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ARTICLE

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Enhancing the knowledge and skills of smallholders to adopt market-oriented tree management practices: lessons from Master TreeGrower training courses in Indonesia

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ABSTRACT

Growing trees on farmland continues to be a promising land-use option for smallholders in Indonesia as they look to diversify their enterprises beyond the main agricultural sector. While most smallholders integrate trees into their farming systems, selling timber and other tree products has usually been infrequent and opportunistic. Because of this infrequent trade, most smallholders rarely adopt silvicultural practices that would increase the commercial value of their trees. A research project trialled an alternative approach to forestry extension in Indonesia, known as the Master TreeGrower (MTG) training course. The MTG training courses used a farmer-centred approach to teach smallholders about forest science and took participants to market hubs so they could better understand how different forest products were valued by traders. The MTG training approach was trialled in 2014 in five districts in Indonesia and involved 118 smallholders and 27 non-farmers as course participants. This article reports on a recent evaluation of the MTG training courses held about three years earlier to explore the enduring impacts of the training approach and whether it can be scaled-out to other areas of Indonesia. The evaluation data were collected via focus group discussions (FGDs), in-depth interviews, household surveys and observations at three project sites: Pati (Central Java), Gunungkidul (Yogyakarta) and Bulukumba (South Sulawesi). A questionnaire was distributed among the participants of the FGDs to assess the extent different knowledge and skills of tree management that had been adopted by them following the MTG courses. The evaluation of the MTG approach revealed that the courses were effective in increasing smallholders' knowledge of commercial forestry and their silvicultural skills. Many participants were more active with silviculture and planned to invest further in commercial forestry following the MTG training. In effect, the MTG training appeared to change the hearts and minds of the farmers about how commercial forestry could enhance their livelihoods.

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Introduction

The Indonesian government continues to encourage and promote community and social forestry programs to smallholders and other people living in close proximity to forests. This includes support for forestry on private farmland, *hutan rakyat* (HR) and community-managed forestry on state land, *hutan tanaman rakyat* (HTR). In 2013, the total areas of HR and HTR were about 34 800 000 ha and 3 600 000 ha (potential), respectively, across Indonesia. A recent study found that the contribution of community-based forestry was nearly 50%, or about 23 000 000 m^3, of the total log supply in Indonesia (ARUPA 2014). However, for most smallholders, the contribution of commercial forestry to their total household income remains small, amounting to about 10% of household income (van de Fliert 2013).

High international demand for wood-based products has been another challenge. Australia has a strong connection to Indonesia's forestry sector, importing AUS$50 000 000 of wood-based furniture in 2014–2015, and increasingly seeking timber imports from 'certified' sustainable sources. The European Union (EU) has also introduced the Timber Regulation (March 2013) requiring all wood and wood-based products traded to the EU to be certified as originating from 'legal' sources. In response, the Indonesian government has developed policies that aim to encourage the forest industry to source supplies from sustainably managed plantations and community-based commercial forests (CBCF) and is progressively introducing the Timber Legality Assurance System (SVLK) (MoEF 2018). Despite the ambitious targets for CBCF, there has been mixed results to date with variable returns for smallholders and continuing conflict over access and ownership rights of some remote forests.

A mix of economic, social and technical issues have been identified as limiting the performance of HR and HTR. For example, Stewart et al. (2014) and van de Fliert (2013) found that poor silvicultural practices were degrading the quality of forest products and financial returns to growers. Moreover, other authors identified issues related to tree growers' knowledge, skills and practices, particularly in the technical aspects of tree management and the understanding of price dynamics in local markets (Widodo 2015; Muktasam et al. 2015). It has also been reported that limited

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and ineffective extension services have contributed to poor forest performance within the non-industrial forest sector (Muktasam et al. 2015).

This article discusses the results of a recent evaluation of an alternative approach to forestry extension—one that is farmer-centred—which may lead to better livelihood outcomes for smallholders involved in CBCF.

Community forestry and forestry extension in Indonesia

Despite smallholders' familiarity with tree growing and government encouragement, a range of issues constrain the development of CBCF in Indonesia (van de Fliert 2013; Reid et al. 2014; Widodo 2015). These not only cover the field of tree and plantation management, but also the marketing and harvesting of timber products. Even farmers who have planted recognised commercial timber species, such as teak (*Tectona grandis* Linn. f.), gmelina (*Gmelina arborea* Roxb.) and sengon (*Paraserianthes falcataria* L.), tend to undertake very little silviculture, such as pruning and thinning, and lack an understanding of different silvicultural options and the result on timber quality and prices. Race and Wettenhall (2016) found that many Indonesian farmers grow timber trees primarily to support their household needs with products such as fuelwood, building timbers and fodder. While recognising that their trees may provide an opportunity in the future for generating income from timber sales, few smallholders give the prospect much thought when their trees are young.

This view is consistent with the finding that most farmers have a weak understanding of how to measure and value their potential forest products, or their understanding about the dynamics of commercial markets (Irawanti et al. 2017). Consequently, it is common for smallholders to sell their timber for low prices and for commercial forestry to provide a limited financial return to the family's household budget. For example, it was recently estimated that in Sumbawa farmers received about one third of the potential revenue for their timber production due to their limited understanding of how to measure and value their timber in the context of local markets (Muktasam et al. 2015; Widodo 2015).

