The Sustainable Coffee Conundrum
A study into the effects, cost and benefits of implementation modalities of sustainable coffee production in Vietnam

Michiel Kuit (Kuit Consultancy)
Fédes van Rijn (Wageningen University and Research, department of Development Economics)
Vu Thi Minh Tu (Kuit Consultancy)
Pham Van Anh

Commissioned by:
DE Foundation (funded by D.E Master Blenders 1753) and the Dutch Ministry of Economic Affairs

October 2013

info@kuit-consultancy.com
Acknowledgements

A word of gratitude towards the companies and farmers in Vietnam that allowed us detailed insight in their supply chains and made available their records and staff to help us. A big thank you also to the entire data collection team: Pham Tan Ha, Nguyen Minh Anh, Ho Quoc Thong, Nguyen Thanh Le, Trinh Van Hung, Le Viet Hoa, Le Ly Va, Bui Thanh Ha, Dinh thi To Nga, Nguyen Duy Tuong, Nguyen Tien Trung, Le Huu Truong Son, Nguyen Thi Bich Ngoc, Nguyen Ngoc Uyen, Hoang Huu An, Nguyen Ngoc Tang, you did a fantastic job. Lan Ge for statistical advice and Don Jansen, Stefanie Miltenburg and the people at UTZ Certified for critical review of the draft report. Marieke Ruijter de Wildt and Marrit van den Berg who in a previous collaboration helped shape the concept of implementation modalities as a research area the idea of which originally came from Don Jansen. Last but not least we thank the DE Foundation and the Dutch Ministry of Economic Affairs for making this study possible.

This research was initiated and co-financed by D.E Master Blenders 1753. This report is one of the outputs of the research project ‘Enhanced sustainability of the imports of cocoa and coffee to the Netherlands: synergy between practice, policy, strategy and knowledge (BO-10-030-001). This research project is supported by the Dutch Top sector research initiative through the Policy Support Programme for International Cooperation of the Dutch Ministry of Economic Affairs, WUR, IDH, D.E Master Blenders 1753, the Ministry of Economic Affairs, UTZ Certified and KIT (Royal Tropical institute).

Abbreviations

4C  Common Code for the Coffee Community
ATT  Average Treatment Effect on the Treated
BPTNT  Bo Phat Tien Nong Ton (Ministry of Agriculture and Rural Development
CG  Control group
DEMB  D.E Master Blenders 1753
FFS  Farmer Field School
GAP  Good Agricultural Practices
Ha  Hectare
ICO  International Coffee Organisation
K  Potassium
KG  Kilogramme
KNVK  Koninklijke Vereniging van Koffiebranders en Theepakkars
mm  Millimetre
Mt  Metric tonne
N  Nitrogen
n.a.  Not applicable
n.s.  Not significant
NGO  Non-Governmental Organisation
OHS  Occupational Health and Safety
P  Phosphorus
PSM  Propensity Score Matching
SD  Standard deviation
T  Treatment
USD  US Dollar
VND  Vietnam Dong

Conversions

1 USD = 20,400VND
Foreword by the DE Foundation

This report is the result of an evaluation study, which has as main focus to clarify the effects on Vietnamese coffee farmers of certification with UTZ Certified and of the trainings given to these farmers. Specifically, attention is given to investigating the effects of quality and quantity of trainings. Part of these trainings are dedicated to teach farmers how to become compliant with the UTZ code of conduct. Other trainings that are required by UTZ relate among others to Good Agricultural and Processing Practices and First Aid.

The study was commissioned and financed by the DE Foundation and the Dutch Ministry of Economic Affairs (BO-Cl subsidy).

The DE Foundation is an independent foundation, established and mainly financed by D.E Master Blenders 1753 (DEMB), the owner of among others the Douwe Egberts coffee brand. Its purpose is to help improving the working and living conditions of smallholders in coffee producing countries. From the start in 2002, we have worked directly with 60,000 smallholder coffee farmers in 7 different countries: Brazil, Uganda, Peru, Vietnam, Honduras, Colombia and Cameroon. Training of farmers, among others in Good Agricultural Practices, which are generally combined with certification, forms an important part of the activities in these projects (see more details on www.defoundation.org).

Selections of areas in which the foundation works, are made in close alignment with DEMB, to ensure that the coffee from the project farmers has a good potential on the world market. Relations between DEMB and project farmers are open in the sense that neither party has to buy or sell to the other, but if mutual agreement is found, business transactions can be made following standard market procedures and negotiated prices.

As part of its sustainability strategy, DEMB – as other major roasters – has committed itself to sourcing increasing volumes of certified sustainable coffee, with UTZ Certified as key partner. For roasters like DEMB, third party certification is one of the few options to help farmers to improve the sustainability of their way of working in a transparent and assured manner that can also be communicated to stakeholders. Sustainability is expected to be credibly enhanced through compliance of farmers with the code of conduct, and through additional trainings that are part of certification procedures. When buying certified coffee, DEMB pays a sustainability premium to the certificate holders, such as exporters and cooperatives, to facilitate farmers to become certified.

DEMB takes sustainability seriously and therefore wants to know whether buying of certified coffee, as well as the activities of the DE Foundation have an impact on farmers. In DE Foundation projects a substantial part of the budget is dedicated to facilitate trainings of high quality and intensity (5-10 trainings per year over a period of about 3-5 years). In purely commercial settings without donor funding, certification related activities have to be paid from the sustainable premium obtained in the market in order for the exporter to remain competitive in the market. The premium first has to pay for the ‘inevitable’ costs of certification, such as the external audit fees and the labor intensive Internal Control System (a requirement for group certification), with only limited funding remaining for training. Compared to DE Foundation projects, training in commercial settings are therefore often of lower intensity and quality. This has raised the question whether certification in combination with training in commercial settings brings sufficient results, or whether indeed more additional, intensive training is needed. This question is particularly interesting when one realizes that several issues that are important for the coffee sector are not always well addressed in the code of conduct of standards, nor taken up in the required additional training. At farm level, these issues comprise improving productivity and input use efficiency, and creating higher income generating capacity, which are seen in the coffee sector as

Page | iv
critical for keeping (particularly small holder) farmers interested in producing coffee for the
world market.

DEMB therefore supported this evaluation that has tried to separate the effects of
compliance with the code of conduct from the effects of training, as well as to see whether
different qualities and intensities of trainings have different impacts.

The main findings of the report are that:

1. Certification in this study primarily leads to access to training, uptake of management
tools such as record keeping and investment planning, but not to significant
improvements in farming efficiencies and better farm economic outcomes. Also,
among the Vietnamese farmers in this research, UTZ certification by itself does not
sufficiently tackle the main challenges such as over-irrigation and excessive fertilizer
applications that the coffee sector is facing; and
2. Improved farm management is primarily and positively affected by the amount and to
a lesser extent by the quality of trainings.

Considering that UTZ Certified claims that its program does lead to more income, higher
productivity and cost efficiency, the findings in this study can give food for though about
UTZ certification of coffee in Vietnam. However, before drawing major conclusions or
generalizing the findings from this report, two points need to be discussed:

1. How representative is this research and its outcomes for other countries than
Vietnam?
2. How can commercial certificate holders and main stream coffee roasters work
 together with certification standards to better support small holder coffee farmers?

Representativeness:
With 20-25% of total volume of UTZ Certified coffee, Vietnam is the second largest supplier
of UTZ Certified coffee, and de facto therefore very representative for UTZ Certified coffee.
The code of conduct has several ‘musts’ that farmers have to comply with. In many of our
projects we see farmers appreciating several of these musts, such as the separate storage of
pesticides and the use of protective clothing when spraying pesticides, or the coverage of
moving parts in machinery. See e.g. testimonials in http://www.defoundation.org/assets/Uploads/Impact5in5Brazil.pdf. As such, the compliance in
Vietnam seems therefore to be quite representative for other coffee producing areas.

The study shows a limited impact of additional training, beyond what is required to become
certified, on productivity, input use efficiency and farm economic outcomes in Vietnam. This
may very well be related to the fact that productivity of Vietnamese coffee farmers is among
the highest in the world, which leaves little scope for financially sound further improvements.
Using more inputs than needed, particularly fertilizers and irrigation water, is seen by many
Vietnamese farmers as an assurance for a good harvest. Paying additional costs for this
assurance may very well be expected to be less costly than the income loss when facing a
reduced production. In this aspect, Vietnam may well be representative for other ‘low
hanging fruits’: the relatively easy to certify producers that have high productivity such as the
large scale producers in Brazil.

However, in areas where farmers have low productivity and lack access to effective
extension services, results of the additional trainings may be much bigger, especially when
combined with improved access to finance to make use of fertilizers possible. This may well

---

1 As stated on the UTZ website: ‘Through the UTZ-program farmers grow better crops, generate more income and
create better opportunities while safeguarding the environment and securing the earth’s natural resources’
(www.utzcertified.org/, 27-09-13); the UTZ program has value for producers through ‘facilitating long term
improvements in productivity, quality and cost efficiency’
(www.utzcertified.org/en/valueforproducersconsumersbuyers, 27-09-13)
be the case in large parts of Latin America and almost all of Africa. In fact, we have seen large increases in productivity in projects of the DE Foundation in Honduras, Peru, Uganda and Cameroon, particularly as result of good, long term and hence rather expensive training, and in Honduras and Cameroon also because of farmers getting access to cheaper and better quality fertilizers.

How to improve certification?
Currently, certification is a mechanism through which roasters can (co-)finance support to farmers in a credible way because third party auditing is checking whether compliance with the standard is achieved and whether training additional to what is required to achieve compliance has been given to farmers. Roasters can evidence certification by using logos on their product packaging. Other players in the value chain become more connected, such as producers that tie up stronger to exporters that act as certificate holder when organizing group certification. From the received premium, certificate holders can deliver services, such as training, to ‘their’ farmers, who in turn may only receive a sustainability premium if they sell coffee to the certificate holder. This ‘capturing’ of farmers may be seen as something undesirable, but without additional outside funding, service delivery to farmers will be financially viable only when sufficient volume certified coffee is sold at a premium.

This system is working in Vietnam, where we see a high production of 2-4 Mt green beans per farm. In Africa, the combination of small farm size and (very) low productivity leads to a low total production of coffee per farm. The premium received is related to the volume of certified coffee sold, while the costs of the internal control system and the external audits relate to the number of farms to be certified. This means that a relatively larger share of the income from the sustainability premium is needed to pay for these costs than in Vietnam. Hence less, if any, budget may be available for training, with consequences for the quantity and quality of training. At a certain production level per farm, there will be no positive business case for certifying small holder farmers as the costs would outweigh the income from premium. Such is the case in DE Foundation’s Uganda project, where certification is only feasible because of additional project funding, while in its Cameroon project the intention to certify farmers was dropped after reviewing the business case, which proved to be negative in financial terms for the commercial partner. In these situations, certification in its current form may not work as tool to foment sustainable development in the local coffee sector.

To move towards a model where certification is commercially viable- and not just when it has external project funding, costs of certifying small holder farmers need to decrease. A risk is that this may affect the credibility of the certification system if less internal and external audits take place. This risk could partially be counteracted when impacts of certification increase as a result of changes to the code of conduct and/or implementation requirements to (better) address the important issues affecting sustainability at farm level, such as increasing productivity and quality. Such change could include adding requirements in the code of conduct/implementation requirements regarding the quality and intensity of the training on these issues. The costs of certification and additional trainings may be too high in some specific situations to be covered for by sustainability premiums. Since we see development in coffee growing agricultural areas as a joint responsibility of the coffee industry (roasters, exporters, farmer organizations, certification standards) and governments in producing as well as consuming countries, we hope that through the collaboration of these entities solutions can be found and implemented. What and how exactly to achieve this, is still unclear and needs to be discussed in a broader audience. We think that this study will provide some important insights to take this discussion forward.

Stefanie Miltenburg  Director DE Foundation
Don Jansen   Programme Manager DE Foundation
Executive summary
Certification is increasingly common in commodity value chains to assure that producers and other value chain partners adhere to pre-defined social, environmental and technical standards. Global supply of certified sustainable coffee has risen from about 1% in 2001 to 9% in 2010 and is projected to rise to 20 to 25% in 2015. Over the same period total supply of all coffee, conventional and certified, grew by over 20%.

Leading coffee roasting companies such as D.E Master Blenders 1753 (DEMB), Nestlé and Mondelez have all voiced ambitious targets for sourcing volumes of certified sustainable coffee, which is translated into increased procurement of certified coffee. The standard organisations behind the certificates are making various claims about the effect certification will have. According to UTZ Certified, continuous improvement in productivity, quality and cost efficiency is gained by applying their code of conduct. Rainforest Alliance also claims that farmers get better access to specialty buyers, greater contract stability and favourable credit options as a result of certification. Remarkably for a sub-sector that sees strong growth and commitment from major companies, very little empirical evidence exists about if, how and for whom certification works. The evidence base to support these claims is therefore very modest.

DEMB, a major buyer of UTZ certified coffee, also supports initiatives that go beyond certification. Through its funding of the DE Foundation, it facilitates implementation of projects with small scale coffee producers, exporters, governments and NGOs in a number of coffee origins. To obtain better insight in the impact of certification, DEMB co-funded this research in Vietnam, one of their important coffee sourcing countries. The Dutch government supports various programmes that aim to upscale production of and trade in certified sustainable products. Through a match-funding facility called Topsectoren, the Dutch Ministry of Economic Affairs and DE Foundation partnered to commission this study into the effectiveness and efficiency of different implementation modalities that seek to promote sustainable coffee production.

Research questions
The research questions that we aim to answer in this study are:
1. Does - in addition to UTZ Certification - the quality and intensity of training on sustainable coffee production (and processing) practices have an effect on changes in crop management and on improvements of performance by farmers?
2. How do costs and benefits of the trainings compare for the different levels of quality and intensity of trainings?
3. What recommendations can be given to policy makers in and outside Vietnam on how to roll out certification and/or productivity trainings?

Research location
The study is implemented in Vietnam, the second largest supplier of conventional and certified sustainable coffee and an important coffee origin for most major coffee roasters. Over 90% of Vietnamese coffee originates from small-scale robusta farmers in the Central Highlands. The study was implemented in the Central Highlands provinces of Dak Lak and Gia Lai, collectively responsible for 50% of Vietnamese robusta production. Vietnam is also the second largest supplier of UTZ certified coffee, accounting for 19% of supply in 2011.

Research methodology
In our attempt to answer the research questions we conduct an empirical analysis of the socio-economic performance of 4 different groups of coffee farmers before and after participation in different sustainability programmes (the treatments). To credibly identify impact we then compare the performance of the 4 groups over time with 2 statistically matched control groups, that are comparable to the treatment groups in important socio-economic aspects, but that were not part of any of the programmes. Each treatment or
implementation modality represents different levels of investment and intensity of farmer training. Three of these groups are UTZ certified and 2 use Farmers’ Field School (FFS) trainings (Table 1), which is the most intensive training modality in this study.

