need for more sustainable materials to substitute for timber. In order to sell into this market quality and sustainability credentials will matter more as regulations and consumer preferences continue to evolve. Arguably, there are Myanmar companies operating in the rattan and wood processing market that provide local best in class benchmarks for others to emulate.

**Recommendations:** the National Export Strategy should pay greater recognition to the role of bamboo as part of the national forest resource mix. This resource should be more sustainably exploited as part of a national industrial, environmental and pro-poor strategy. Target markets include raw bamboo and edible shoots in the short term leading to more value added processing (veneer/ply, flooring and bamboo housing) over the medium term. Sector promotion mechanisms to facilitate this include qualifying the species and their commercial attributes, study tours to build supply chain relationships, seminars and workshops to promote bamboo as an alternative material, and finally promoting quality bamboo products (including innovation).

**Pro-poor opportunities**

The evidence base review of the pro-poor impacts highlighted that context matters in terms of achieving pro-poor impacts. Existing poverty levels and local conditions can influence the distribution of benefits and the impact on the poorest – not least ongoing conflict-affected areas and the remoteness of parts of the country. Female participation in the sector can be seen at many levels – one company interview for this report is led by a female CEO and another one has strong female contributions at board level, edible shoots harvesters and retailers have strong female representation as do processing and weaving businesses on the factory floor. At the factory level, and in harvesting, there are health and safety issues to be addressed for the benefit of all workers and firm level productivity.

**Recommendations:** develop pro-poor operating principles and enterprise CSR policies and promote these as part of a sector support programme – including communicating the benefits of strong H&S practices (getting the message across to workers as well as owners). The China Carbon Fund sets out some of the relevant principles as outlined in Box 3.7 as does the sustainability approach adopted by firms like Teragren – a leading US bamboo manufacturer.

**Address knowledge gaps**

Knowledge of the bamboo sector is far from perfect in a number of areas; in particular the scale and quality of the resource base; the best target markets to develop trade linkages with, the potential impact of bamboo on climate change, and the nature of pro-poor impacts in a non-China context.

**Recommendations:** provide wider support to the sector, or cooperate with other market players, to ensure better understanding of the bamboo resource base, existing markets linkages at firm level, and bamboo environmental/pro-poor impacts. The relationship between ecosystem and the promotion of intensive bamboo cultivation is an area for further research. MRBEA members and a company set up by their members could be potential partners on such a research programme.

**Sector policy matters**

**At the policy level progress is being made.** Land transaction policy and land rights are improving. However, to ensure the much needed investment – both local and international – greater clarity and transparency is required. This is as vital for rural community enterprises as it is for entrepreneurs looking to establish a bamboo plantation or processing facility.
Recommendations: Land rights should be further improved and made more transparent promoting land use allocation for bamboo production. Duty drawback on supply tax inputs should be examined by government (for example on imported inputs for bamboo processing) to encourage greater local value addition. Continued transport investment and ports will aid the development of the sector, and other export orientated sectors. However, regional clusters should be promoted to maximise agglomeration and natural advantages.

Protect what is there and develop

There is uncertainty over the scale and quality of the bamboo resource base which needs to be better understood. However, what is certain is that the existing resource is not being managed effectively, which limits its potential contribution to the development of the sector in the short term. Longer term there is a need to promote the development of well managed plantations as a beacon of a new approach to natural resource management.

Recommendations: There is a need to promote cost-effective approaches to the dissemination of best practice in bamboo resource management at a community and enterprise level (working with private firms and the Forestry Department). The reduction of waste is key to a profitable and sustainable sector. Waste reduction has important pro-poor impacts (for example the introduction of small kilns for processing waste into charcoal at a village level) as well as reducing business power input costs.

Private sector has cash to invest

There is without doubt a constraint in the availability of risk funding to support the sector’s development; in particular for capital intensive bamboo processing investment. However, it is evident that there is local capital available, and inward investment funds to be invested, where a business case can be established.

Recommendations: provide investment feasibility assistance to lead entrepreneurs considering new investment (ideally working alongside green investment banks to provide proof of concept and to promote financial instruments for the sector). A survey of species in the Tanintharyi area to determine the viability of post-harvest manufacturing, pole export or shoot canning nears the bamboo groves/plantations is recommended.

Ensuring an environmental dividend

The evidence base on the net environmental impact of the bamboo sector is less than clear cut – baseline conditions matter and will determine the extent of any positive contribution compared to alternative land uses. Against this background there are a number of precautionary principles that can be adopted that will aid the sustainable development of the sector as outlined in Box 2.1.

Recommendations: develop and disseminate best practice production and processing environmental principles to businesses and communities. The use of ICT and the development of a ‘Bamboo Farm App’ is one approach to explore with the Association and the Forestry Department). The feedback on the industry training undertaken as part of this rapid assessment was very positive, with a latent demand evident for further knowledge transfer.

Walk-run

There is a need for investors to adopt risk-based assessments in any investment decisions which arguably means going slow on looking to compete in value-added markets. However, local and foreign investors are already making decisions at a pace and some are already starting to
run. There is a potential ‘will-skill’ mismatch evident that needs to be addressed through facilitating business planning support to the sector.

**Recommendations:** Support those early movers that are running now to mitigate initial sector investment failures which could undermine any crowding-in effects. It also provides an opportunity to promote best practice socio-economic and environmental principles. To achieve this objective facilitating access to markets and like-minded buyers will be vital.