Challenges with forestry extension

The challenges of providing smallholders with adequate agricultural and forestry extension in Indonesia are many, with the core issue being the inability of any extension service to reach most farmers with interests beyond growing commodity crops (Muktasam et al. 2003; Muktasam 2012; van de Fliert 2013; Reid et al. 2014; Muktasam et al. 2015; Widodo 2015; Riyandoko et al. 2016). To expand on existing extension services and better engage with farmers, the government has supported the trial of three different participatory approaches since the 1980s, namely: Farmer Field School (FFS), Decentralized Agricultural and Forestry Extension Project (DAFEP), and Farmer Managed Extension Activities (FMA) introduced through the Farmer Empowerment through Agricultural Technology and Information (FEATI) project. While these approaches were perceived as being more participatory than previous extension efforts (e.g. direct training, visiting demonstration sites), there was little adoption by the lead extension agencies in their day-to-day operations (Muktasam and Ridwan 2013).

The FFS model was first introduced in Indonesia in the late-1980s with support from the World Bank, to help farmers address pest and disease issues. Some extension analysts viewed the FFS model as a more participatory approach to extension than the conventional approach of simply providing technical information, as it adopted adult learning principles (van den Ban & Hawkins 2002). Typically, with the FFS approach, local extension activities were managed by a small group of farmers who met regularly to discuss pest and disease issues on their farms. Due to its perceived advantages in supporting effective farmer learning and transfer of technology, the FFS approach was extended and adopted to cover issues related to climate change (Suadnya et al. 2011) and other food crop production issues when the FFS concept was transformed into the Integrated Crop Management Farmer Field School (Ministry of Agriculture 2008; Ernawati et al. 2015; Firmana & Nurmalina 2016).

The DAFEP (2003–2006) and FEATI (2007–2012) approaches were supported by the World Bank and extended the use of participatory approaches within the prevailing extension system. Through these projects, farmers were encouraged to form local groups to design and manage their own extension activities (FMA). Progressively, farmers were encouraged to use information technologies such as computer-based and internet-connected data analysis, which also enhanced the capacity of extension and research agencies, and approaches used by field-based extension agents. Extension services have evolved over time to now include providing much more information via the internet, such as through 'e-Farmer' (Muktasam & Ridwan 2013).

However, these models have focused primarily on food crop production and have not been designed and used in the forestry context. In addition, these models are still just adopted and implemented by individual projects and do not appear to have influenced the approach used by government extension services more widely. As such, these models tend to be limited in terms of the outcomes achieved beyond the participating farmers, and the benefits being sustained for just a short period after the projects were completed (Muktasam & Ridwan 2013).

Master TreeGrower innovation for forestry extension

The innovation underlying the Master TreeGrower (MTG) training courses is that it is focused on both the *content* (information) and the *approach* to working with participating farmers to enhance CBCF management practices. The desired outcome of the initial MTG training courses conducted in 2014 in Indonesia was that participating farmers would acquire the *knowledge* and *skills*, and implement *practices*, considered necessary for their successful involvement in CBCF. That is, farmers would have the knowledge and skills to adopt and adapt appropriate silvicultural practices to produce and market a range of desired forest products to their satisfaction. Both the content and approach of the MTG training are discussed below.

Content

The broad outline of the material presented to participants across the five-day training course is presented in Table 1. The topics were identified in previous studies as covering the common knowledge gaps by farmers involved in CBCF obtained through focus group discussions (FGDs) with

Table 1. The content delivered in a five-day Master TreeGrower training course

Day 1: Mastering the art of tree growing
– Importance of farmer decision-making and appropriate design
– Identification of 'farmer' problems and aspirations (short, medium, long term)
– The role and prospects of community-based commercial forests in the region
Day 2: Markets
– Product specifications, marketing options, regulations, etc.
– Visits to processors and market outlets
– Secondary and on-farm markets for forest products
Day 3: Measurement
– Tree and stand assessment relative to product specifications (use of Master TreeGrower Tape)
– Landholder needs and aspirations
– Documenting forest growth for timber, carbon and other values
Day 4: Management
– Tree and forest growth, silvicultural options (pruning, thinning etc.)
– Examples of farmers applying silvicultural methods
Day 5: Farm visits, graduation and the future
– Appropriate design, risk assessment, evaluation of options, etc.
– Presentation of certificates
– Role of farmer groups and information networks*

interested farmers, and a workshop conducted with a group of experienced forestry extension and project staff (van de Fliert 2013; Reid et al. 2014; Manurung 2015).

The approach

The MTG training courses were designed as a '… flexible participatory learning model that could be presented as a short course for a group of farmers' (Reid et al. 2014, p. 27). The authors also stated that the:

> '… underlying philosophy of the MTG program is that agroforestry and farm forestry development *should be guided by farmers*. It should look and feel like forestry by farmers for farmers, and should reflect the diversity of interests, resources and aspirations of the farming individual and community' (Reid et al. 2014, p. 27).

The term 'Master' was deliberately used to emphasise that the participating farmers were undergoing a process of empowerment, where farmers will make their own decisions about forestry for their farm's development. The approach of the MTG training courses emphasised the vital role farmers should play in leading the development of their farms. This reflects a large body of evidence that suggests the failure of many rural development projects is due to the lack of genuine community participation and empowerment (Muktasam 2000, 2004).

Illustrative of the MTG training courses' participatory approach is the first session where, after the introduction of participants and facilitators, participants are asked to share their interests and aspirations for tree growing. Their responses are used by the training facilitators to adjust and confirm the approach and content for the five-day training course with the participants. While the MTG program has been delivered extensively in Australia and some other countries (Reid 2017), it had not been delivered in Indonesia prior to the trial implemented in 2014. The trial of the MTG training courses in Indonesia was delivered in five project regions involving 145 participants, comprised of 118 farmers and 27 non-farmers, such as government extension agents, forest officers, industry members and those involved with related non-government organisations (Muktasam et al. 2015).