Table 1: Research group characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Treatment</th>
<th>FFS-only</th>
<th>FFS+UTZ</th>
<th>Medium intensity+UTZ</th>
<th>Low intensity+UTZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project implementer</td>
<td>Multinational exporting company</td>
<td>Multinational exporting company</td>
<td>NGO</td>
<td>National exporting company</td>
<td></td>
</tr>
<tr>
<td>Implementation modality</td>
<td>High intensity training, high investment</td>
<td>High intensity training, high investment</td>
<td>Moderate intensity training, moderate investment</td>
<td>Low intensity training, low investment</td>
<td></td>
</tr>
<tr>
<td>Project sponsor</td>
<td>Coffee roasting company</td>
<td>DE Foundation</td>
<td>NGO</td>
<td>Purely commercial, no sponsor</td>
<td></td>
</tr>
<tr>
<td>Predominant sales channels</td>
<td>Local traders, exporters</td>
<td>Exporter (project implementer)</td>
<td>Local traders, exporters</td>
<td>Exporter (project implementer)</td>
<td></td>
</tr>
<tr>
<td>Certificate holder</td>
<td>n.a.</td>
<td>Exporter</td>
<td>Exporter</td>
<td>Exporter</td>
<td></td>
</tr>
<tr>
<td>Nr of farmers in (certified) supply chain</td>
<td>n.a.</td>
<td>811</td>
<td>46</td>
<td>1,783</td>
<td></td>
</tr>
<tr>
<td>Province</td>
<td>Dak Lak</td>
<td>Gia Lai</td>
<td>Gia Lai</td>
<td>Dak Laki</td>
<td></td>
</tr>
<tr>
<td>Certified since</td>
<td>n.a.</td>
<td>2008-2011</td>
<td>2011</td>
<td>2007-2011</td>
<td></td>
</tr>
</tbody>
</table>

When implementing UTZ certification, two major activities regarding changing the way of working of farmers (and other value chain partners) are needed:

- Stimulation and checking compliance with the code of conduct; internal and external audit and training on code compliance are expected to assure that producers and other partners adhere to pre-defined social, environmental and in some cases technical standards.
- Developing professional farming: the certificate holder is required to give trainings to farmers on various topics to help farmers to professionalize their crop and farm management

In our study we conduct 3 separate analyses:

1. In the first we analyse performance of each group relative to its control group. This analysis takes the training package, UTZ certification (Compliance and Professionalization) activities as a whole. It allows us to discern how the different treatments perform. This assessment is done on basis of 63 outcome and impact indicators.
2. With the second approach, in addition to including a variable to indicate whether or not farmers are UTZ certified (the Compliance component), we quantify aspects of implementation of the Professionalization activities. The latter is expressed in variables on training amount, training quality and quality of the trainer. In this approach we also explore possible inter-action effects of the variables. This allows us to identify the relative contributions of each of the aspects to overall impact. We apply
this approach to 18 indicators from the dimensions training, farm management and farm economics.

3. Thirdly we look at implementation costs of UTZ certification and the training modalities applied.

Outcomes of analyses

General outcomes
Overall, the performance of the 4 treatment groups relative to their control group shows a link between investments made and results achieved. The performance of the FFS supported groups, with or without UTZ certification is most impactful overall. The medium intensity training group performs comparably at first glance despite being certified recently, but this group is biased towards better-off farmers. The low intensity training group meanwhile showed the lowest scores of all treatment groups, scoring positively on 12% and negatively on 8% of the indicators (Figure 1).

Outcomes analysis 1: comparison of treatments
A framework of 10 dimensions is used to logically group 63 outcome and impact indicators. The dimensions are: training, farm management, coffee trade and product quality, farm economics, assets, living conditions of children, occupational health and safety, waste management, labour relations and natural resources. The 3 dimensions where most change was observed are training, farm management and farm economics.

Training
The training dimension consists of 11 indicators. We capture a rating of satisfaction of farmers with their knowledge and skills, the amount of training received on average over the past 4 years and the subsequent degree of application of training content split by major farm activities. All treatment groups have better access to training than their peers in the control group. Uptake of training content that is expected to have a large effect on productivity and efficiency sees better uptake as training intensity increases, irrespective of farmers being UTZ certified. Regardless of treatment, the capital asset base has influence on uptake with more labour intensive techniques seeing better uptake among those with larger human and

2 In discussion with UTZ Certified the organization voiced its concerns about the segregation of implementation aspects to discern their relative contribution to impact. According to UTZ, its programme cannot be seen in isolation of ‘professionalization’ training because this is a pre-requisite to become certified. While factually correct, trainings varied strongly between the different certified groups we evaluated, which makes that Professionalization activities are therefore separable from the Compliance activities. As such, we feel that analytically we can do this to see if obtaining the certificate in addition to having training adds to the amount of impact on the indicators we measure.
social capital. Financial capacity is a determining factor for the application of more costly techniques.

Farm management
The application of training content and good practices from the UTZ certification programme and the training programmes is expected to result in measurable farm management improvements. While the intervention logic between the different treatments is not equal, a central premise is that having access to training, keeping records of crop management activities and doing better investment planning will help farmers to make better-informed decisions. We assess this by analysing the use of such management tools. This in turn is expected to result in changes in efficiency and productivity.

For record-keeping, all treatment group farmers outperform their peers in the control group on all indicators except the FFS only group who indicate they do not keep specific records on biocide application (which is a requirement for UTZ certification).

Decision-making on key investment aspects such as irrigation and fertiliser applications have not significantly changed for any of the groups. Across all the groups, 60% to 80% of farmers indicate that their decisions on how much fertiliser to apply are based on what they did last year as well as their own experience and tradition.

Efficiency is measured by the farmers’ use of irrigation water and fertiliser. Over-use of both is a well-documented sustainability challenge for the Vietnam coffee sector. All UTZ certified groups are operating at or around the advised irrigation dose. In terms of efficiency of irrigation water use, i.e. the amount of coffee produced with a given amount of irrigation water, only the FFS+UTZ group outperforms its control group. The other 2 UTZ certified groups show no improvement relative to their control group and the he FFS-only group performs worse than its control group on irrigation efficiency.

Nutrient management efficiency is measured by the amount of N, P and K used per unit green coffee. The low intensity training + UTZ group is significantly less efficient than its control group on N usage. The FFS+UTZ group shows a tendency towards more efficient nutrient management, but not significantly so. Various social and environmental factors appear to have far greater influence on efficiency and productivity than any of the treatments.

Productivity is high for all groups, none of the treatments shows significant productivity change over time relative to its control group.

Generally, more intensive training contributes to better farm management performance. The expected professionalization of farm management as a result of UTZ certification is not reflected in the way farmers make decisions nor in the majority of efficiency ratios in this research.

Farm economics
Changes in farm management as a result of training and using various management tools is expected to contribute to farm economic performance. We measure this with 7 indicators on turnover, various production cost aspects, income and credit availability. We find no overall impact on farm economics for any of the treatments. Some treatments score better on aspects of farm economics and in some cases the treatment groups’ performance is significantly lower than their peers in the control group. Lower performance on farm economic indicators by the treatment group seems more prevalent among the lower intensity trainings. The hypothesis that ‘efficiency improves with UTZ certification’ had to be rejected. All UTZ certified groups have significantly higher labour costs and as a result 2 of the 3 UTZ certified group have lower earnings, although this difference is not significant. These higher labour costs could not be attributed to additional labour required for code compliance.
Outcomes analysis 2: Effects of aspects of treatment
In the second analysis we aim to identify the relative contribution of different aspects of the treatments to outcomes and impact. To do so we add training quality, amount, quality of the trainer (professionalisation activities) and compliance with the UTZ code to the models. We find that drivers for change in uptake of training content by farmers are training quality, amount and the profile of the trainers involved. Where training is given, being compliant with the UTZ code does not show a significant effect on use of training content by farmers.

Farm management is primarily positively affected by amount of training. Our current models with training and trainer quality do not explain which aspects of training lead to change, other than the amount. We do not find any additional effect on farm management and efficiency by being compliant with the UTZ code.

Training quality and training amount show impact on 6 farm economic aspects. Taken on its own, UTZ code compliance appears to have negative influence on production costs and earnings but in combination with more training this effect disappears. The impact of interaction effects of UTZ code compliance and training quality on farm economics is negative. This suggests that irrespective of training quality, being compliant with the UTZ code does not improve outcomes beyond what the training delivers. In all cases a sufficient amount of training remains required.

Outcomes analysis 3: Implementation costs
Implementation of UTZ certification at farm level appears to be cost neutral, but after controlling for share of certified coffee sold as such and factoring in opportunity costs for the amount of time farmers spend on certification related work and meetings (excluding agronomy trainings) the margin in fact is negative. The contribution to net farmer earnings of UTZ certification, depending on the implementation modality, ranges from -0.33% to -0.76%.

For the certificate holder, implementing UTZ certification cost effectively seems possible. The certificate holder of the low-intensity training group has margins of around 20USD/Mt green coffee, while the other 2 UTZ certified groups reach just about break-even. Excluding premium payments to collectors and/or farmers, system costs (Internal Control System, external auditing) for the certificate holder make up one- to two thirds of the implementation cost. Even after factoring in a few USD per Mt green coffee in additional costs as a result of inherent supply chain inefficiencies that certification brings about (separating product flows for example) UTZ certification can pay for itself. But cost effective implementation comes at the expense of quality of implementation and impact at farm level. The low-intensity training treatment scored positively on 50% of the outcome indicators, but 0% on the impact indicators (which gives a positive score on 12% of all indicators). The FFS-based methods that do lead to more impact are more costly and push down profit margins on certified coffees for certificate holders which means a disincentive to apply them.

Answering the research questions and recommendations
From the results we arrive at the following answers to the research questions.

1. Does - in addition to UTZ Certification – the quality and intensity of training on sustainable coffee production (and processing) practices have an effect on changes in crop management and on improvements of performance by farmers?

We conclude that intensity of training as measured by the amount given to farmers has a positive effect on some of the crop management practices but that it affects few of the impact indicators. We suspect this may be partially caused by a rising and steady coffee price level up until the first half of 2011 which limits the necessity for farmer to adapt their farm management, especially when it concerns cost savings on fertilizer costs and irrigation water.
When we analyse the relative contribution to impact of training and certification aspects such as training amount, quality and being compliant with the UTZ code we find the role of the UTZ code in improving farm management to be very limited. We conclude that compliance to the UTZ code as such is no replacement for training of farmers and on its own does little to deliver the promised benefits.

Although the UTZ certified code of conduct states that training should be given, it does not give any indicators to describe the minimum level of quality and intensity that the trainings should adhere to. UTZ certification however, does play a facilitating role by allowing certificate holders to recoup (part of) the implementation cost by selling UTZ certified coffee against premiums. However, due to the lack of requirements on quality of trainings, certificate owners do not have a financial incentive to go for the more expensive higher quality and intensity trainings.

2. How do costs and benefits of the trainings compare for the different levels of quality and intensity of trainings?

The most intensive FFS model in the study can be operated for about 15USD per Mt green coffee per year. Lower intensity training models vary in cost from 2.46 USD/Mt green coffee to 10.46 USD/Mt, excluding the non-training certification costs. As yields may vary from year to year, a better measure is to look at training cost per farmer. With 4-6 sessions a year, an average productivity of 3.68Mt/ha and a coffee acreage of 1.35ha, this amounts to training costs of about 75USD per farmer per year in the FFS model. The main driver for impact is training amount of the FFS type in particular. Unlike the FFS approach, lower cost models as applied by the low intensity training group do not yield much impact at farm level but have the merit of being fundable from purely commercial revenue stream that result from premium payment for certified coffees.

3. What recommendations can be given to policy makers in and outside Vietnam on how to roll out certification and/or productivity trainings? Does quality and intensity of trainings on sustainable coffee production (and processing) practices of small-scale Robusta farmers have an effect on changes in crop management by these farmers and on improvements of the economic and environmental performance of their crop management in addition to certification by UTZ Certified?

Certification of coffee by third parties such as UTZ Certified, Rainforest Alliance and 4C is appealing to coffee roasting companies seeking ways to shape their sustainability policies. This study in Vietnam with small scale Robusta farmers operating in a complex farming reality, shows that compliance with the UTZ code fails to deliver impact consistently on the measured indicators. Results are only attained if sufficient training on professionalization of farmers is provided, e.g. with the help of donor funding, as is the case in 2 of our research groups and even then performance is not consistent. In several of the cases we investigated the requirement for and reliance on donor funding renders the UTZ certification in combination with more intensive training approaches inherently unsustainable.

As more intensive training in combination with UTZ Certification depend on donor funding there are implications for rolling out of these practices across the Vietnam coffee sector. Certification has a role to play since coffee roasting companies build their sustainability policies around it. Certification will also continue to be of importance if NGOs continue to require coffee roasting companies to use it. Despite the push effect from NGOs to use certification as a means to improve farming and living conditions in origin, we find that UTZ certification in this study leads primarily to access to some training, uptake of management tools such as record keeping and investment planning but not to improvements in farming efficiencies and better farm economics. As such, among the farmers in this research in
Vietnam, UTZ certification largely fails to address the main challenges such as over-irrigation and excessive fertiliser applications that coffee sector is facing.

The main positive benefit of UTZ certification is that it allows certificate holders to make some investments in the farmers in their supply chains. This is made possible by the fact that coffee roasting companies pay extra for the assurance that UTZ certified coffee is produced in accordance with their standard. However, we have found that the assurance on standard compliance by producers is not water-tight. On some mandatory control points, such as not using child labour for heavy and dangerous work a few isolated farmers are not compliant. For other aspects non-compliance can reach 30% of the UTZ certified producers. This could endanger the credibility of UTZ Certified’s assurance.

The case of Vietnam is to some extent also illustrative for governments and companies in countries with less productive farmers than the Vietnamese coffee producers. This particularly relates to the business case for farmers and certificate holder: as costs for certification are accrued per farmer, volumes per farmer are critical to the return on investment of the certificate holder. The 10 to 20 USD profit margin obtained by exporters in Vietnam because of the premium, will quickly evaporate at lower levels of production per farmer. This will lead to certificate holders having even less incentives in financing intensive training activities from their own pocket. For coffee roasters, a realisation of these economic realities is critical against their desire to continue growing certified volumes. Assuming that certification remains important for them, it will become important to seek ways with certification agencies and possibly other stakeholders to generate more impact at farm level and make implementation cost-effective for low-volume producers.

On the other hand, in areas with low productivity, the professionalization activities may contribute to much improved yields and efficiency of input use. In several projects of the DE Foundation such effects are reported, and the implementing organisations attribute them almost completely to the quality and intensity of the professionalization activities.