Methodology for evaluation

To explore the adoption of knowledge, skills and practices resulting from smallholders' participation in the MTG training courses the evaluation study drew on established methodologies such as 'project logic' (Patton 1997), Targeting Outcomes of Programs (TOP) Model (Rockwell & Bennett 2004), and the 'most significant change' evaluation frameworks (Davies & Dart 2005). Patton's and Bennett's frameworks provide a logical link between inputs or resources with activities and the changes that are intended to occur due to the activities. Both frameworks use the same terms such as outputs and outcomes (short, intermediate and long term). A third framework was also used—the 'most significant change' framework, which helped to get a better understanding of the MTG training courses' outcomes, which emerged variously in the short, intermediate and long term. The use of multiple evaluation frameworks ensured a comprehensive and holistic assessment of the training continuum—from inputs through to outcomes. The frameworks highlight that the direct outputs of the MTG training are the changes in participants' knowledge, attitudes, skills and aspirations, and these changes may lead to subsequent changes in participants' tree management practices (short-term outcomes), forest production (intermediate outcomes), income and socio-economic and environmental benefits (long-term outcomes). The evaluation study also recognised a range of external factors affecting the participants' behaviour which may work against or in support of the adoption and diffusion of improved tree management practices (e.g. prices offered for forest products).

Variables and measurement

The following variables were measured in the evaluation study:

(1) *Changes in farmer tree management* due to their knowledge, skill, attitudes and aspirational changes, such as thinning, pruning and estimating timber volume in preparation for selling trees
(2) *Changes in social, economic and environmental conditions* due to the changes in tree management, such as better prices received for forest products after they have adopted recommended silvicultural practices and used better marketing approaches
(3) *Adoption of the MTG training model by local forestry extension agencies/organisations as a preferred approach to extension*, such as the adoption by the local government agency to implement the MTG model (or an adaptation of the model) and its perceived effectiveness (number of training courses, level of satisfaction and cost effectiveness) and
(4) *Farmers' and extension/field agents' perceptions of the effectiveness of the MTG training*, as directly reported by a range of participating farmers and facilitators/trainers.

Data collection

Data collection for the evaluation study occurred in Pati (2–6 November 2016, FGD at the Trees4Trees Office, Sodomulyo Village, Central Java), Gunungkidul (8–14 November 2016, FGDs at Dengok village and Wanagama Training Center, Yogyakarta), and in Bulukumba

Figure 1. Locations of evaluation of Master TreeGrower training courses, Indonesia

(12–18 December 2016, FGDs at Benjala and Malleleng villages, South Sulawesi), with the locations of the MTG training courses and evaluation are presented in Figure 1. Data was obtained via in-depth semi-structured interviews and FGDs with a wide range of the MTG participants, including farmer participants, local government staff (from the local forestry office) and local partners at each site. Field observation of a small number of farmers' tree management was also used to triangulate with the evaluation study's qualitative data from interviews and group discussions (Bryman 2012).

Data analysis

Descriptive statistics were compiled and analysed using simple aggregate measures, including the percentage of participating farmers who had adopted recommended silvicultural practices, measured their trees, or shared their knowledge with other farmers; with some metrics compared to the practices of neighbouring farmers who did not participate in the MTG training (i.e. non-participants).

Qualitative analysis of the in-depth interviews with MTG trainers/facilitators was used to identify dominant topics of conversation and emerging patterns of responses about the overall effectiveness of the MTG training, specific aspects about the content and training approach, and the value of conducting further MTG training courses in the future.

Results

Respondent characteristics

It was anticipated that the data for the evaluation would be collected from most of the MTG training course participants at the study areas, with a small number expected to be unavailable or unwilling to be involved in the evaluation FGDs. The participants for the evaluation interviews, FGDs and field visits were selected purposively from those attending the discussions. The MTG training course participants were originally selected from local farmer groups and who expressed interest in acquiring more knowledge about tree growing.

The evaluation process convened five FGDs (comprised of 64 participants, including five women; Table 2), with the highest rate of MTG participants engaged in the evaluation study in Pati, where 18 out of 20 MTG participants attended the FGD. The lowest rate of engagement in the evaluation was at the Wanagama meeting which was attended by about half of the MTG participants. Accessibility for participants to join the FGDs is likely to have been a factor in whether they participated in the evaluation process, with some farmers living at considerable distance from the village centre.

The participation rate was also high in Benjala where nearly all the farmers who attended the MTG course came to the evaluation FGD. The other MTG participants in this village included field extension agents and other government staff (including the Director of the Bulukumba Forestry Office), and they were interviewed separately. Data presented in Table 2 indicates that 62 out of 64 people engaged in the evaluation study's FGDs were farmers or tree growers. The remaining two participants included a village leader and a government staff member.

The average land size for participants in the evaluation who were farmers (tree growers) was less than 1 ha in all five villages. The largest area of farmland was held by a participant from Jepitu who managed about 5 ha. The average area of farmland managed by a single family in this study reflects that of smallholders across much of Indonesia. Although most smallholders in the villages are familiar with tree growing, with a variety of species grown for timber, fuelwood and fruit (mainly for home consumption), few had a strong intention of growing trees primarily for commercial markets. Commercial markets exist for a range of forest products in all locations, yet demand and prices can fluctuate, and most smallholders sell their trees directly to local brokers.