We suggest certification agencies in general and UTZ Certified in particular to seek ways of embedding more intensive training approaches in certification schemes and use existing revenue streams from premium payments to pay for it.
# Table of Contents

**Foreword**  iv  
**Executive summary**  vii  

1 **Introduction** 16
   1.1 The conundrum 16  
   1.2 Reasons for this research 17  
   1.3 Implementation modalities 17  
   1.4 Structure of the report 18  

2 **Research methodology** 19
   2.1 External validity 19  
   2.2 Internal validity 20  
   2.3 Selection and sampling 20  
   2.4 Data collection 23  
      2.4.1 Structured interviews 23  
      2.4.2 Semi-structured interviews 24  
      2.4.3 Literature study 24  
      2.4.4 Case studies 24  
   2.5 Analytical model 24  
      2.5.1 Livelihood framework 26  
      2.5.2 The training 28  
      2.5.3 The trainer 29  
      2.5.4 Exposure effects 29  
      2.5.5 Interaction effects 29  
      2.5.6 Implementation costs 29  
   2.6 Data analysis 29  
      2.6.1 Average impact of research groups 30  
      2.6.2 Distributional impacts of research groups 32  
      2.6.3 Impact of UTZ code compliance and training 33  
   2.7 Pre-treatment comparison 33  
      2.7.1 Propensity score matching (PSM) 35  
      2.7.2 Capital asset indices 37  
   2.8 Final data and analysis considerations 37  

3 **Results** 39  
   3.1 Group comparison by treatment 39  
      3.1.1 Training 39  
      3.1.2 Farm management 42
3.1.3 Coffee trade and product quality
3.1.4 Farm economics
3.1.1 Assets
3.1.2 Living conditions of children
3.1.3 Occupational health and safety (OHS)
3.1.4 Waste management
3.1.5 Labour relations
3.1.6 Natural resources
3.2 Impact of UTZ code compliance and training
  3.2.1 Training
  3.2.2 Farm management
  3.2.3 Farm economics
3.3 Cost of implementation

4 Conclusions
  4.1 General outcomes
  4.2 Outcome analysis 1: comparison of treatments
  4.3 Outcome analysis 2: Effects of aspects of treatment
  4.4 Cost of implementation

5 Recommendations

6 References

Annex I: Case study reports
Annex II: Commune selection criteria
Annex III: Map of interview locations
Annex IVa: Questionnaire farmers
Annex IVb: Questionnaire trainers
Annex V: Livelihood index values by treatment
Annex VI: Training indices
Annex VII: Control variable values by treatment
Annex VIII: Summary of analysis outcomes
1 Introduction

Certification of commodities is an increasingly common way to ensure that producers and other value chain partners such as traders and exporters adhere to pre-defined social, environmental and in some cases technical standards. Global supply of certified sustainable coffee has risen from about 1% in 2001 to 9% in 2010 and a projected 20 to 25% in 2015 (Pierrot, et al., 2010). Supply growth of conventional coffee averaged around 2% over the same period (author’s calculation, based on ICO data). Consumption of certified sustainable coffees is concentrated in mature markets, but within those there are large uptake differences between national markets (Panhuysen & Reenen, 2012).

Internationally, the Dutch coffee market leads the way with 38% of consumption certified sustainable in 2011 whereas this was less than 3% in 2001. DE Master Blenders 1753 (DEMB) is the single largest coffee roaster in the Netherlands with a market share of over 50% and the 3rd largest worldwide. Due to their size, the growth of certified sustainable market share in the Netherlands is to a large extent driven by their purchasing strategy. Collectively, the Dutch coffee sector has voiced the ambition to have 75% of the Dutch market certified sustainable by 2015 (KNVKT, 2010). Other large companies such as Nestle and Mondelez have also voiced their ambitions with regards to certified sustainable coffee. According to Panhuysen & Reenen (2012), Nestle indicates that all its coffee purchased directly from farmers will meet the 4C sustainability standard by 2015. This is expected to amount to 180,000Mt green coffee annually. In addition, 90,000Mt will be sourced in accordance with the Rainforest Alliance standard. Mondelez in turn expresses the commitment to have all its European coffee brands sustainably sourced by 2015, using 4C, Rainforest Alliance and Fairtrade systems.

Seventy per cent of coffee is produced by an estimated 20 to 25 million small-scale farmers (Volcafe 2013; Kolk, 2011; Bacon, 2005). Some of these farmers are member of cooperatives, but the majority operates as individuals. Aside from a lack of management and administrative skills, individual small holder coffee farmers can't profitably access the market for “certified sustainables” because they lack sufficient volumes over which to spread implementation costs. Given the large and fragmented supply base, addressing demand for certified sustainable coffee requires trading and exporting companies that buy coffee from (groups of) small-scale producers to organize producer groups and use these as a basis for implementation of certification. Doing this cost-effectively requires market premiums to cover additional costs made both by farmers and companies. Even with premiums paid for certified sustainable coffee the economics do not always work out. Implementation costs are a function of the number of farmers with whom a company implements a certification programme in its supply chain, whereas benefits in the form of premiums are primarily a function of volume sold. Hence, low volume farmers are relatively more costly to certify. It is no coincidence that by far the majority of certified sustainable coffees, be it UTZ certified, Rainforest Alliance or Fairtrade originate from areas with a relatively high degree of farmer organisation or high production in Central and South America and South East Asia. The 4 dominant suppliers of certified sustainable coffee are Brazil, Vietnam, Colombia and Peru, accounting for close to 80% of supply (IISD, IIED, 2010). While sustainability certification is frequently stated to assist small-scale producers it is the better organised smallholders as well as the large producers in the Americas that benefit most. Outside Central and South America, with their history of collective marketing, company-led implementation of sustainability certification seems to be predominant model and strengthens the role of well organised multinational corporations in local supply bases (Neilson, 2008).

1.1 The conundrum

Remarkably for a sub-sector that sees such strong growth and commitment from major companies, very little empirical evidence exists about if, how and for whom certification works. According to certification agencies continuous improvement in productivity, quality
and cost efficiency is gained by applying their code of conduct (UTZ Certified, 2012). Claims of other certification agencies are quite similar (4C Association, 2012) or go further still (Rainforest Alliance, 2012). Yet the evidence base to support these claims is very modest (Steering Committee of the State-of-Knowledge Assessment of Standards and Certification, 2012). A meta-study commissioned by the Scientific and Technical Advisory Panel of the Global Environment Facility (2010) reviewed 134 studies that claim to assess impact of certification in different sectors. Out of these only 14 were deemed sufficiently rigorous in their research design to appear credible. Of these only six identified some positive socioeconomic or environmental impacts at farm level as a result of certification in coffee.

In most of these studies certification is modelled as a yes-no option. By failing to account for the multi-dimensional nature of the implementation of certification, time effects and the inherent complexity of measuring impact on disparate populations that operate in variable environments, conclusions from such studies are usually limited to stating that certification worked (or not). It does not allow the reader to discern why and how, beyond being certified, certain impacts were achieved, and if so, whether this was done in an efficient manner. The causal pathways to lead to impact thus remain obscured and the conundrum persists.

1.2 Reasons for this research

DEMB, as a major buyer of certified coffee, also supports sustainability initiatives that go beyond certification only. Through its funding of the DE Foundation, it facilitates implementation of projects with small scale coffee producers, exporters, governments and NGOs in a number of coffee origins. To obtain better insight in the impact of certification, DEMB co-funded this research in Vietnam, one of their important coffee sourcing countries. The Dutch government supports various programmes that aim to upscale production of and trade in certified sustainable products (Rijksoverheid, 2012). Through a match-funding facility called Topsectoren, the Dutch Ministry of Economic Affairs and DEMB partnered to commission this study into the effectiveness and efficiency of different implementation modalities that seek to promote sustainable coffee production.

Specific research questions that we aim to answer with this study are:

1. Does in addition to UTZ Certification – the quality and intensity of training on sustainable coffee production (and processing) practices have an effect on changes in crop management and on improvements of performance by farmers?
2. How do costs and benefits of the trainings compare for the different levels of quality and intensity of trainings?
3. What recommendations can be given to policy makers in and outside Vietnam on how to roll out certification and/or productivity trainings?

1.3 Implementation modalities

Through its work with the DE Foundation, DEMB has a growing realisation that what leads to impact at farm level is not so much sustainability certification in and of itself, but more the way by which it is achieved. This is what we call the “implementation modality”. In this study we distinguish 3 implementation modalities that are used to achieve certification: high intensity training, medium intensity training and low intensity training. Modalities matter because they may influence the degree and direction of impact at farm level, but they also carry different costs and more costly modalities may negatively affect the return on investment for a certificate holder. By quantifying and measuring distinct implementation modalities we expect to help solve the conundrum. To date we are not aware of literature that addresses implementation of sustainability certification in this manner.
1.4 Structure of the report

In section 2 the research methodology is described by detailing the research sites, the sampling methodology, data collection methods and the analytical models used. At the end of that section we also expound on the limitations of this study.

Section 3 provides an overview of the current state of affairs in the field of impact measurement in general and outcomes of certified sustainable production in coffee in particular. This helps to frame our results which are discussed in section 4.

Results are presented in 2 sub-sections and pertain primarily to 63 outcome and impact indicators across 10 dimensions that reportedly occur at farm level. The first section provides a comparison of the socio-economic and environmental outcomes for the different treatment groups. In the second part we dive deeper in the data by trying to attribute main socio-economic impacts to specific and measurable training intensity and quality characteristics. Finally, a review of financial costs and benefits at certificate holder level is presented.

Conclusions are presented in section 5.

Recommendations for various actors in –and outside the coffee value chain are presented in section 6.
2 Research methodology

In our attempt to answer the research questions we use an ex-post empirical analysis of 4 different groups of coffee producers, that have received varying degrees of training in terms of intensity and quality and 3 of which are UTZ certified and 2 of which use Farmers’ Field School trainings (the treatments) and 2 control groups. Each treatment or implementation modality represents differing levels of investment (Table 2).

Table 2: number of respondents in each category of implementation modality, and certification status; T1-T4: Treatment groups; C: Control groups

<table>
<thead>
<tr>
<th>Implementation modality (type of training)</th>
<th>UTZ Certified</th>
<th>Non-UTZ Certified</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High intensity (Farmers’ Field School), high investment</td>
<td>76 (T2)</td>
<td>79 (T1)</td>
<td>155</td>
</tr>
<tr>
<td>Medium intensity, moderate investment</td>
<td>44 (T4)</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>Low intensity, low investment</td>
<td>75 (T3)</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>None</td>
<td>-</td>
<td>75+75 (C)</td>
<td>150</td>
</tr>
<tr>
<td>Total included in analysis</td>
<td>195</td>
<td>229</td>
<td>424</td>
</tr>
<tr>
<td>Excluded group (see section 2.3)</td>
<td>25</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>Total # interviews</td>
<td>210</td>
<td>239</td>
<td>449</td>
</tr>
</tbody>
</table>

In the remainder of the report the T1 group will be referred to as the FFS-only group; T2 as the FFS+UTZ group; T4 as the medium intensity+UTZ group and T3 as the low intensity+UTZ group.

2.1 External validity

The study is implemented in Vietnam. As a country Vietnam is the second-largest exporter of coffee after Brazil, and the largest exporter of Robusta coffee. It is also the second-largest supplier of UTZ certified coffee. Vietnam is one of the important coffee origins for DEMB and the DE Foundation has for 10 years been active in the country with various projects (Jansen, 2012).

Vietnam is a coffee origin where productivity of Robusta coffee is far above the global average in general (International Coffee Organisation, 2012). Its sector is marked by a high degree of intensification in terms of labour use and inputs which marks it as atypical. Its literacy rate is higher than that of other Robusta coffee producing countries such as Cote d’Ivoire, Cameroon and Uganda (World Bank, 2013). Implications are that the external validity of the research outcomes beyond Vietnam are somewhat limited and care should be taken when generalising specific outcomes from this study to other countries and production systems. This specifically holds for positive farm level impacts as these tend to affect farm level investment strategies that are out of reach for the average small scale Robusta producer in other countries.

The absence of impact or negative effects can probably be extrapolated to other geographical areas with more confidence on the grounds that if relative resource rich Vietnamese coffee producers fail to capitalise on opportunities offered by UTZ certification and training it is unlikely that their poorer counterparts in other countries are able to do so, bar radically different implementation modalities perhaps.

Within Vietnam, the provinces of Dak Lak and Gia Lai were selected. In these provinces the implementation modalities that we think are required to understand the conundrum are present. The 2 provinces produce about half of Vietnam’s coffee on about 48% of its acreage under coffee (Nguyen & Tuan, 2012), thus ensuring external validity for the country. Dak Lak represents the relatively more mature coffee areas, characterized by older tree stocks, some
with declining productivity. Gia Lai is a more recently established coffee area with a younger tree population and tends to be more productive.

2.2 Internal validity

The experimental design is quasi-random as producers that belong to the treatment groups are self-selected as they all voluntarily participated in the certification. From within this population of self-selected participants, interviewees were selected randomly. A control group was constructed by introducing a similar self-selection process (section 2.3) and a subsequent random selection of interviewees from the self-selected control group population. To assess causal impact of certification and the effect of different implementation modalities we build counter-factual scenarios. In the counter-factual scenarios we estimate what the socio-economic and environmental outcomes would have been had the certified producers not been certified, taking implementation modalities into account. We do this by assessing socio-economic and environmental outcomes for control group members, mostly looking at changes over time, and comparing these to outcomes for members of the treatment group that were statistically identical for pre-treatment characteristics that may have led to inclusion in the treatment group and have an influence on how well a farmer is farming. This comparison was done using Propensity Score Matching (PSM) and regression analysis based on pre-treatment characteristics.

To calculate the difference and to conduct matching we require data about the situation on the farms prior to certification or project participation. We deal with a disparate group of treatments that diverge spatially and in time and that in most cases lack a set of baseline data. In those few cases where baseline data was available it is not always comparable across the groups. We therefore had to rely to some degree on recall data from producers. In defining the recall data point we settled on 2008. The majority of treatments were about to start or were under way for 1 year. We justify the 1-year time lag by noting that impacts of interventions in perennial crops often take 2 years to materialise (Waarts, 2012). Recall data was limited to a number of key factors that producers are likely to remember, such as production and farm size. Hard numbers on volumes of inputs and costs from 2008 are unlikely to be accurate. Instead we asked producers to estimate if their current performance is worse, the same or better than what it was then. One treatment (T1) was underway for longer and we may under-estimate its impact if we compare the change in socio-economic and environmental outcomes to the change observed in its control group. For example, in addition to the amount of change over time in productivity, we also considered current productivity levels. Our reasoning is that even if expected change in productivity occurred before 2008 the treatment group, all other factors influencing productivity being equal, would have higher actual productivity levels today.

2.3 Selection and sampling

Using a database of certified suppliers provided by UTZ certified and information provided by DE Foundation we selected 3 companies implementing UTZ certified supply chains in the provinces of Dka Lak and Gia Lai. A pre-selection was made to exclude outliers with questionable productivity figures and atypical business models (e.g. a coffee roasting company producing for the local market) and to include only certified Robusta suppliers. To avoid attribution problems we excluded UTZ certified suppliers that operate more certification schemes with the same producer base and suppliers with geographically overlapping supply chains. And we aimed to have suppliers with established reputations that are active in international markets and could potentially be a supplier of DEMB. A short-list of 4 suppliers resulted and all were addressed in writing. Two of those confirmed their willingness to participate and were included.

One of the certified supply chains was partly set up with funding from the DE Foundation and is organized by an international exporter. The 2 other supply chains belong to national
companies. One of the national companies at a later stage turned out to be a somewhat different entity than we initially thought. It concerned a plantation company with contract farmers whom do not make their own management decisions but rather rely on central management. Such plantation management structures are not very representative for the majority of current coffee production in Vietnam, which is reflected in the fact that the plantation company’s market share has steadily declined over the past years (National Institute for Agricultural Planning and Projection, 2013 (forthcoming)). Because of the rarity of this construction and the associated problems this would give us in constructing a credible counter-factual for this group we excluded this group from the statistical analysis. Out of interest they have been included in the sampling but their outcomes do not affect our conclusions. In their place, a recently established farmer organization was used, that became UTZ certified in 2011. Admittedly also a rarity, among others from the fact that it received NGO support in building up the organisation which in Vietnam is not very normal, but one in which farmers, as in the other groups, make their own management decisions.

Table 3: Treatment group overview

<table>
<thead>
<tr>
<th>Selection aspect</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FFS-only (T1)</td>
</tr>
<tr>
<td></td>
<td>FFS+UTZ (T2)</td>
</tr>
<tr>
<td></td>
<td>Medium intensity+UTZ (T4)</td>
</tr>
<tr>
<td></td>
<td>Low intensity+UTZ (T3)</td>
</tr>
<tr>
<td>Project implementer</td>
<td>Multinational exporting company</td>
</tr>
<tr>
<td>Project sponsor</td>
<td>Coffee roasting company</td>
</tr>
<tr>
<td>Predominant sales channels</td>
<td>Exporter (project implementer)</td>
</tr>
<tr>
<td>Nr of farmers in (certified) supply chain</td>
<td>n.a. 811 46 1783</td>
</tr>
<tr>
<td>Province</td>
<td>Dak Lak</td>
</tr>
<tr>
<td>Certified since</td>
<td>2008-2011 2011 2007-2011</td>
</tr>
</tbody>
</table>

The sample size within each treatment groups depends on three factors: the level of precision required, the intrinsic variability of the variables to be estimated, and the confidence level at which precision is calculated (Poate & Daplyn, 1993). We set the required level of precision at ±10%, with 95% confidence. This means that an error greater than 10% (i.e. deviance from actual population mean) is expected in at most 5% of all possible samples. We use the following formula to calculate a base sample size, where $z$ is the level of confidence, $c$ is the level of variation, and $x$ is the level of difference we want to estimate:

$$n = \left( \frac{Zc}{x} \right)^2$$

Using previous survey data in Vietnam we find that the coefficient of variation of some general agronomic variables (yield, expenditures, income, number of coffee trees) is generally between 40% and 85%, which is similar to the 40-80% mentioned by Poate and Daplyn (1993) as generally applicable numbers. For our base calculation we use a 10% precision level, a 95% confidence level and an average coefficient of variation of 62.5%, resulting in a sample size of 105.

$$n = \left( \frac{1.64 \times 62.5}{10} \right)^2 = 105$$
For comparing different groups, we first multiply the base sample size by the number of groups, which would result in a total sample size of 525. We expect stratification at province level to reduce the coefficient of variation in our outcome of interest, enabling a smaller sample size of 75 per group, except for T3 where the total population size was 50 and we decided to attempt to interview all. This resulted in a grand total of 449 interviews. Respondents are located in 21 communes, 9 districts and 2 provinces (Table 4).

Table 4: Number of respondents in total and by treatment type (T1 to T4) and Control groups (C) with their share of the total and their location by province, district and commune.

<table>
<thead>
<tr>
<th>Type</th>
<th>Treatment group locations</th>
<th>District</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Ea Kuang</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37</td>
<td>8.25</td>
<td>Phuoc An</td>
</tr>
<tr>
<td>T1</td>
<td>Hoa Tien</td>
<td>9</td>
<td>Dak Lak</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Ea Yong</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.45</td>
<td></td>
<td>Quang Phu</td>
</tr>
<tr>
<td>T1</td>
<td>Ea Kenh</td>
<td>22</td>
<td>Krong Nang</td>
</tr>
<tr>
<td></td>
<td>4.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Ea Phe</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.57</td>
<td></td>
<td>Gia Lai</td>
</tr>
<tr>
<td>T3</td>
<td>Quang Tien</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>Ea Tam</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Ea Toh</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>Buon Trap</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.67</td>
<td></td>
<td>Buon Trap</td>
</tr>
<tr>
<td>T3</td>
<td>Ea Kao</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>CuEbuia</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Hoa Thang</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Al Ba</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>H’Lop</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Dun</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.57</td>
<td></td>
<td>Chu Se</td>
</tr>
<tr>
<td>T2</td>
<td>Chu Se</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Ia Tiem</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Chu Pong</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Nghia Hung</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.57</td>
<td></td>
<td>Phu Hoa</td>
</tr>
<tr>
<td>T4</td>
<td>Tra Da</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.60</td>
<td></td>
<td>Pleiku</td>
</tr>
<tr>
<td>Excluded</td>
<td>Ia sao</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.34</td>
<td></td>
<td>Ia Kha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>449</td>
<td>100</td>
</tr>
</tbody>
</table>

Selection of treatment group respondents was done using the RAND function in MS Excel 2010. With this function each producer in a complete list of members of a specific treatment was assigned a random number. These were then sorted in ascending order and the first \textit{x}+10 producers were selected, where \textit{x} denotes the number of interviewees required and 10 indicates the number of backup interviewees should the selected be untraceable on the day of interviewing. This exercise resulted in a list of producers to be interviewed and the communes in which they live.

Selection of control group interviewees to build the counter-factual, was done first by selecting communes comparable to those where the treatment group members stay in terms of the importance of coffee as a livelihood. A matrix with 14 key agro-ecological and socio-economic variables was constructed and filled out with the assistance of the respective Departments of Agriculture and Rural Development of each of the provinces (see annex II). Six communes from which to select control group members were thus chosen. Depending on
a respondent’s location a value would be assigned to him for each of these 14 variables and these were included in their commune matrix score.

Producers that participate in a certified supply chain have usually opted to do so. At some stage they were asked or offered the opportunity to participate. The fact that they chose to do so, may indicate that they are more motivated to invest in their farm, seek new knowledge or otherwise strive for improvement than those that were given the same opportunity but declined to participate. A difficulty in constructing the counter-factual lays in controlling for motivational bias. Respondents in the control group would ideally be similarly motivated, but without participating in a certified supply chain. To address motivational bias we designed a half-day training session on coffee pruning and nutrient management in each of the 6 selected communes. The opportunity to participate was announced a few days in advance. The Western Highlands Agroforestry Research Institute (WASI) was contracted to implement these trainings. Using this method we attempt to mimic the self-selection aspect of the certified farmers in our control groups, assuming those that participate in the training are more motivated than those that do not. At the end of each session an announcement was made requesting interview opportunities. Appointments were made on the spot for an interview at the farmer’s house within the same week.

A total of 150 respondents comprise the control group, 75 in each province. Treatment groups were only compared to control group producers from the same province, either by performing a separate PSM or by including the province as a control variable in the regression analysis.

2.4 Data collection
To collect data, a number of techniques were used. We relied heavily on structured, semi-structured and in-depth interviews with farmers, trainers, exporters, certification agencies and project implementers as well as a literature review.

2.4.1 Structured interviews
Structured interviews were used for data collection at farm level. A detailed questionnaire was designed to provide a mix of quantitative and qualitative data, this was reviewed and adapted by a pool of 4 experts with knowledge in areas of coffee production, research techniques and Vietnam agriculture (annex IVa). The questionnaire was then translated into Vietnamese. A team of 12 data collectors was recruited and contracted to perform data collection over a 1 month period of time just after the ending of the 2011/12 coffee harvest season. Questions relating to current practices cover the 2011/12 season and recall data was obtained for the 2008/09 season. Enumerators received a 1-day training on using the questionnaire. Data collection started the following day and one of the lead researchers accompanied the team in the field for nearly the entire duration of the data collection exercise. GPS coordinates of each interview location were logged and plotted to allow a possible follow-up at a later date with the same producers to be implemented (see annex III for interview locations). One issue with this type of data collection is that the person interviewed is not always the person who is most active in coffee within the household. Data was entered by the team leader in an MS Excel data base.

To better understand the intricacies of the interventions and discern what makes them work, interviews were also conducted with all 35 trainers who have provided agricultural and other training to producers over the course of the various interventions in each treatment. To this end, a structured questionnaire was designed (annex IVb) and one of the researchers interviewed all the trainers in person. Data was entered in an MS Excel data base and later on each producer was assigned a calculated training index values based on the trainer(s) from whom he/she received training.
2.4.2 Semi-structured interviews
Semi-structured interviews were conducted with the DE Foundation management, and with the M&E manager, the Vietnam representative and the Field Development manager of UTZ certified. The purpose of these interviews was to help build a so-called theory of change. This describes how the act of becoming certified or participating in a training programme is supposedly leading to impacts through a number of intermediate stages. Each interview lasted about 2 hours. Managers responsible for implementing certified supply chains were interviewed in Vietnam. Implementers of the FFS based interventions (both the FFS-only and FFS+UTZ projects) were interviewed remotely. The purpose of these interviews was to clarify knowledge gaps, discuss probable impact pathways and ascertain implementation costs and perceived benefits of certification and training. These interviews took a maximum of 3 hours.

2.4.3 Literature study
We rely on literature to clarify the context of the Vietnam coffee production system, approaches to impact assessment in general and current thinking on the impact of certification. References to literature are applied where deemed relevant and appropriate.

2.4.4 Case studies
Data from the structured interviews as well as notable farmers pointed out by the data collection team were approached once more after the initial interview to have an open conversation about their views, expectations and experiences. A stratification on yield and income levels, duration of being part of a treatment group and satisfaction with UTZ certification was applied to ensure a representation of views from the tail ends of the distribution; views that would otherwise be lost in averaging of quantitative data. Collectively, these views have contributed to the results section. Summaries of these interviews are in annex I.

2.5 Analytical model
The analytical model and the theory of change describe how impact is thought to come about. According to UTZ certified (UTZ Certified, 2012), it pays attention to code compliance, various types of training and traceability.

Implementing UTZ certification has two major activities regarding changing the way of working of farmers (and other value chain partners) (Figure 2):

- Stimulation and checking compliance with the code of conduct; internal and external audit and training on code compliance are expected to assure that producers and other partners adhere to pre-defined social, environmental and in some cases technical standards.
- Developing professional farming: the certificate holder is required to give trainings to farmers on various topics to help farmers to professionalize their crop and farm management
In our evaluation, besides analysing effects on outcome and impact indicators of ‘Certification’ as one single activity, we also tried to separate the effects of the underlying ‘Compliance’ and ‘Professionalization’ activities.3

The act of certification (the combination of Compliance and Professionalization) according to UTZ Certified leads to value for producers as it facilitates long-term improvements in productivity, quality and cost efficiency. When this happens is not clear. That such changes do not come about from one day to another seems self-evident, but how long should a producer be certified before the claimed benefits start materializing? This, and the exact mechanisms by which these changes come about are not entirely clear and may vary from one case to another. Training of producers however was expected to play a decisive role in achieving impact. Interviews with exporters and implementers of (certified sustainable) supply chain projects confirmed this expectation.

How long one needs to be certified, how much training would be needed, of which type and what role training quality and quantity may play remains difficult to ascertain. Uptake of training may also vary across different households, depending on their wealth, labour availability, distance from city centres, etc.

To characterise the producers and identify the influence of pre-treatment assets we apply the DFID livelihood framework (DFID, 1999), see section 2.5.1. Having thus described the means by which we identify the level at which producers enter into the treatment groups we look at how these programmes work. We do this by developing and applying a framework to measure intensity and quality of the training and quality of the trainer (sections 2.5.2 and 2.5.3). We also take treatment duration, interaction effects and implementation costs into account (sections 2.5.4, 2.5.5 and 2.5.6).

With these elements we then build a multi-layered theory of change that gradually progresses from simple and confirmatory models to more complex and exploratory models to

---

3 In discussion with UTZ Certified the organization voiced its concerns about the segregation of implementation aspects to discern their relative contribution to impact. According to UTZ, its programme can not be seen in isolation of ‘professionalization’ training because this is a pre-requisite to become certified. While factually correct, trainings varied strongly between the different certified groups we evaluated, which makes that Professionalization activities are therefore separable from the Compliance activities. As such, we feel that analytically we can do this to see if obtaining the certificate in addition to having training adds to the amount of impact on the indicators we measure.
measure and explain impact. The following sections explain the elements of these models, before providing a mathematical notation that captures our theory of change in its entirety in section 2.6.

2.5.1 Livelihood framework

The starting point of those that become certified and/or participate in training may influence outcomes or impacts. Producers that are already better off in one or more ways may be in a better position to capitalise on the opportunities that certification may present or alternatively be less motivated to do so. The livelihood framework identifies 5 types of capital assets that people can draw on to achieve livelihood outcomes within a certain set of contextual parameters (Figure 3). These capitals are human, natural, social, financial and physical (Natural Resource Perspectives, 1999). The livelihood framework groups structures and processes from government and private sector under the heading “transforming structures and processes”. We have decided to group some governmental policies and support mechanisms under a 6th capital that we call “institutional capital”. We justify this by noting that people can actively draw on this capital especially when, as in coffee, it concerns agricultural extension budgets or coffee sector support programmes. Laws are not optional and these are therefore not included in institutional capital.

![Figure 3: DFID livelihood framework](image)

Applying the framework to sustainable coffee production we assume that the livelihood outcomes to be achieved are those that the implementation projects strive for and that the certification agencies claim to deliver. The capital assets therefore have to reflect those aspects that we think may positively influence achieving livelihood outcomes, in this case productivity, quality and cost efficiency of production.

Human capital represents the skills, knowledge, ability to labour and good health that enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID, 1999). Under human capital we group variables on marital status, family size, and number of people dependent on the farm as indicators for labour capacity. We also include the maximum education level among adults in the family, the ethnicity, whether people are living on the same farm as their parents, their dependence on coffee as a share of their total family income and the number of trainings on coffee they had in 2008 (our t=0). Taken together these indicators are expected to represent the producers’ intrinsic capacity to produce coffee and their motivation to do so.
In the context of the sustainable livelihoods framework social capital it is taken to mean the social resources upon which people draw in pursuit of their livelihood objectives (DFID, 1999). Under social capital we have grouped variables on the duration of residency in the region, the number of years coffee has been produced in the village. These may indicate the level of knowledge and experience with coffee in the area and the connectedness to it where we assume that longer term residents may have more access to and also a better understanding of agro-ecological aspects that affect coffee production. We assume that the potential knowledge of coffee production is strongly linked to amount of exposure to coffee production someone has experienced. We relate this exposure to the number of years of working in coffee, as well as whether the parents of the producer were coffee farmers, . In addition to intrinsic knowledge gained from exposure to coffee, farmers may have differing degrees of access to networks of clubs and communal initiatives that enable better access to knowledge. We therefore include membership of, or participation in other projects and initiatives as a variable.

Natural capital is the term used for the natural resource stocks from which resource flows and services (e.g. nutrient cycling, erosion protection) useful for livelihoods are derived (DFID, 1999). One of the first and foremost indicators for coffee in Vietnam is access to irrigation facilities. We also include variables on the acreage under coffee at t=0, soil colour as a proxy indicator for soil quality making a distinction for generally more fertile reddish soils and more sandy greyish soils. The use of shade trees is determined and, at a commune level, the amount of rainfall.

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods (DFID, 1999). For the situation in 2008 , we inquired after the ownership of irrigation pumps, irrigation pipes, two-wheeled tractors and coffee hulling equipment. Access to electricity is asked since it may result in lower production costs for irrigation. The size of the drying yard was asked as a small one is a known limiting factor in Vietnam for producing quality coffee.

Financial capital denotes the financial resources that people use to achieve their livelihood objectives (DFID, 1999). Actual capital in terms of money at t=0 may be difficult to determine, we therefore designed a number of proxy indicators for wealth and we assume that a higher score on these implies greater wealth and therefore a greater capacity to invest in coffee. Variables used are credit consumption, type of farm ownership, housing quality, a selected number of electrical appliances, means of communication (mobile phones, internet) and modes of transportation.

Institutional capital encompasses the presence and outputs of organisations, both private and public, that set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods (DFID, 1999). Practically, we limited ourselves to directly accessible services that may differ from one commune to another. National level policies are not taken directly into account as in principle these are applied to all respondents. Variables grouped under institutional capital are the number of farming input shops and coffee buyers in the commune, the distances to the nearest research station and the district capital. Also included are the agricultural extension budget at district level for coffee, the number of coffee programmes and projects in the province and the number of (micro)credit institutions in the commune.

In addition to the capital assets a number of general control variables that may have influence on size and direction of impact are included: average age of coffee trees, productivity in 2008, amount of training from other sources, altitude, the sum of the ages of husband and wife and gender in case of single person households. These variables were not
part of any of the previously mentioned assets because the effect on assets, i.e. increasing or decreasing, is ambiguous.