The data presented below were derived from the FGDs at all sites. The participants were asked to identify the topics they learned at the MTG training courses (rather than being offered a pre-determined list of topics). Table 3 is an aggregated and simplified version of the data collected from all of the FGDs. A five-point scale for evaluating the learning obtained during the MTG course was collected from participants on their last day of training. Scales were also used for assessing the adoption and change in practices by participants, such as the following:

Table 2. Characteristics of evaluation participants and the training sites, 2016

Master TreeGrower sites	Gender		Primary occupation			Average land size (ha)	Average number of trees	Dominant tree species, farming system and other characteristics
	Male	Female	Farmer	Extension	Other			
Pati	16	2	18	0	0	0.44	260	Sengon mix with other crops such as cassava, banana; better access to market; commercial-oriented sengon growers
Dengok	11	1	12	0	0	0.79	572	Teak as monoculture or mix with other trees and crops—agroforestry system; good market access
Wanagama (participants from Jepitu & Katongan villages)	9	0	9	0	0	0.96	431	Jepitu village: Teak, Acacia growing as monoculture or mixed with other trees and crops, hilly and rocky land; 32 km from Wonosari; Katongan village: Monoculture teak; 14 km from Wonosarii
Benjala	11	2	13	0	0	0.62	69	Gmelina, Teak & Bitti—planted as monoculture or mix of tree species and crops; some farms are rocky land; 25 km from Bulukumba
Malleleng	12	0	10	1	1	0.71	176	Gmelina, Teak & Mahogany planted at low land garden and hilly land a bit far from the village; 32 km from Bulukumba
Total	59	5	62	1	1			

Dominant timber species include teak (*Tectona grandis*), gmelina (*Gmelina arborea*), sengon (*Paraserianthes falcataria*), bitti (*Vitex cofassus* Reinw.) and mahogany (*Swietenia macrophylla* King).

Table 3. Improved knowledge reported by participants in Master TreeGrower training by sites

Master TreeGrower sites	Learning topics							
	Market	Measurement			Farm and tree management			Others (liquid smoke, mushroom cultivation)
		Diameter	Height	Volume	Pruning	Thinning	Pest & diseases	
Pati	√	√	√	√	√	√	√	√
Dengok	√	√	√	√	√	√		
Wanagama	√	√	√	√	√	√	√	*
Benjala	√	√	√	√	√	√		
Malleleng	√	√	√	√	√	√	√	√**

*In Wanagama, the participants also learned subjects on land preparation, seeds and seedling management, planting, fertilising, and maintenance**. In Malleleng, the participants also reported learning about trees to grow in response to market demand, pest and diseases, and the roles of farmer groups (the farmers subsequently established a tree grower forum and network named as Himpunan Pengusaha Kayu Indonesia (HIPKI) and the Forum Koordinasi Hutan Rakyat (FKHR)).

- Have you implemented your knowledge in tree prunning: Yes/No
- If Yes, what is the proportion of your tree in your property did you prune?

1: 100%, 2: >50%, 3: 25–50%, 4: <25%, 5: None.

The effectiveness of Master TreeGrower training courses

Facilitating smallholders' learning

The MTG training courses identified and promoted topics widely viewed by professionals employed in the CBCF sector as likely to be of interest and directly relevant to smallholders' forest management, and included: *Tree and forest measurement, Pruning and thinning* and *Harvesting and marketing timber*. In the evaluation study, conducted about three years after the MTG training courses were delivered, informants involved in the FGDs were asked *What did you learn from the MTG courses in 2014?* In response, informants at all sites reported that they learned about tree and farm management, measurement and marketing (refer to Table 3).

Changing smallholders' practices—adoption (changes in practices, such as silvicultural and marketing practices)

Field visits to the project sites in Pati, Gunungkidul and Bulukumba for the evaluation found a consistent result from those involved in the MTG training courses, where almost all course participants claimed to have implemented some of the knowledge and skills they had gained from the MTG training (Table 4).

Data presented in Table 4 reveal that only two out of the 64 MTG course participants have not implemented the knowledge gained from the courses, with both from the district of Pati. However, a field visit to and observation of one of these 'non-adopting farmers' confirmed that he had small trees where the knowledge and skills (e.g. pruning and thinning) were not required as yet. Nonetheless, this same farmer said that the MTG training had improved his knowledge and skills.

Further investigation of those whom claimed to have adopted practices learnt during the MTG course found that 90% of the MTG course participants had undertaken *pruning*. Knowledge and skills on *timber measurement* and *marketing* appeared to be the topics with the most limited application, with just 36% and 17% MTG course participants reporting in the evaluation that they had correctly measured tree diameter and had undertaken market/price investigations respectively (refer to Table 5). The relatively low adoption of these topics may in part be due to many of the farmers' trees being young and not ready for sale. Also, farmers in Pati usually do not measure their timber volume because of the '*tebas*' system, where it is the task of the traders to *cut, carry* and *count* (measure) the timber. This finding is consistent with the common practice across Indonesia where farmers usually sell their trees 'standing' and so do not have to physically harvest the trees, measure or calculate the volume of timber. As traders usually pay the farmers promptly for

Table 4. Distribution of focus group discussions informants who implemented knowledge and skills learned from Master TreeGrower (MTG) courses by sites

	Distribution of MTG participants who implemented the knowledge and skills gained from MTG training											
Adoption	Pati		Dengok		Wanagama		Benjala		Malleleng		Total	
Yes	8	44%	7	58%	8	89%	2	15%	5	42%	30	47%
No	2	11%	0	0%	0	0%	0	0%	0	0%	2	3%
Some	8	44%	5	42%	1	11%	11	85%	7	58%	32	50%
Total	18	100%	12	100%	9	100%	13	100%	12	100%	64	100%

Those who responded 'Yes' and 'Some' were re-categorised into 'adoption' category.