While the livelihood framework is a useful tool to broadly grasp principle elements of livelihood strategies and helps to explain outcomes we find it insufficiently exact to identify explanations for impact. To that end we have quantified each capital which allows us to assess the contribution of it to impacts. Each capital represents the aggregated value of the control variables applicable to that capital. Each control variables is rescaled from 0, the minimum level to 1, the maximum level and summed up for each individual farmer within the population.

The advantage of grouping is that variables that individually are insignificant become important only when seen on conjunction with similar ones, or in other words when seen as an aggregated asset. A drawback of the re-scaling that is needed for the grouping is that each control variable is assumed to contribute equally to capital base whereas in reality it may well be that e.g. education level contributes more to impact than labour availability does. Another drawback of grouping is that we may lose detail: some variables depend on others to have effect. The cost-saving aspect of using electricity for irrigation only becomes relevant when access to irrigation is present. To counter these effects we have therefore run analyses both with variables grouped under capitals and with each variable as a discrete entity, section 2.6 provides more detail.

2.5.2 The training

We expect the way by which certification is implemented to have an effect on the impacts but also on the costs associated with it. To better quantify the implementation modality we have built training indices (annex VI) that capture training quality and quantity. The input to construct these indices originates from the household surveys as well as the trainer interviews. For farmers in the control group we were not able to track the trainers from whom they have received training. It therefore proved virtually impossible to construct a training index for them. Training index values for control group farmers were thus set at zero.

Training quality is measured using 3 aspects: organisation, degree of participation and the curriculum. The organisation captures the number of trainers per group and the number of farmers per trainer, location of training sessions as a proxy for distance from the farm to the training site, and the attendance rate. Jointly these aspects give an indication of the potential for trainer-trainee interaction where larger groups and sessions organised further away from farming areas are expected to be less effective. Another aspect of organisation is the type, quality and quantity of training material, if any, that is available, the way by which evaluation of the training is organised and the perceived satisfaction with the organisation by the target groups.

The degree of participation by farmers in the training is deemed important to generate impact by all project implementers. A lot of the success of Farmers’ Field Schools is attributed to the high degree of participation stimulated by the practical nature of these trainings. Taking this as a starting point the participation index reflects the decision-making process on training topics, the amount of time spent in meeting rooms and in the field, the space for questioning and the perceived satisfaction of the target group with this aspect.

The curriculum is quantified by the number of agricultural practice topics discussed and the timing of these discussions relative to the crop cycle, where appropriate timing, i.e. providing training on a topic just before it is needed on the farm, scores higher points.

The items for each of these three aspects were aggregated and their average forms the training quality index included in our models.
Training quantity is measured by the average number of sessions per year, the average duration of each session and the number of years of exposure a farmer has had.

2.5.3 The trainer
We suspect that a critical aspect of training refers to the skills and capacity of the person giving it. The quality and background of the trainer could have substantial influence on uptake of the training message and hence impact. To find this out we have attempted to measure trainer quality by quantifying what we think are critical aspects.

Experience is captured by measuring the number of subject-related technical workshops attended over the past 5 years as well as the number of workshops on training methodology. The years of experience in giving agricultural training in general and coffee agronomy training in particular are also counted.

Background is measured by age, education level and appropriateness of education. In the latter a trained coffee specialist will rate higher than a general agronomist who rates higher than an electrician. Not all excellent trainers will have an appropriate formal education hence we have included owning a coffee farm and living in the village where one gives training as positive attributes. These 2 aspects are added in several of our models to account for the quality of the trainer.

2.5.4 Exposure effects
We assume the impact of both certification and training to be subject to the law diminishing returns. Understanding how these interventions are subject to this is important when designing policies, projects and programmes that rely on these methods to bring about change at farmer level. In our final set of analyses we aim to discover if certification and amount of training as discrete variables have a noticeable effect on impact.

2.5.5 Interaction effects
Effectiveness of certification, training and impacts over time may well be subject to interaction effects of the different indices that we have specified. For example, more training by a trainer of better quality may have far greater effects than these 2 aspects may have in isolation. Similarly, UTZ code compliance may have greater impact if trainers are of better quality. To discern this we have specified interaction variables where we multiply code compliance status by training quality, or training amount and training amount with training quality. This can reveal if a combination of these aspects reinforce each other as one could expect.

2.5.6 Implementation costs
Lastly, we finish our analytical model by looking at cost of implementation. Understanding impact without knowing at what cost it was achieved is of limited use. Cost information is expressed as USD per Mt green coffee produced under the 4 treatment types. We include cost-benefit calculations at certificate holder level and aim to estimate the profitability of each of the treatments.

2.6 Data analysis
In this section we describe the analysis of our data to test the theory of change. In effect we construct multiple theories of change, testing each. The formulas used for each test effectively describe the theory of change itself. Instead of presenting one complex graph with multiple relations, causations and assumptions we prefer a more mathematical approach because that forces one to be more explicit about assumptions.
Data analysis is done in 3 stages. The first stage identifies the average impact of the treatment on all the outcome indicators, applying the variables that make up the capital assets as discrete entities (2.6.1). The second stage identifies the distributional impact of the treatment on a subset of the outcome indicators taking the capital asset base explicitly into account for selected indicators (2.6.2). In the first two stages treatment is identified as belonging to one of the four projects or the control group. The third stage explores the average impact of the treatment on the same subset of the outcome indicators using different model specifications including interaction terms. In this stage treatment is defined in terms of UTZ code compliance, duration of training and trainer aspects.

2.6.1 Average impact of research groups
The first phase identifies the average impact of the treatment on 63 outcome indicators (section 3.1). The main purpose is to give a reliable and robust estimate for the impact of each treatment compared to their specific control group, and compared to each other. We will first provide some descriptive data and a t-test. The t-test will be made more reliable using 3 propensity score matching techniques to control for the most significant initial differences between the treatment and control group. The third step involves a regression analysis including all groups and where possible a robustness analysis. By applying multiple models to the same data and indicators we expect to gain robustness of conclusions. We only accept impact when multiple analyses show impact and all point in the same direction (Table 5).

Table 5: Type of impact and related model outcomes; PSM = propensity score matching (see section 2.6.1.2)

<table>
<thead>
<tr>
<th>Type of impact</th>
<th>3 PSM + 2 regression models</th>
<th>3 PSM and 1 regression model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong significant impact</td>
<td>5 out of 5</td>
<td>4 out of 4</td>
</tr>
<tr>
<td></td>
<td>4 out of 5</td>
<td>3 out of 4 (both methods)</td>
</tr>
<tr>
<td></td>
<td>3 out of 5 (both methods)</td>
<td>2 out of 4 (both methods)</td>
</tr>
<tr>
<td>Moderate, but significant Impact</td>
<td>3 out of 5 (only PSM)</td>
<td>3 out of 4 (only PSM)</td>
</tr>
<tr>
<td></td>
<td>2 out of 5 (both methods)</td>
<td>1 out of 4 (only regression)</td>
</tr>
<tr>
<td></td>
<td>2 out of 5 (only regression)</td>
<td></td>
</tr>
</tbody>
</table>

2.6.1.1 Descriptive data and T-test
The first step in our analysis is to test whether the mean value of a specific outcome variable is statistically different between a specific group and its respective control group. We test this using a two group mean comparison test where $\bar{x}_C$ and $SE_C$ are the mean value and standard error of control group $i$ and $\bar{x}_T$ and $SE_T$ are the mean value and standard error of treatment group $i$.

$$t = \frac{\bar{x}_C - \bar{x}_T}{SE_C - SE_T}, \text{ with } df = (n_c + n_T) - 2 \quad (1a)$$

The ratio $t$ will be negative if the mean in the control group is lower than the treatment group and significant if it is large enough to say that the difference between the groups is not likely by chance (based on the two-sided student's t statistic). This t-test should give us an initial idea of the size and direction of the impact.

We use a standard t-test because we assume equal variance (even though in practice they might slightly differ). This means we assume beforehand that our different treatment groups are “drawn” from the same population. The different sample sizes are included in the formulae by specifying $n_c$ and $n_T$ instead of only $n$. 
2.6.1.2 Propensity score matching

While the t-test can give an indication of size and direction of impact it does not take pre-treatment differences in observed characteristics of farms and farmers into account. Yet, these characteristics may influence the outcome or impact. To ensure better comparability of the control and treatment group, it is important to control for potential pre-treatment differences between the control group and the treatment group. Propensity Score Matching (PSM) is a method that allows matching of treatment group with control group farmers based on one or more control variables (see for example Bryson, Dorsett et al. 2002). Differences in the outcomes between the two groups are attributed to the program. However, the more control variables are included, the more difficult, if not impossible, it becomes to find an identical control group.

Rosenbaum and Rubin (1983, from Bryson et al. 2002) showed that matching on a single index, the so-called propensity score, reflecting all relevant control variables achieves more consistent results compared to matching treatment and control group members on all covariates separately.

In order construct the counterfactual, the propensity score is calculated using:

\[ P_i = a + \sum_{j=1}^{n} b_j \cdot X_j + \epsilon_i \]

Where \( P_i \) is the probability of a farmer belonging to the treatment or control group; \( X_j \) stands for control variables (see annex VI); \( a \) and \( b \) are parameters; and \( \epsilon_i \) is a residual value that includes all other determinants of the indicator in question.

Using the calculated propensity score of each individual we apply three types of analysis are done (Caliendo & Kopeinig 2005):

1. Stratification matching: compares the mean values within 5 subgroups that each include participating and control farmers within a certain range of the propensity score;
2. Nearest Neighbour matching: matches each individual farmer to the control farmer with the closest propensity score; and
3. Kernel Matching: compares the average of the participating farmers to the weighted average of the entire control group by giving more weight to control observations that are more comparable to the participating individuals

We eliminate households from our sample that fall outside the “common support”: i.e. households which do not have a propensity score that lies within the range of the scores of the opposite group. In other words, we exclude from our sample households that do not have potentially comparable households in the control group. After the matching, the mean outcome indicator value in the treatment group is compared to that in the control group. Based on the t-statistic we calculate whether the difference is significant. An issue with this calculation is that the estimation of the propensity score, the use of “common support” and possibly the order in which the treated individuals are matched introduce variation beyond normal sampling variation. A technique called “bootstrapping” can be used to deal with this problem. According to Caliendo & Kopeinig (2005), each bootstrap draw includes the re-estimation of the results, including the first steps of the estimation (propensity score, common support, etc.). Repeating the bootstrapping N times leads to N bootstrap samples and in our case N estimated average treatment effects. The distribution of these means approximate the sampling distribution (and thus the standard error) of the population mean.

Theoretically, the 3 matching methods should lead to similar conclusions. However due to small sample sizes and different model specifications they can have different results. In such cases we consider conclusions to be less robust.
2.6.1.3 Regression analysis

Besides controlling for the difference between our treatment and control groups using PSM we also use regression analysis. Besides being a robustness check, regression analysis also allows us to identify the effect of the starting capitals on our outcome variables and to compare the impact of the different groups by pooling all households into one sample.

First we estimate an ordinary least squares (OLS) model where we select the $\beta's$ in such a way that the differences between the actual outcome and the linear approximation are smallest.

$$E[Y_i(j) - Y_i(0)|T = j, X = x)]$$

, estimated as the following OLS regression function

$$Y_i = \beta_0 + \beta_1 T + \beta_2 X_i + \epsilon_i$$  \hspace{1cm} (1c)

, where $Y$ is the outcome variable, $X$ is the set of control variables and $T$ is the set of treatment dummies, $\beta_n$ are parameters and $\epsilon_i$ is a residual that include all other determinants of the indicator in question. Because some of our outcome indicators are binary or ordered categorical variables, OLS regression might not be appropriate. We therefore also use a binary choice model in case of binary variables as a robustness analysis.

$$p(x) = \Pr(Y = 1|X = x, T = t)$$

, estimated as the following logistic regression function where $p$ is confined between values of 0 and 1. The model is estimated using a backward selection method with a 10% significance level.

$$Y_i(x) = \ln \frac{\pi(x)}{1-\pi(x)} = \beta_0 + \beta_1 T_i + \beta_2 X_i + \epsilon_i$$  \hspace{1cm} (1d)

In case of categorical variables, e.g. a decrease, the same or an increase, we use a multinominal logit model to allow the treatment to influence the different outcomes differently. To estimate this model we essentially estimate equation (1d) twice: one comparing a decrease versus the same, and one comparing an increase versus the same.

2.6.2 Distributional impacts of research groups

The second phase of analysis is to test whether the significance, size and direction of impact on a selection of outcome indicators related to training, farm management and farm economics differs according to the level of various household capitals (section 2.5.1). The household capitals represent the aggregated value of the variables under each capital rescaled from 0 (minimum level of that specific capital) to 1 (maximum level of that specific capital). The main purpose of this phase is to explore whether the projects might influence households with different profiles differently.

We estimate models for those households in our sample with above or below average values for each of the 6 capital assets. We therefore estimate the following equations 6 times$^4$.

$$Y_i = \beta_0 + \beta_1 T + \beta_2 X_i + \epsilon_i \mid C_i > \bar{C}$$  \hspace{1cm} (2a)

$^4$ We were able to estimate almost all models using the regression equations specified above. One exception relates to distributional impact according to physical capital where we had to drop ownership of irrigation pipes because of between-term co linearity. This means the variable appeared to be a near perfect linear combinations of other variables. The second exception relates to the distributional impact according to institutional capital, where we had to eliminate extension budget, number of government programs and the province dummy from our model.
\[ Y_i = \beta_0 + \beta_1 T + \beta_2 x_i + \epsilon_i \mid C_i < \bar{\chi} \] (2b)

where \( Y \) is the outcome variable, \( T \) is the set of treatment dummies, \( x \) is the set of control variables, \( C \) is any of the 6 capitals (household, social, natural physical, financial or institutional), \( \bar{\chi} \) is the average value of that specific capital, \( \beta_n \) are parameters and \( \epsilon_i \) is a residual that include all other determinants of the indicator in question. All models are estimated using a backward selection method with a 15% significance level.

2.6.3 Impact of UTZ code compliance and training

The third stage of the statistical analysis evaluates the impact of UTZ code compliance and training on a selection of outcome variables (section 3.2). The main purpose of this phase is to explore to which extent UTZ code compliance and training can account for the impact observed in the first phase of our analysis. We test three models. First we identify the effect of UTZ code compliance and training. Secondly, we differentiate between quantity and quality of training, and thirdly we explore potential interaction effects between UTZ code compliance and training aspects.

We use the OLS model as specified in equation (3) where \( T \) is replaced by UTZ code compliance and training indicators;

\[ Y_i = \beta_0 + \beta_1 Utz + \beta_2 Tr + \beta_3 x_i + \epsilon_i \] (3a)

\[ Y_i = \beta_0 + \beta_1 Utz + \beta_2 TrQn + \beta_3 TrQl + \beta_4 TE + \beta_5 TB + \beta_6 x_i + \epsilon_i \] (3b)

\[ Y_i = \beta_0 + \beta_1 Utz + \beta_2 TrQl + \beta_3 TrQn + \beta_4 TB + \beta_5 (Utz \ast TrQl) + \beta_6 (Utz \ast TrQn) + \beta_7 (Utz \ast TB) + \beta_8 (TrQl \ast TrQn) + \beta_9 (TrQl \ast TB) + \beta_10 (TrQn \ast TB) + \beta_11 x_i + \epsilon_i \] (3c)

, where \( Utz \) refers to being UTZ certified or not, \( Tr \) refers to whether a household received training in the last four years or not, \( TrQl \) refers to the quality of training received in the last four years, \( TrQn \) refers to the amount of training received in the last four years, \( TE \) refers to the experience of the trainer, \( TB \) refers to the background of the trainer and \( X \) is the set of control variables. Training quality (\( TrQl \)), trainers’ experience (\( TE \)) and trainers’ background (\( TB \)) were only identified for the treatment groups and coded to 0 for our control groups. \( \beta_n \) are parameters and \( \epsilon_i \) is a residual that include all other determinants of the indicator in question. The coefficient for these indicators therefore only measures the impact of training quality and trainers’ experience and background on those households involved in a project/program. The three interaction terms in model (3c) are the product of the two variables5. All models are estimated using a backward selection method with a 10% significance level.