Table 5. Distribution of focus group discussions participants according to their adoption behaviour at study sites

Knowledge & skills gained from Master TreeGrower training	Pati (n = 18)		Dengok (n = 12)		Wanagama (n = 9)		Benjala (n = 13)		Malleleng (n = 12)		Total (n = 64)	
Pruning	16	89%	12	100%	9	100%	9	69%	12	100%	58	91%
Thinning	1	6%	9	75%	2	22%	6	46%	7	58%	25	39%
Measurement—volume	3*	17%	12*	100%	2*	22%	1	8%	5	42%	23	36%
Marketing	0	0	0	0	0	0	4	31%	7	58%	11	17%

*Just measuring the tree diameter.

their trees, this remains a popular way to sell timber (Perdana et al. 2012; Irawanti et al. 2017).

Interesting results were found at Benjala and Malleleng (Bulukumba), where the tree growers have become more confident in their negotiations with the timber traders after learning about tree and timber measurement and quality assessment. Knowledge about timber measurement gained from the MTG training has improved farmers' ability to estimate their timber volume and negotiate with the local traders. Also, some farmers at Malleleng reported they had harvested their trees and undertook simple processing of logs before selling to traders for higher revenue compared to selling standing trees or harvested logs. A forestry extension staff in Bulukumba confirmed the view that farmers' bargaining power was increasing as they had better knowledge about markets and prices gained from the MTG courses.

Field investigation for the evaluation found that about 25% of tree growers who had participated in the MTG courses had pruned and thinned their whole tree plantation. The remaining MTG participants had completed partial pruning of their plantations (an estimated 52% of MTG participants had pruned between 10% and 50% of their trees).

Information given by the MTG alumni who had not pruned all their trees revealed several reasons for not completing the pruning, with the most common reasons being that they were too physically weak (i.e. sick or older than 60 years of age), lacked the available labour and that their trees were closely spaced producing small branches. Some tree growers in Malleleng also reported that their trees were too tall to be pruned.

Results from the change in practices

As a result of the knowledge and skills gained from the MTG courses, the FGD informants at all sites reported improved performance of their farms, not only in terms of being more presentable, but also with regard to tree growth and development (e.g. reported that their trees were growing faster and bigger). Moreover, the pruning and thinning provided fodder, firewood and organic matter to meet other household needs, and farmers had additional space to grow crops and medicinal plants under the trees.

The impact of Master TreeGrower training at the community level

Sharing of the Master TreeGrower experiences with other farmers

The evaluation found that 75% of MTG participants had shared their knowledge and skills gained from the training courses with neighbouring farmers, such as other members of the local farmer group, relatives and friends. This finding is consistent with the discussion among participants at the end of the course (about three years earlier), when most participants expressed a willingness to share their experiences (knowledge and skills) with neighbouring farmers (Reid et al. 2014). In response to the question *'How many farmers did you share the knowledge and skills with that you gained from the MTG course?'*, the FGD informants at Pati, Dengok and Wanagama stated that they shared the information with members of their farmer groups (groups comprised of 25–50 members). They shared most topics learned from the MTG courses such as *marketing, measurement*, and *tree and farm management*. Sharing of information from the MTG training was mostly within their extended family and with farming neighbours. These findings highlight the value of involving farmers as participants for MTG training courses who are leaders in their local communities. The MTG participants at Wanagama and Malleleng stated there were neighbouring farmers following their silvicultural practices and farm management. Field visits to the tree farms of MTG participants and their neighbours confirmed that two non-MTG participants had pruned their teak trees similar to that of the MTG-trained farmers. Conversely, another MTG participant reported that they would not share information from the MTG training until he could demonstrate 'successful' tree farming to his neighbours.

Significant changes for tree growers' livelihoods

As intended, in the medium to long-term (5–20 years), farmers would improve their livelihoods as an outcome of their participation in MTG training and improved forest management, and that there would be some flow-on benefits to neighbouring farmers. The evaluation found through the FGDs that there had already been a significant improvement in some tree growers' livelihoods (i.e. <5 years). The *most significant change* claimed by the FGD informants at

Malleleng was that *farmers were now in a stronger bargaining position* due to their better understanding about the value of their timber. Four informants at the FGD in Malleleng reported that they were bargaining more effectively with traders and were selling their timber at a better price than previously, due to their better understanding of tree volume, timber grades and market prices. Two farmers who recently sold their sengon trees as *balok* (processed timber) explained that they had investigated the prevailing market price before initiating discussions with prospective timber traders.

Another *significant change* reported at Malleleng was that several farmers developed a more favourable perception of the potential financial returns from commercial forestry. One example of this was an MTG alumni who re-took possession of his *gadai* land[1] from the leaseholder of 2 ha to grow sengon because he better understood the dynamics of the forest products market and the silviculture required to produce high-quality timber.

Discussion

Master TreeGrower course effectiveness

Using the Logic model, TOP model and the Most Significant Change evaluation frameworks, it appeared that the MTG training course has been effective in improving landholders' knowledge, skills, management and, ultimately, their confidence in investing in commercial forestry. This is consistent with the positive learning outcomes and participants' expectations identified by the participants immediately after the MTG courses (Reid et al. 2014). Further investigation by this evaluation revealed that a large majority of MTG participants implemented the knowledge and skills gained from the courses (97%) resulting in better tree and farm management, measurement and marketing of forest products. These changes are identified as short-term outcomes in the Logic model (Patton 1997), or a change in practices resulting in intermediate outcomes in the TOP model (Rockwell & Bennett 2004). Knowledge and skills of *timber measurement* and *marketing* appeared to be the topics presented during the MTG training courses with limited application at the time of this study. Only 36% MTG course participants were measuring tree diameter and 17% undertaking market/price investigations.

Results arising from these changes (adoption or changes in practices) identified by the participants in the evaluation included that tree growers perceived their trees looked better in terms of growth and development. Growers also reported producing fodder, firewood and foliage (for improved soil nutrition) as benefits from pruning and thinning.

Following the Most Significant Change framework (Davies & Dart 2005), this evaluation found that the most significant changes have taken place in the village of Malleleng where some MTG participants (four farmers) were now in a stronger bargaining position due to their better understanding about the value of their timber and market prices. Confirming this change was a timber trader who reported that because of the MTG course, he was finding it more difficult to purchase timber at the former lower price. The adoption of the MTG concept by the local government and field extension agents in Pati and Bulukumba was also identified as further evidence that the MTG training was of appreciable value.

Strengths of the Master TreeGrower training approach

The results of this evaluation of the MTG program across several districts in Indonesia are consistent with the earlier evaluation by Muktasam (Muktasam et al. 2015) of the MTG training course conducted in Sumbawa, where it was shown that farmers who attended the MTG course had changed their knowledge, skills, attitudes, aspirations and practices. These findings reinforce the strength of the MTG model as an innovative approach for building the knowledge, skills and capacity of smallholders involved in commercial forestry. The identified strengths are summarised into the following points:

(1) The MTG training course was *developed, designed and implemented through a participatory process*: At the design and development stages, the MTG course facilitators actively engaged with local partners and stakeholders. Identification of constraints and opportunities to support CBCF was conducted with a participatory approach (van de Fliert 2013). The use of terms and activities such as *discussion and reflection, brainstorming, and other forms of farmer involvement* during the MTG course reflect a participatory approach. These types of participatory processes are aligned with the influential concept of farmer-centred development originated in the 1980s–1990s (Chambers 1983, 1997; Chambers et al. 1989; Cernea 1991), and follows the adult learning principle where adults need to be involved in the planning and evaluation of their actions (Knowles 1984). It also shows that the adult learning principles (originally developed in a Western cultural context) are transferrable to different socio-cultural contexts, such as from Australia to Indonesia. A key aspect of the participatory approach is that it is not only critical to create a sense of belonging to the program and activities, but it is important to respect farmers' experiences, develop commitment and responsibility as part of empowering smallholders to pursue strategies that improve their livelihoods. Muktasam (2004) found that the key to the success of the *Inpeng* agroforestry practice in Thailand was the participation of the local community in learning and action.

(2) The MTG courses use a *market first approach*. Visiting timber processing industries and companies during the first or the second day of the course reflects the importance of farmers understanding the dynamics of the local market and how this understanding should inform their involvement in CBCF. Farmers' decisions about trees and farm management should be based on market expectations, information and demand (timber species, quality, price, timing). Visiting timber processors is also critical for developing smallholders' understanding about the link between timber quality and their silviculture. Poor tree management usually leads to lower timber quality, lower prices and lower

[1]A land occupation system where a farmer borrows money from others in exchange for letting their farmland until the amount of money is repaid.

financial returns. The market-based approach of the MTG is aligned with the approach to undertaking a value chain analysis (M4P 2012; Irawanti et al. 2017), and follows an important principle of adult learning where people tend to learn more effectively when they observe firsthand and participate in related activities ('seeing is believing'; Leagans 1963; Kondylis et al. 2014).

(3) The MTG courses address participants' lack of *awareness and knowledge*, unfavourable *attitudes, perceptions, skills, aspirations and practices*. The MTG training takes place in the classroom as well as on participants' farms and in the facilities of timber processors. Participants learn from a mix of resource people (e.g. experienced farmers, mill operators, local traders and extension agents, rather than a single 'expert') field observation and group discussions, and from applying new knowledge about silviculture (e.g. pruning, thinning and measurement) on their own properties. *Combining classical presentations, field observation and doing real things* is an effective approach to assist people change their knowledge, attitudes, skills, aspirations and practices. The approach used in MTG courses is consistent with Dale's seminal Cone of Learning Experience, which states that '… people tend to learn more when they see, and they do the real things' (Dale 1969, p. 108). Facilitating participants to take action themselves on topics such as *tree measurement* and *management* is an effective way to promote learning and improvement of skills. The approach is also consistent with Roger's (1995) concept of 'Innovation Decision Making' where people tend to adopt innovations that are delivering relative advantages *(relative advantage)*, compatible to their current situation *(compatibility)*, are simple *(minimal complexity)*, can be observed *(observability)* and tested *(trialability)*. The FFS approach used in Indonesia's food crop sector also applies the principles of adult learning (van den Ban & Hawkins 2002; Nathaniels et al. 2005; Mariyono et al. 2013; Gadzirayi & Mafuse 2015).

(4) The selection of MTG course participants was a critical step in the implementation of the MTG training. This study found that the participants were mostly willing to share their knowledge and skills with other farmers in their respective groups, including their extended family and community members in their villages. As a result, many non-MTG participants changed their knowledge, attitudes, skills, aspirations and practices in relation to CBCF. The MTG approach applies the concept of involving informal leaders in the diffusion process of innovation (Rogers 1995) and agricultural extension and development (van den Ban & Hawkins 2002; Hameed & Sawicka 2017).

(5) Conducting an MTG course at the local or village level, close to where farmers live or practice farming, appears to be another strength of the training course (in the case of Pati, Dengok, Benjala and Malleleng). For various reasons of accessibility and efficiency, farmers prefer to stay close to their home and farms when attending meetings or training events, so they are not far from the demands of their farming business. As adult learning principles suggest: 'Farmers learn best when in a place of comfort' and 'farmers as adults are more interested in learning subjects that have immediate relevance to their job or personal life' (Knowles 1984).