2.7 Pre-treatment comparison

A first step in the pre-treatment comparison is to review the control variables for each group in our artificial t=0, i.e. 2008. Of all the 46 control variables (annex VI), 13 show significant difference for one or more groups. The pre-treatment comparison in Table 6 and Table 7 show the variables in question by province and treatment.

---

5 To maintain a correct interpretation of the original variables and prevent multi-co-linearity, the interactions represent the residual part of the product after the original variables have been partialed out. This means we run a regression with \( x_{1}\ast x_{2} = b_0 + b_1\ast x_{1} + b_2\ast x_{2} + e \), where \( e \) represents the interaction.
Table 6: Comparison of significantly different pre-treatment variables for treatments in Dak Lak province. Type of variable indicated by D (Discrete) and C (Continuous) and showing means and standard deviations (SD). Coffee acreage does not differ, but has been included for purpose of illustration.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>FFS (T1)</th>
<th>Low intensity training + UTZ (T3)</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Ethnic majority household (%)</td>
<td>D</td>
<td>77%</td>
<td>42%</td>
<td>88%</td>
</tr>
<tr>
<td>People dependent on farm</td>
<td>C</td>
<td>5.0</td>
<td>1.9</td>
<td>4.7</td>
</tr>
<tr>
<td>Access to training (# sessions in 2008)</td>
<td>C</td>
<td>3.2</td>
<td>4.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Parent's farm</td>
<td>D</td>
<td>23%</td>
<td>42%</td>
<td>21%</td>
</tr>
<tr>
<td>Mobile phone (%with)</td>
<td>D</td>
<td>56%</td>
<td>50%</td>
<td>67%</td>
</tr>
<tr>
<td>Computer (%with)</td>
<td>D</td>
<td>13%</td>
<td>33%</td>
<td>19%</td>
</tr>
<tr>
<td>Internet (%with)</td>
<td>D</td>
<td>2%</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Credit consumption (0=need, 1=access; 2=no need)</td>
<td>D</td>
<td>1.30</td>
<td>0.49</td>
<td>1.13</td>
</tr>
<tr>
<td>Coffee acreage (ha)</td>
<td>C</td>
<td>0.84</td>
<td>0.44</td>
<td>1.70</td>
</tr>
<tr>
<td>Productivity (Mt/ha)</td>
<td>C</td>
<td>2.63</td>
<td>0.99</td>
<td>3.21</td>
</tr>
<tr>
<td>Age of coffee trees</td>
<td>C</td>
<td>19.0</td>
<td>5.9</td>
<td>16.0</td>
</tr>
<tr>
<td>Shade trees (0=none, 2=in all fields)</td>
<td>D</td>
<td>0.86</td>
<td>0.81</td>
<td>0.60</td>
</tr>
<tr>
<td>Access to irrigation</td>
<td>D</td>
<td>67%</td>
<td>47%</td>
<td>71%</td>
</tr>
<tr>
<td>Pump (%with)</td>
<td>D</td>
<td>79%</td>
<td>40%</td>
<td>93%</td>
</tr>
<tr>
<td>Tractor (%with)</td>
<td>D</td>
<td>68%</td>
<td>47%</td>
<td>56%</td>
</tr>
<tr>
<td>Hulling machine (%with)</td>
<td>D</td>
<td>25%</td>
<td>44%</td>
<td>67%</td>
</tr>
<tr>
<td>Input suppliers (#)</td>
<td>C</td>
<td>3.2</td>
<td>2.5</td>
<td>5.9</td>
</tr>
<tr>
<td>Coffee buyers (#)</td>
<td>C</td>
<td>4.2</td>
<td>2.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Annual rainfall (mm)</td>
<td>C</td>
<td>1,512</td>
<td>38</td>
<td>1,715</td>
</tr>
</tbody>
</table>

The household ethnicity differs notably between both interventions and the control group with the latter having a greater share of ethnic minorities included. Access to training is another such variable where the earlier starting point of T1 explains the relatively high amount of training already in 2008. A notable difference with the control group is that members thereof are working on farms that were not previously owned by their parents. This could indicate that they are more recent settlers with less experience in coffee. Assets among T1 members are somewhat lower in terms of access to irrigation and ownership of pumps and hulling machines.
Table 7: Comparison of significantly different pre-treatment variables for treatments in Gia Lai province. Type of variable indicated by D (Discrete) and C (Continuous) and showing means and standard deviations (SD). Coffee acreage does not differ, but has been included for purpose of illustration.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>FFS + UTZ (T2)</th>
<th>Medium intensity training + UTZ (T4)</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Ethnic majority household (%)</td>
<td>D</td>
<td>99%</td>
<td>11%</td>
<td>100%</td>
</tr>
<tr>
<td>People dependent on farm</td>
<td>C</td>
<td>4.5</td>
<td>1.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Access to training (# sessions in 2008)</td>
<td>C</td>
<td>3.3</td>
<td>3.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Parent's farm</td>
<td>D</td>
<td>8%</td>
<td>27%</td>
<td>21%</td>
</tr>
<tr>
<td>Mobile phone</td>
<td>D</td>
<td>84%</td>
<td>37%</td>
<td>82%</td>
</tr>
<tr>
<td>Computer</td>
<td>D</td>
<td>13%</td>
<td>34%</td>
<td>16%</td>
</tr>
<tr>
<td>Internet</td>
<td>D</td>
<td>3%</td>
<td>16%</td>
<td>7%</td>
</tr>
<tr>
<td>Credit consumption (0=need, but no access; 1=access; 2=no need)</td>
<td>D</td>
<td>1.12</td>
<td>0.46</td>
<td>1.32</td>
</tr>
<tr>
<td>Coffee acreage (ha)</td>
<td>C</td>
<td>1.43</td>
<td>0.13</td>
<td>1.60</td>
</tr>
<tr>
<td>Productivity</td>
<td>C</td>
<td>4.04</td>
<td>1.33</td>
<td>3.69</td>
</tr>
<tr>
<td>Age of coffee trees</td>
<td>C</td>
<td>14.9</td>
<td>4.0</td>
<td>13.8</td>
</tr>
<tr>
<td>Shade trees</td>
<td>D</td>
<td>1.09</td>
<td>0.87</td>
<td>0.98</td>
</tr>
<tr>
<td>Access to irrigation</td>
<td>D</td>
<td>74%</td>
<td>44%</td>
<td>93%</td>
</tr>
<tr>
<td>Pump ownership</td>
<td>D</td>
<td>92%</td>
<td>27%</td>
<td>97%</td>
</tr>
<tr>
<td>Tractor ownership</td>
<td>D</td>
<td>26%</td>
<td>44%</td>
<td>11%</td>
</tr>
<tr>
<td>Hulling machine</td>
<td>D</td>
<td>39%</td>
<td>49%</td>
<td>25%</td>
</tr>
<tr>
<td>Input suppliers</td>
<td>C</td>
<td>5.5</td>
<td>6.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Coffee buyers</td>
<td>C</td>
<td>7.3</td>
<td>7.9</td>
<td>4.8</td>
</tr>
<tr>
<td>Annual rainfall (mm)</td>
<td>C</td>
<td>2,251</td>
<td>12</td>
<td>2,234</td>
</tr>
</tbody>
</table>

The control group in Gia Lai has a higher share of ethnic minorities. Training access for T2 and T3 was higher in 2008 due to their earlier starting dates. The control group appears to have lower ownership of pumps but more access to tractors and hulling machines. A notable fact is that on average plantations in Gia Lai are younger than in Dak Lak and rainfall is more plentiful. Productivity is higher.

Not all pre-treatment characteristics are identical and for those that are significantly different between each treatment and its control group (with significance levels of 10% or less) propensity score matching or regression analysis is required to create comparable groups.

2.7.1 Propensity score matching (PSM)

The PSM used to identify the impact of the different treatments (as specified in 2.6.1.2) is done using all control variables related to human, social, natural, physical and financial capital (Table 8). In order to estimate equation (1b) we had to eliminate some variables due to multicollinearity. For T1 and T4 we removed marital status and for T4 we also had to remove ownership of irrigation pipes from our model. For T3 we were not able to estimate a propensity score without dropping a large number of variables and observations. This means

---

6 Multicollinearity is a statistical phenomenon where 2 or more predictor variables show perfect or near perfect correlation with each other. While this may not affect overall model reliability as far as the sample is concerned, it can limit the reliable estimation of the contribution to model outcomes of individual variables. Therefore if the influence of individual predictor variables is of interest multicollinearity is to be avoided.
that T3 is apparently quite unique compared to its control group. Even with PSM we failed to construct a credible counterfactual for this group. Regression results related to this group should therefore be interpreted with extra caution. In Table 8 we include the final PSM outcomes for T1, 2 and 3, where the p-values indicate the probability of belonging to a treatment group based control variable characteristics.

Table 8: PSM outcomes (degree of significance * p<0.10, ** -<0.05, ***<0.01, ns=not significant) for all control variables. Note that T4 (medium intensity training + UTZ) could not be included:

<table>
<thead>
<tr>
<th>Control variables</th>
<th>FFS (T1)</th>
<th>FFS + UTZ (T2)</th>
<th>Low intensity training + UTZ (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity (ethnic majority)</td>
<td>***</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Communication means in 2008 (≥1)</td>
<td>***</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Tractor ownership in 2008 (≥1)</td>
<td>*</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>People dependent on farm (+1)</td>
<td>**</td>
<td>*</td>
<td>ns</td>
</tr>
<tr>
<td>Membership non-farm related clubs in 2008 (yes)</td>
<td>***</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>Use of shade trees (yes)</td>
<td>**</td>
<td>ns</td>
<td>**</td>
</tr>
<tr>
<td>Training received since in 2008 (+1 event)</td>
<td>***</td>
<td>ns</td>
<td>***</td>
</tr>
<tr>
<td>Farming parent’s farm (yes)</td>
<td>***</td>
<td>ns</td>
<td>*</td>
</tr>
<tr>
<td>Irrigation access (yes)</td>
<td>**</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Hulling machine ownership in 2008 (yes)</td>
<td>**</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Transportation ownership in 2008 (yes)</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Creditworthiness (increase from 0 (credit needed but no access) to 1 (credit needed and access) to 2 (no credit needed))</td>
<td>*</td>
<td>***</td>
<td>ns</td>
</tr>
<tr>
<td>Membership farming related clubs 2008 (≥1)</td>
<td>***</td>
<td>***</td>
<td>ns</td>
</tr>
<tr>
<td>Productivity in 2008 (+1Mt)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Drying yard space in 2008 (sufficient)</td>
<td>ns</td>
<td>**</td>
<td>ns</td>
</tr>
<tr>
<td>Electricity access in 2008 (yes)</td>
<td>ns</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>History of coffee experience in commune (+1 year)</td>
<td>ns</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Ownership of farm in 2008 (increase from 0 (traditional landuse right) to 1 (rent or lease) to 2 (red book⁷))</td>
<td>ns</td>
<td>**</td>
<td>ns</td>
</tr>
<tr>
<td>Irrigation pipes ownership in 2008 (yes)</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Soil color (fertility increase with soil color as proxy from 0 (yellow) to 1 (black) to 3 (red))</td>
<td>ns</td>
<td>ns</td>
<td>***</td>
</tr>
<tr>
<td>Acreage under coffee in 2008 (+1ha)</td>
<td>ns</td>
<td>ns</td>
<td>***</td>
</tr>
<tr>
<td>Housing conditions in 2008 (rescale, increase from 0 (poor quality) to 1 (good quality))</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Origin in current district of residence (yes)</td>
<td>ns</td>
<td>ns</td>
<td>**</td>
</tr>
<tr>
<td>Parents coffee farmers (yes)</td>
<td>ns</td>
<td>ns</td>
<td>*</td>
</tr>
<tr>
<td>Nr of years experience with growing coffee</td>
<td>ns</td>
<td>ns</td>
<td>***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>154</td>
<td>151</td>
<td>150</td>
</tr>
</tbody>
</table>

⁷ Officially all land belongs to the government, a Red book is proof of a fifty year land lease and the closest Vietnam offers to full ownership.
Table 8 shows that the final models are different for the different groups, meaning that each group essentially has a different control group. The outcome of the PSM using these models is successful for almost all variables included in equation (1b), meaning that all control variables included in the model have equal mean values across our treatment and control group. Two exceptions relate to credit access for group 1 and pump ownership for group 3, both not being fully balanced across all blocks of propensity scores. We do not expect this to bias results considering the large number of indicators we include in our estimation of the propensity score, and the fact that they are balanced for all other variables.

2.7.2 Capital asset indices

To arrive at capital index values that are composed of multiple control variables to the control variables have been rescaled from 0 to 1. This was done by dividing every observation for a given control variable by the maximum value of that variable in the sample. The index for a group is then computed by taking the average of the control variable values of the group members and then calculating the average of the control variable averages that make up the index. Table 9 shows the 6 capital asset indices for each group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Capital asset indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Human</td>
</tr>
<tr>
<td>Mean</td>
<td>0.48</td>
</tr>
<tr>
<td>T1</td>
<td>0.49</td>
</tr>
<tr>
<td>T2</td>
<td>0.49</td>
</tr>
<tr>
<td>T3</td>
<td>0.48</td>
</tr>
<tr>
<td>T4</td>
<td>0.50 **</td>
</tr>
<tr>
<td>C Dak Lak</td>
<td>0.46 ***</td>
</tr>
<tr>
<td>C Gia Lai</td>
<td>0.47 *</td>
</tr>
</tbody>
</table>

The index values underlying the averages presented in Table 9 are used as an overall proxy for the level of capital assets that each individual can draw on. Variability between groups on human and social capital assets is relatively limited. Only ethnicity varies among the groups, with those in Dak Lak having greater shares of ethnic minorities within them, 23% and 12% respectively for T1 and T4 against 1% and 0% for T2 and T3. Both control groups have a higher than average share of ethnic minorities, 35% and 23% respectively. This may indicate that implementers of sustainability projects have a preference to work with ethnic majorities who are known to be more productive when it comes to coffee cultivation (Dang Thanh & Shively, 2008; Agergaards, et al., 2009). In any case it highlights the importance to control for ethnicity in our analyses. More variability is found on natural and physical capital. Differences in natural capital are driven mostly by access to irrigation, productivity in 2008 and the use of shade trees in 2008.

In the group comparison by treatment section (3.1) we will use both the individual control variables and in a separate model the capital asset index values to see if farmers with above and below average index values respond differently to project treatments.

2.8 Final data and analysis considerations

A major consideration is the absence in most cases of baseline data. To track changes over time we therefore had to rely on recall data. This is notoriously unreliable, especially when dealing with hard numbers. We therefore limited our recall data questions dealing with volumes and amounts to productivity, which Vietnamese coffee farmers tend to be well aware of. Information on costs, incomes, inputs and water use were framed as “less, same, more” questions relative to the 2011/12 season’s levels. Other baseline input concerned easier to remember information on the capital asset variables.
Another aspect is that not all treatments started at the same time (Table 10).