(6) Working closely with local organisations and government agencies is another strength of the MTG course. This approach has been illustrated in Pati and Bulukumba where the local forest agency has not only provided strong support to the delivery of MTG courses but have also adopted the MTG training approach when working with their other farming communities. This has boosted the enduring outcomes of the initial MTG training, as continued use of the approach by local organisations and agencies reinforce the positive aspects of the MTG training among the wider farming community.

Conclusion

The evaluation of the MTG training courses conducted across five sites in Indonesia in 2014 indicates that farmer-centred extension can be effective for smallholders investing in CBCF. The approach used by the MTG courses were effective in engaging farmers in the content and processes that were directly relevant to their forestry-related needs and aspirations. The content was delivered in a style and language suited to the participants, and at a pace governed by their needs and abilities (not an 'outsiders' schedule). The effectiveness of the MTG training course can be summarised as due to the participatory process that is farmer-centred, market-first and encouraged people to learn-by-doing.

Accepting that the form and practice of CBCF will vary between farmer to farmer, village to village and island to island in Indonesia, the MTG model challenges the entrenched extension paradigm that a narrow and prescriptive approach to CBCF can be delivered in a 'top down' process that would appeal to a wide cross-section of smallholders. Though built on sound principles and a structured framework, the content of each MTG training course was adapted to the needs and aspirations of the participating smallholders in each area and the available markets. This study found the MTG training to be an effective approach to changing farmers' knowledge, skills, attitudes and practices (actions) for successful forestry.

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References

ARUPA. 2014. Developing delayed cutting tree growers' cooperatives to strengthen the roles of smallholders private forestry (*hutan rakyat*, HR) in climate change mitigation (*Pengembangan Koperasi Tunda Tebanguntuk Memperkuat Peran Hutan Rakyat dalam Mitigasi Perubahan Iklim*). Sinduadi (Indonesia): Aliansi Relawanuntuk Penyelamatan Alam (ARUPA). Brief Info No. 5. [accessed 2017 Sep 6]. Available from: http://www.arupa.or.id.

Bryman A. 2012. Social research methods. 4th ed. Oxford: Oxford University Press.

Cernea M, editor. 1991. Putting people first: sociological variables in rural development. New York: Oxford University Press.

Chambers R. 1983. Rural development: putting the last first. New York: Longman.

Chambers R. 1997. Whose realities counts: putting the first last. London: Intermediate Technology Publications.

Chambers R, Pacey A, Thrupp LA. 1989. Farmer first: farmer innovation and agricultural research. Brighton (UK): Institute of Development Studies (IDS).

Dale E. 1969. Audio-visual methods in teaching. New York: Dryden Press.

Davies R, Dart J. 2005. The 'Most Significant Change' (MSC) technique: a guide to its use (version 1.0). Hastings (Australia): Clear Horizons; p. 104.

Emawati DL, Djaraf L, Sudirman. 2015. Integrated crop management farmer field school as an effort to increase farmer capacity: a research at Sungai Garam Hilir Village, Singkawang Subdistrict, Singkawang Municipality. (*Sekolah Lapang Pengelolaan Tanaman Terpadu sebagai Upaya Peningkatan Kapasitas Petani: Penelitian di Kelurahan Sungai Garam Hilir Kecamatan Singkawang Utara Kota Singkawang*). Pontianak (Indonesia): University of Tanjungpura. Junal Tesis PMIS-UNTAN-PSS-2015.

Firmana F, Nurmalina R. 2016. The impact of SLPTT program on the paddy farm business income in Telagasari District. (*Karawang Regency Dampak Penerapan Program SLPTT terhadap Pendapatan Usahatani Padi di Kecamatan Telagasari Kabupaten Karawang*). Journal of Agrikultura. 27:38–48.

Gadzirayi CT, Mafuse N. 2015. Comparative analysis of farmer participatory extension approaches: case of farmer field schools and master farmer training in Mashonaland Central Province of Zimbabwe. Asian Journal of Agricultural Extension, Economics & Sociology. 4:317–324.

Hameed TS, Sawicka B. 2017. The importance of opinion leaders in agricultural extension. World Scientific News. 76:35–41.

Irawanti S, Race D, Stewart H, Parlina N, Suka AP. 2017. Understanding the timber value chain in community-based forestry in Indonesia: analysis of sengon in central Java. Journal of Sustainable Forestry. 36:847–862. doi: 10.1080/10549811.2017.1381029

Knowles M. 1984. Andragogy in action. San Francisco: Jossey-Bass.

Kondylis F, Mueller V, Zhu Siyao J. 2014. Seeing is believing? Evidence from an extension network experiment. Washington (DC): World Bank Group. Impact Evaluation Series; Policy Research Working Paper WPS #7000. [accessed 2017 Oct 5]. Available from: http://documents.worldbank.org/curated/en/647501468003943080/Seeing-is-believing-evidence-from-an-extension-network-experiment.

Leagans JP. 1963. The communication process in rural development. Ithaca (New York): Cornell University.

M4P. 2012. Making value chains work better for the poor: a toolbox for practitioners of value chain analysis. Phnom Penh (Cambodia): Agricultural Development International.

Manurung GES. 2015. Results of data analysis for silvicultural practices at Pelat and Batudulang Villages. Sumbawa: Kanoppi Annual Meeting.

Mariyono J, Luther GC, Bhattarai M, Ferizal M, Jaya R, Fitriana N. 2013. Farmer field schools on chili peppers in Aceh, Indonesia: activities and impacts. Agroecology and Sustainable Food Systems. 37:1063–1077.

Ministry of Agriculture. 2008. Implementation guides for Corn Integrated Crop Management Farmer Field School. Panduan Pelaksanaan Sekolah Lapang Pengelolaan Tanaman Terpadu (SL-PTT) Jagung. Jakarta (Indonesia): Ministry of Agriculture.

MoEF (Ministry for Environment and Forestry). 2018. State of Indonesia's forests. Jakarta (Indonesia): Ministry for Environment and Forestry, Government of Indonesia.

Muktasam A. 2000. Role of groups in Indonesian rural development [PhD thesis]. Brisbane (Australia): The University of Queensland.

Muktasam A. 2004. A study of rural development in two Asian countries: a benchmarking process for best practices. Nov 2003–25 June 2004. Asian Public Intellectual Research Fellowship. Tokyo (Japan): The Nippon Foundation.

Muktasam A. 2012. Training module development to improve the capacity of local community groups for sustainable utilization of non-timber forest products. Mataram (Indonesia): World Wildlife Fund/International Tropical Timber Organization. Technical Report.

Muktasam A, Amiruddin U, Effendi A, Perdana A. 2014. Value chain analysis and business models for timber and non-timber forest products in Sumbawa. Mataram (Indonesia): Research Center for Rural Development – The University of Mataram. Research Report for ACIAR Project No. FST/2012/039.

Muktasam A, Reid R, Race D. 2015. Evaluation report of the 'Master TreeGrower (MTG) Indonesia Initiative' - overcoming constraints to community-based commercial forestry in Indonesia. Mataram (Indonesia): Research Center for Rural Development – The University of Mataram.

Muktasam A, Ridwan NM. 2013. Impact studies of FEATI in West Nusa Tenggara Province). A collaborative project between Badan Koordinasi Penyuluhan Pertanian (Bakorluh) – nusa Tenggara Barat and communication and extension study program – Faculty of Agriculture – the University of Mataram. Mataram (Indonesia): Communication and Extension Study Program, Faculty of Agriculture, The University of Mataram.

Muktasam A, Rosiady S, Bambang H, Gatot DH, Markum. 2003. Implementation of agroforestry and integrated farming system through involving community participation in the forest boundary and steep dry land area (Multi-stakeholders Forestry Program). Mataram (Indonesia): Research Center for Rural Development, The University of Mataram. Research Report.

Nathaniels N. 2005. Cowpea Farmer field schools and farmer-to-farmer extension: a Benin case study. Agricultural research and extension network. Denmark: CABI Bioscience; p. 2–19. Network Paper no. 148.

Patton QM. 1997. Utilization focused evaluation: the new century text. 3rd ed. London: Sage Publications.

Perdana A, Roshetko JM, Kurniawan I. 2012. Forces of competition: smallholding teak producers in Indonesia. International Forestry Review. 14:238–248.

Race D, Wettenhall G. 2016. Adding value to the farmers' trees: experiences of community-based commercial forestry in Indonesia. Canberra (Australia): Australian Centre for International Agricultural Research (ACIAR).

Reid R. 2017. Developing farmer and community capacity in agroforestry: is the Australian Master TreeGrower program transferable to other countries? Agroforestry Systems. 91:847–865.

Reid R, Syafii S, Oktalina SN, Manalu P, Rohadi D, Herawati T, Rizal A, Nurhaedah, Sumirat BK, Hayati N, et al. 2014. Research task 4: design, delivery and evaluation of an alternative farmer learning approach to enhancing the capacity of farmers to participate in community based commercial forestry in Indonesia. Report for ACIAR Project FST/2008/030. Parkville (Australia): University of Melbourne.

Riyandoko ME, Perdana A, Yumn A, Roshetko JM. 2016. Existing conditions, challenges and needs in the implementation of forestry and agroforestry extension in Indonesia. Bogor (Indonesia): World Agroforestry Centre (ICRAF) Southeast Asia Regional Program. Working Paper no. 238. doi: 10.5716/WP16141.PDF

Rockwell K, Bennett C. 2004. Targeting Outcomes of Programs (TOP) Model: a hierarchy for targeting outcomes and evaluating their achievement. Lincoln (USA): University of Nebraska.

Rogers EM. 1995. Diffusion of innovations. 4th ed. New York: Free Press.

Stewart HTL, Rohadi D. 2014. Research task 3: evaluation of the dominant business models of CBCF being implemented by government and the private sector. Report of a study conducted in Gunungkidul, Pati, Bulukumba, South Konawe and Sumbawa. ACIAR Project FST/2008/030 – overcoming constraints to community-based commercial forestry in Indonesia. Canberra (Australia): Australian Centre for International Agricultural Research.

Suadnya IW, Muktasam A, Puspadi IK, Putrantijo N. 2011. Understanding community knowledge on climate change and their adaptation strategies: in searching for effective dissemination of climate information. Mataram (Indonesia): Mataram University Research Agency,

Mataram University.
van de Fliert E. 2013. Social dimensions analysis of community-based forestry in Indonesia: report of a study conducted in Gunungkidul, Pati, Bulukumba, South Konawe and Sumbawa. ACIAR Project FST/2008/030 – overcoming constraints to community-based commercial forestry in Indonesia. Brisbane (Australia): University of Queensland.
van den Ban AW, Hawkins HS. 2002. Agricultural extension. Carlton (Australia): CBS Publishers and Distributors.
Widodo DP. 2015. Policy analysis to support timber and non-timber forest product production, marketing and processing in Sumbawa District, West Nusa Tenggara. (*Analisis Kebijakan dalam Mendukung Produksi, Pemasaran dan Pengolahan Hasil Hutan Kayu dan Hasil Hutan Bukan Kayu di Kabupaten Sumbawa – nusa Tenggara Barat WWF Nusa Tenggara: Mataram, Indonesia*). ACIAR Project FST/2012/039 – development of timber and non-timber forest products' production and market strategies for improvement of smallholders' livelihoods in Indonesia. Mataram (Indonesia): WWF Indonesia.

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