Table 10: Treatment and starting point

<table>
<thead>
<tr>
<th>Code</th>
<th>Treatment</th>
<th>Year(s) of start</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>High intensity (Farmers’ Field School), high investment, no certification</td>
<td>2005</td>
</tr>
<tr>
<td>T2</td>
<td>High intensity (Farmers’ Field School), high investment and UTZ certification</td>
<td>2006</td>
</tr>
<tr>
<td>T3</td>
<td>Low intensity training + UTZ certification</td>
<td>2007</td>
</tr>
<tr>
<td>T4</td>
<td>Medium intensity, moderate investment and UTZ certification</td>
<td>2011</td>
</tr>
</tbody>
</table>

One in particular (T1) already started in 2005. As our t=0 is set at 2008, we may be underestimating the amount of impact of T1. We control for this by not only looking at amount change over time for each indicator but also at the actual level in the 2011/12 season.

For T1 and T2 detailed databases for respectively a sample and all producers exist. Only in case of T2 did we obtain access to this dataset. The project sponsor of T1, a large coffee roasting company declined to respond despite repeated enquiries. This also limited us in assessing the cost of implementation. With the help of the project implementer of T1 we were able to reconstruct an estimation of expenditure for that treatment.
3 Results

Results are captured by 63 indicators grouped under 10 dimensions. In the presentation of results we follow a logical sequence where the dimension on training is presented first. Having access to and application of training content (3.1.1) and being certified is supposed to lead to improvements in farm management (3.1.2). In combination with improvements in coffee trade and product quality (3.1.3) farm economics improve (3.1.4). This in turn can be expected to affect ownership of a number of key assets (3.1.1). Further down the desired impact pathway better farm economics affects living conditions of families. We have chosen to focus on the most vulnerable family members, the children (3.1.2). Aside from these changes, a number of practices are expected to improve as a result of training and/or certification. These are on-farm health and safety measures (3.1.3), waste management (3.1.4), relations with hired workers (3.1.5) and influence on selected natural resource indicators (3.1.6). Where significant and deemed relevant the role of capital assets in determining impact is added in section 3.1.

Outcomes of exploratory analysis on UTZ code compliance and training indices is covered in section 3.2 where we focus on selected training, farm management and farm economic indicators.

Annex VII contains details on all analyses.

3.1 Group comparison by treatment

In the main comparison by treatment we compare each treatment with its own control group. To quantify impact we look at differences in change over time between both groups. For those groups that started prior to 2008 it may well be that the main change in indicator value took place before 2008. By comparing the amount of change from 2008 to 2012 with their control group we could under-estimate the impact of these treatments. To account for different starting points and incomplete baseline data we also compare recent actual levels of indicators between the two groups.

At the start of each section a spider web diagram shows indicators used and the (in)significance of change, be it positive or negative resulting from each treatment relative to its control group. Along the axes of the diagram the impact levels 0, 1 and 2 indicate respectively “no impact”, “moderate impact” and “strong impact”. Where the value is positive, the impact is considered positive and vice versa. For each dimension we discuss the most pertinent indicators only. More context and illustration is provided after each spider web. Where treatment fails to explain change, we look at the role of other explanatory variables.

3.1.1 Training

The training dimension consists of 11 indicators. We capture satisfaction of farmers with their knowledge and skills, the amount of training received on average over the past 4 years and the subsequent degree of application of training content split by major farm activities. In addition we look at 3 training aspects that are not directly farming related but may nonetheless influence farming performance. These are community, business and organisational development (Figure 4).
Farmers in T1, the group that received FFS training only are the only group to indicate they are significantly more satisfied with their knowledge and skills on coffee production (Y10.1). Incidentally, this is also the group that has had the longest exposure to training. A group level regression shows a positive correlation between ownership of stone-built housing and a greater number of floors in the house and satisfaction with knowledge and skills. This may point to better-off farmers being more satisfied but it could equally mean that better satisfied farmers earned more by better application of knowledge and were able to construct better housing.

All treatment groups receive significantly more training than their control groups (Y10.1), but there is much variation within groups (Table 11) which indicates that not all registered farmers are attending all trainings.

Table 11: Average annual amount of agronomy training received from 2008 to 2011, Standard Deviation (SD) and minimum and maximum.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Frequency</th>
<th>Average</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS (T1)</td>
<td>79</td>
<td>2.9</td>
<td>3.4</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>FFS + UTZ (T2)</td>
<td>76</td>
<td>3.2</td>
<td>2.8</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Low intensity training + UTZ (T3)</td>
<td>75</td>
<td>2.2</td>
<td>2.8</td>
<td>0</td>
<td>13.8</td>
</tr>
<tr>
<td>Medium intensity training + UTZ (T4)</td>
<td>44</td>
<td>2.2</td>
<td>1.5</td>
<td>0.25</td>
<td>7.5</td>
</tr>
<tr>
<td>Control Dak Lak</td>
<td>75</td>
<td>1</td>
<td>0.8</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>Control Gia Lai</td>
<td>75</td>
<td>1.2</td>
<td>1.9</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>
Pruning, soil management and irrigation are seen as important drivers for productivity and profitability (Marsh, 2007). Pruning because it requires large amounts of labour, soil management, especially application of fertilisers, and irrigation represent major capital expenditures. Significantly more application of training on each of these measures is seen in 3 out of 4 treatments. The UTZ certified group of farmers that have been trained with low intensity see no significant change in uptake of training content on soil management and irrigation, only on pruning. The group that has been trained with medium intensity training performs better on uptake with significant uptake on soil management and irrigation, but not on pruning.

Explanation for the absence of uptake on pruning among 57% of the certified group with medium intensity training indicated that techniques were considered too labour intensive (44%) and, more worryingly, not applicable (36%), 20% listed other reasons. A similar view emerges for the certified group with low intensity training where 51% indicates not to use the taught techniques because they were either too labour intensive (34%), not applicable (26%), too expensive (29%) or otherwise not useful (11%). The labour-use argument seems to be supported by the fact that farmers with above average human capital in all the treatment groups are significantly more likely to apply the pruning trainings. Older and more experienced farmers are also more likely to implement pruning practices as indicated by the greater uptake of practices by farmers with above average social capital among all the treatment groups but one.

Soil management training content application shows a similar trend to the pruning training where farmers with above average social and human capital are significantly more likely to apply the training message.

Application of biocide training is not significant among any of the groups, but a separate analysis based on capital indices shows that among all the treatment groups, farmers with below average natural and physical capital are significantly more likely to apply the training message on biocide application.

Uptake of irrigation techniques is significant among all but the UTZ certified low intensity training group. UTZ certification thus seems to have influence on this. Richer farmers, as expressed by above average physical capital and financial capital, which includes tractor ownership, but also irrigation equipment as well as farmers with below average social capital are more likely to apply trained irrigation techniques. Lower social capital farmers have generally less experience with coffee and also do not originate from the area that they currently live in. A large share of the Vietnamese coffee farming population has migrated to the central highlands over the past 2 decades and belongs to the Kinh ethnic majority (e.g. Agergaards, et al., 2009). Ethnic minorities are frequently cited as not having benefited from the coffee boom in the central highlands (ICARD, Oxfam, 2002; (World Bank, 2004). We do not however see a correlation between uptake of trained irrigation techniques and ethnicity which could indicate that the ethnic minority population in the research areas is catching up with the Kinh majority.

Uptake of taught harvesting techniques is not significant among 2 of the groups. Among all the groups, irrespective of significance, more than 50% of respondents that do not apply the harvesting techniques, indicate that taught techniques are too labour intensive. Yields across the groups range from 2.8 to 4.3Mt green bean per hectare. To varying degrees farmers rely on increasingly costly hired labour to assist with harvesting. This, and the general absence of a price incentive to provide better quality beyond meeting moisture level requirements and limited foreign matter incentivises them to minimise labour expenditure for harvesting.

Application of techniques that go beyond farming as such but may help farmers to coalesce into groups that operate as a single, more powerful entity in the market is rare. So far, this is
only attempted by the UTZ certified group that receives FFS training. This indicates that this process is driven by a specific component of the training and not by the UTZ certification. Training on business development, which is offered to this group as well, does not see this uptake.

In conclusion, uptake of training content that is expected to have a large potential effect on productivity and efficiency sees better uptake as training intensity increases irrespective of being UTZ certified. Regardless of treatment, be it certification or training, the capital asset base has influence on uptake with more labour intensive techniques seeing better uptake among those with larger human and social capital. Financial capacity is a determining factor for the application of more costly techniques.

3.1.2 Farm management

The application of training content and good practices from the UTZ certification programme is expected to result in measurable farm management improvements. While the intervention logic between the different treatments is not equal, a central premise is that having access to training, keeping records of crop management activities and doing better investment planning will help farmers to make better-informed decisions. This in turn is expected to result in changes in efficiency and productivity. We assess this by analysing the use of such management tools with 6 indicators. We then review changes in efficiency and productivity over time with 6 indicators. As not all the treatments started at the same time we also review the actual values of these indicators. For treatments that started prior to 2008 we may underestimate the impact if the majority of change was achieved prior to our 2008 baseline. By reviewing actual efficiency and productivity levels, in addition to change over time, we can still draw conclusions for those treatments that started earlier. If changes are durable and persistent then these treatment groups would still outperform their peers in the control group even if the change over time does not corroborate this.

We distinguish 5 types of records that can be kept: yield, usage of fertiliser, biocide, production costs and sales. Ideally, outcomes of these records, once analysed, are fed into investment planning exercises. With UTZ certification this is not required, there records are primarily kept to show auditors that farmers have not applied illegal substances and provide a way to track persons responsible in case this did occur (exporter, 2012). In some of the training modalities, the FFS in particular, better investment planning and decision making is expected to result in improved efficiency and productivity. The efficiency ratios are measured by the amount of N, P and K used per Mt green coffee produced and the volume of irrigation water per Mt green coffee in the 2011/12 crop year. In the absence of reliable quantitative information on these aspects from the 2008/09 crop year we only assess current efficiency ratios and not change over time. For productivity we include change over time from 2008/09 to 2011/12 as well as the actual yield in 2011/12. Figure 5 shows the impact of the 4 treatments on these indicators.
Figure 5: Impact on record keeping, investment planning and selected production efficiency related indicators for 4 treatments, each relative to its own control group. 0, -1 and -2 indicate no, moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact.

For record-keeping, all treatment group farmers outperform their peers in the control group on all indicators except the FFS only group who indicate they do not keep specific records on biocide application. This is interesting as that programme does include detailed record-keeping exercises. The good performance of all groups on record keeping and investment planning does not translate to all-round better performance in efficiency and productivity, were the impact is much more fragmented.

3.1.2.1 Record keeping

While all the treatment groups outperform their peers in the control group, a large share of UTZ certified farmers, irrespective of the type of training received, indicate that they do not keep records for fertiliser and biocide applications (Table 12).
Table 12: Percentage of farmer indicating that they practice record keeping and investment planning in 2012 by treatment group. For biocide record-keeping the value between brackets indicates the share of farmers using biocides, the second value the share that use biocides and keep records for it. All farmers use fertiliser.

<table>
<thead>
<tr>
<th>Record keeping aspect</th>
<th>FFS (T1)</th>
<th>FFS + UTZ (T2)</th>
<th>Medium intensity training + UTZ (T4)</th>
<th>Low intensity training + UTZ (T3)</th>
<th>Control Dak Lak</th>
<th>Control Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>52%</td>
<td>49%</td>
<td>63%</td>
<td>45%</td>
<td>16%</td>
<td>10%</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>51%</td>
<td>64%</td>
<td>72%</td>
<td>52%</td>
<td>18%</td>
<td>11%</td>
</tr>
<tr>
<td>Biocide</td>
<td>(33%) 8%</td>
<td>(72%) 33%</td>
<td>(41%) 50%</td>
<td>(64%) 34%</td>
<td>(55%) 7%</td>
<td>(79%) 10%</td>
</tr>
<tr>
<td>Production costs</td>
<td>47%</td>
<td>70%</td>
<td>70%</td>
<td>37%</td>
<td>18%</td>
<td>14%</td>
</tr>
<tr>
<td>Sales</td>
<td>33%</td>
<td>38%</td>
<td>41%</td>
<td>32%</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>Investment planning</td>
<td>66%</td>
<td>79%</td>
<td>80%</td>
<td>56%</td>
<td>25%</td>
<td>13%</td>
</tr>
</tbody>
</table>

According to the UTZ Certified code of conduct (Utz Certified, 2010) record keeping for biocide application is mandatory and for fertiliser application it becomes mandatory from the second year of certification onwards. Depending on the treatment, 20% to 49% of UTZ certified farmers are in violation of the code of conduct where biocide record keeping is concerned. For fertiliser record keeping the share of farmers in violation of the code of conduct ranges from 28% to 48%. Still, the certified farmers are about twice as likely as those that have only received FFS training to keep records on biocide application.

The majority of farmers indicate that they try to analyse their own records. In the FFS and medium intensity training treatment an almost equal share indicate that they keep records for inspection purposes only (Figure 6).

When asked how useful farmers feel record keeping is for them, a majority in each treatment group indicates that it helps them to improve their farm management, while a minority indicates they also learn from gaining insight in how other farmers work by comparing their analysed records (Figure 7).
Still, for the certified treatment groups with FFS, medium and low intensity training, 16%, 43% and 20% respectively indicate they only keep records for certification inspection purposes without attempting further analysis.

3.1.2.2 Efficiency and productivity
Efficiency ratios are subdivided in fertiliser, irrigation and productivity sections.

Fertiliser use
Effects of treatments on N, P and K application are limited with a strongly negative efficiency effect in the low intensity UTZ certified group (Figure 5). There does appear to be a tendency for the FFS and the FFS and UTZ certified groups to be more efficient especially in N usage. The medium training intensity and UTZ group stands out for very high N and K applications (Figure 8).
Using data on recommended N, P and K volumes applied per Mt green coffee from BNN & PTNT (2008) and subtracting these from applied volumes, an indication of excess nutrient application can be calculated by:

\[
Net_e = \left(\frac{Nut_a}{P}\right) - (Nut_r \times P)
\]

Where \(Net_e\) is the excess nutrient application, \(Nut_a\) is the actual nutrient application in kg/ha, \(P\) is productivity in Mt green coffee per ha and \(Nut_r\) is the recommended nutrient application in kg per Mt green coffee.

The UTZ certified group with medium intensity training is least efficient on all nutrients (Figure 9).
The expected efficiency gain from UTZ certification alone does not seem to materialise. A tendency to perform more efficiently can be seen among the FFS+UTZ group.

Other factors that influence the amount of N and P is gender of the interviewee, where women appear to respectively apply 52kg and 31kg more. Their productivity is also slightly higher, 3.84Mt versus 3.66Mt for men, but not significantly so. Farmers that indicate they needed credit for inputs in 2008 (71%) and were able to obtain it (90%) tend to apply slightly more N. Despite the fact that coffee collectors provide pre-finance, often also for inputs, by far the majority of credit users indicate they obtain their funding through banks (75%), only 10% accesses credit through collectors or traders. Very few farmers (<2%) indicate they take nutrient management advice from their fertiliser dealer. This, therefore does not serve as a possible explanation for the higher application rates of N among those farmers that have access to credit for inputs. It may just be that they are flush with cash and want to spend it. Membership of so-called farmer- or extension clubs, a government initiative to rollout extension services, has a significant positive effect on N and P efficiency, the regression coefficient resulting from model 1d (section 2.6.1) indicates 43kg and 23kg lower usage rates per Mt green coffee compared to those that have not participated at any point since 2008..

Given the importance of nutrient management to obtain good yields, the cost associated with it and the potential environmental impact when handled carelessly, the various training programmes and UTZ pay attention to it. Consequently, one would expect the decision making process on nutrient management to be professionalised. Despite indicating that they apply the trained techniques on nutrient management, few farmers have fundamentally altered the way in which they arrive at decisions on how much fertiliser to apply. It could still be that they have changed the volumes, products, frequency and timing of applications, but the way they have arrived at these has not changed significantly over time, except for the medium intensity training and UTZ group where the share of farmers following advice of
trainers has doubled from 2008 to 2012 to 36%, but that group also is the least efficient (Figure 9). Across all the groups 60% to 80% of farmers indicate that their decisions on how much fertiliser to apply are based on what they did last year as well as their own experience and tradition (Figure 10).

![Image](image.png)

**Figure 10:** Share of farmers by treatment and year indicating how they decide on how much fertiliser to apply.

The FFS+UTZ group shows a tendency to be more efficient in nutrient management. The low intensity training + UTZ group performs significantly less efficient than its control group on N-use efficiency (Figure 5). Overall, the medium intensity training group is least efficient on all nutrient applications, albeit not significantly so (Figure 9).

**Irrigation**

Application of irrigation water varies notably (Figure 11) between treatments. Especially in the FFS only group the heavy use of irrigation stands out, but this area sees far lower rainfall than the other project locations. Still, this group applies significantly more than its control. All treatments do show a decrease of extremely high water use as witnessed by the lower standard deviation.
Using data from (D'haeze, et al., 2003; Cheesman, et al., 2007) an indicative irrigation balance can be calculated by:

\[ \text{Irr}_b = (Irr_r \times D_t \times T_{\text{ha}}) - (V_{\text{mt}} \times P) \]

Where \( \text{Irr}_b \) is the irrigation balance, \( Irr_r \) is the number of irrigation rounds a farmer uses, \( D_t \) is the recommended dosage in m\(^3\) per tree per irrigation round of 390l, \( T_{\text{ha}} \) is the number of trees per ha, \( V_{\text{mt}} \) is the applied volume per Mt coffee; and \( P \) is productivity in Mt/ha. We see that all the UTZ certified treatments, irrespective of the type of training received, operate close around the recommended volume (Figure 12). However, only the FFS+UTZ group is significantly more efficient than their control group (Figure 5).
The combination of training and record keeping is expected to lead to better decision making. If efficiency is to improve then key aspects of production such as irrigation and nutrient management are likely to be affected as these make up a majority of the production costs. Several authors have pointed to over-irrigation in Vietnam’s Robusta production (D’haeze, et al., 2003; Cheesman, et al., 2007; Bennet, et al., 2009). Choice of irrigation methods as well as decision-making on how much irrigation water to apply feature to varying degrees in all training curricula. Despite record keeping and UTZ certification we do not see a change in how farmers make decisions on how much irrigation water to apply. This does not mean irrigation volumes have not changed, but it does show farmers have not significantly altered the way they make the decisions (Figure 13). As irrigation efficiency does improve significantly in the FFS+UTZ group, longer exposure to FFS training could have an effect (although the FFS-only group does not display a similar improvement).

![Figure 13: Share of farmers by treatment and year indicating how they determine the irrigation volume to apply](image)

Irrigation water delivery mechanisms are changing with time. Sprinkler irrigation is increasingly popular, about equally across all groups. Over the entire population 46% now indicates they use sprinklers for at least part of their field, against 33% in 2008. While the use of basin irrigation is reducing, it remains predominant with 75% using it against 81% in 2008.

Production and productivity

Based on farmer reported production figures and their acreage under coffee in 2008 and 2011 the change in productivity over time can be calculated. This is not significant for any of the treatments. To control for underestimation of those treatments that started earlier, we also look at actual productivity in the 2011 coffee year. Marked differences exist between the groups (Figure 14), but a regression over the entire population does not show that participation in any one group adds significantly to productivity.
Despite the absence of significant change on productivity, production has not been static and farmers indicate as much (Figure 15).

Among all groups 50% of more of farmers indicate they see higher production compared to 2008/09. Reasons for change are important to understand and can be grouped by aspects that farmers can have influence on and those that are beyond their immediate control. Examples of the first include application of training content which could lead to productivity improvements or expanding the area planted with coffee or the number of coffee trees both of which can raise the total production and those that are beyond farmers' control such as weather conditions (Table 13).
Table 13: Share of farmers that indicate reasons for production change from 2008/09 to 2011/12 by treatment and control group by decreasing of relevance

<table>
<thead>
<tr>
<th>Reasons</th>
<th>FFS (T1)</th>
<th>FFS + UTZ (T2)</th>
<th>Medium intensity training + UTZ (T4)</th>
<th>Low intensity training + UTZ (T3)</th>
<th>Control Dak Lak</th>
<th>Control Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application of GAP</td>
<td>28%</td>
<td>25%</td>
<td>28%</td>
<td>50%</td>
<td>27%</td>
<td>21%</td>
</tr>
<tr>
<td>More investment capital</td>
<td>14%</td>
<td>24%</td>
<td>28%</td>
<td>48%</td>
<td>16%</td>
<td>28%</td>
</tr>
<tr>
<td>Coffee cycle</td>
<td>14%</td>
<td>13%</td>
<td>28%</td>
<td>9%</td>
<td>11%</td>
<td>20%</td>
</tr>
<tr>
<td>Good weather</td>
<td>15%</td>
<td>11%</td>
<td>9%</td>
<td>8%</td>
<td>8%</td>
<td>13%</td>
</tr>
<tr>
<td>Change in planted area</td>
<td>5%</td>
<td>5%</td>
<td>9%</td>
<td>14%</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>UTZ certification</td>
<td>3%</td>
<td>5%</td>
<td>8%</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Better access to inputs</td>
<td>3%</td>
<td>1%</td>
<td>3%</td>
<td>7%</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>More productive trees</td>
<td>6%</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Lower production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee cycle</td>
<td>16%</td>
<td>7%</td>
<td>9%</td>
<td>5%</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Adverse weather</td>
<td>5%</td>
<td>7%</td>
<td>11%</td>
<td>9%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Pest and disease pressure</td>
<td>4%</td>
<td>4%</td>
<td>9%</td>
<td>0%</td>
<td>8%</td>
<td>1%</td>
</tr>
<tr>
<td>Less investment capital</td>
<td>8%</td>
<td>1%</td>
<td>4%</td>
<td>5%</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Sold or lost land</td>
<td>4%</td>
<td>7%</td>
<td>4%</td>
<td>5%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>UTZ certification</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Worse access to inputs</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Important drivers for production change are application of Good Agricultural Practices and investment capital, both aspects under farmers’ control (to varying degree of course). Aspects beyond farmers control are the coffee cycle and weather conditions; their influence is more associated with lower production.

Large correlation coefficients are found between productivity and ownership of bicycles, motorbikes and cars in 2008, with each additional unit linked to 0.63Mt/ha additional productivity. This could point to richer farmers being more productive, or more being productive means becoming richer. Similarly, richer farmers tend to be more likely to have hulling machines and as a proxy for wealth, ownership of such a machine adds 0.43Mt per ha to productivity. Contrary to Cheesman, et al. (2007) we do find a positive correlation between importance of coffee as an income source and productivity. All other things being equal, every step up from very little to all or almost all income from coffee on a 5 level scale increases productivity by 0.43Mt.

Agro-ecological factors that appear to be of influence are precipitation and soil quality. Every additional 100mm of rainfall adds 80kg to productivity. We do not know at what point this effect tails off. As a very rudimentary proxy for soil fertility we asked farmers to indicate the colour of their soil ranging from red to black to grey, where red represents generally fertile Rhodic Ferralsols and grey is characteristic of less fertile granite-based soils, while black is in between fertility-wise due to higher organic matter contents in the topsoil. Every step down from red reduces productivity by 0.24Mt. No correlations were found between productivity
and application of N, P and K, we suspect this is due to the large variability in volumes applied.

A leaner linear model with productivity as the dependent variable and rainfall, soil color and the amount of N, P and K per Mt green coffee produced as independent variables shows the significance of soil quality and rainfall albeit with an R-squared of 0.137. Every step up from grey (relatively infertile) to red (relatively fertile) on our 3 level soil color scale adds 0.84Mt/ha in productivity. Every additional 100mm of rainfall explains 0.3Mt/ha. The role of nutrients remains elusive in light of limited variability in volumes applied with only N showing a significant, but negative, effect of -0.8kg/ha for every additional kg of N applied.

A negative correlation is also found between couples where either one or both of the spouses is born in the same district as they currently grow coffee in. Each additional person from within the area pushes down productivity by 0.54Mt. This could point to a known phenomenon where migrants from the deltas tend to be more economically savvy than indigenous inhabitants and outperform them (Marsh, 2007). Such couples are not notably different in terms of age or establishment date of their coffee fields.

### Coffee trade and product quality

An improvement in product quality is expected to occur as a result of certification (UTZ Certified, 2012), training, record-keeping, investment planning and resulting professionalization of farm management. Simultaneously, being part of a certified supply chain is expected to result in better trade relations and better market access. We operationalize this dimension by looking at 5 indicators (Figure 16). Trade relations are captured by changes in the number of coffee buyers that a farmer sells to over time, as well as the actual nr today. We hypothesise that better trade relations may lead to a reduction of the number of buyers that a farmer sells to. Aside from that, certified coffee can only be traded as such by the one who holds the certificate, which in all cases lies with an exporting company, not the farmers themselves. To capitalise on trade-related certification benefits a farmer would thus have to sell to that particular company, or the middleman that acts in their name. Better trade relations could also result in a perceived fairness of prices received, but it could equally lock farmers in rigid off-take arrangements that reduce competition.
None of the treatments, however, show significant effect on any of the indicators.

Regardless of the treatment or control group to which a farmer belongs, 90% to 96% of farmers sell all their coffee to 1 or 2 traders. We did not find a relation between the number of buyers that a farmer makes use of and the number of traders available at commune level. The number of traders at commune level varies from 4 to 7 across the treatments and all farmers, except those in the FFS-only group have seen an increase in the number of traders available in their areas. Regardless of training or certification, farmers tend to have long standing trade relations with their buyers. Across the entire population, farmers indicate they have been doing business with the same buyer for 7.4 years on average. Most frequently mentioned reasons to maintain long lasting trade relations are competitive pricing and reliability. Contrary to what we expected, demand for certified coffee plays a role for only a third of the UTZ certified farmers when deciding to whom to sell. There does seem to be a tendency for the FFS+UTZ group to sell to fewer traders, but this only shows in the regression and not in the PSM analysis. The dangers of lock-in of small-scale farmers in certified supply chains of multi-national trading and exporting companies that (Neilson, 2008) postulated in his assessment of possible effects of certification on Indonesian smallholders does not (yet) play out in this particular case. Given current trends of strong growth in certified supply, a lock-in could lead to reduced competition for farmers’ coffee, although it should be noted that the Vietnamese market is known for its very competitive nature (World Bank, 2004) and small-scale buyers have certain have lower overheads and tax burdens allowing to buy at competitive prices that can surpass the price+premium model that certified supply chains tend to rely on.

Quality improvement is measured by the share of ripe cherries harvested, defect rates, moisture content, foreign matter and bean size. Farmers were asked their opinion on whether these changed over time. We did not observe significant change relative to the
control group, but across the board 70% of all farmers indicate they feel they improved the quality of their coffee (Figure 17).

A minority of each group indicates that quality-based buying occurs and they receive a better price for better quality coffee. While the price - quality relation improvement is not significant there is tendency for all the treatments to outperform the control groups.

In conclusions, trade relations are not significantly affected by training or UTZ certification. Some of the UTZ certified groups show a tendency to rely on fewer buyers, but reasons for this are found primarily in the value of existing relations. While quality improves across the board, farmers that receive training and are UTZ certified have a tendency to indicate they receive better prices for better quality.

3.1.4 Farm economics
The farm economics dimension is covered by 7 indicators. These are turnover per unit coffee, effectively the coffee price, costs per unit coffee, with a further breakdown of main expenses. Subtracting the total costs from the turnover gives the earnings per unit coffee.

The earnings analysis is done by:

$$E_{Mt} = \frac{T_f - (C_f + C_m + C_p + C_e + C_{eq} + C_s + C_c + C_l + C_{p+e})}{P_T}$$

Where $E_{Mt}$ is the earning per Mt green coffee before taxes and without taking into account of depreciation and amortisation (only production-related interest payments are included), $T_f$ the total coffee turnover per farm, $C_f$ is fertiliser cost, $C_m$ the manure and compost cost, $C_p$ the cost for biocides, $C_e$ the energy cost, $C_{eq}$ equipment rental cost, $C_s$ cost for hired services, $C_c$ cost for production related credit (interest payments), $C_l$ the labour cost, $C_{p+e}$ the processing cost, and $P_T$ is total production. This calculation does not take direct
household labour costs into account nor depreciation of equipment. Possible additional earnings from certification premiums are not yet factored in.

Lastly the change in credit availability for those that indicate they need credit to finance inputs is included. The hypothesis is that better farm management and market access results in better turnover, lower costs and therefore better earnings. These in turn, and over time could reduce credit requirements but could enhance credit availability as farmers can be seen as more creditworthy (Figure 18).

![Figure 18: Farm economic impact by treatment, each relative to its own control group. 0, -1 and -2 indicate no, moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact.](image)

Turnover per unit coffee is effectively the price a farmer received for his coffee. Overall, the earnings for all treatments, except the low intensity training + UTZ group are not significantly impacted. Farmers in the medium intensity training + UTZ group receive better prices, while those in the low intensity+UTZ group receive significantly lower prices. Total costs remain stable across all treatments but further breakdown of total costs shows that all the certified groups have significantly higher hired labour use per unit coffee and therefore higher labour costs. Credit availability for those that need it has not significantly changed.

A more detailed breakdown of costs shows the degree of variance by group (Figure 19).
Turnover, or coffee price per Mt green coffee across the groups, and by extension the provinces of Gia Lai and Dak Lak, is very similar. As the outcomes of the t-tests, PSM and regression show, significant differences are found in the labour costs for all the UTZ certified groups, regardless of training. Similarly, the regression over total costs shows a correlation between participation in a certification project in 2008 and 3.9 million VND higher costs in the 2011 crop year. This is somewhat striking, especially as we left out costs directly attributable to certification, e.g. time spent on administration of certification records, or attending meetings.

In addition to regular operational costs, certified farmers have an additional cost aspect, as well as potential extra revenues from certification premiums. Costs to be paid in cash are primarily for hardware investments and administration and vary from 16,000 to 200,000VND/Mt. As farmers are certified for longer, these costs stabilise at 16,000 to 65,000VND/Mt per year. Initial costs are higher as they involve larger expenditures for PPE that are amortised with time.

For those UTZ certified farmers that sell certified coffee average premiums per Mt green coffee sold range from 192,000VND to 298,000VND. However, a large share of farmers do not sell any of their certified coffee into certified marketing channels at all (Figure 20).
Figure 20: Cumulative share of farmers and their share of certified production sold in a certified market channel against a premium by treatment in the 2011 crop year. The area above the treatment lines represents the total share of certified coffee sold as such.

Figure 20 shows that in the FFS+UTZ group 29% of the farmers do not sell any of their UTZ certified coffee in a certified market channel and thus do not receive any premium on it. For the medium intensity training+UTZ group and the low intensity training+UTZ group this share is even higher at 36% and 67%. Especially in the Medium and Low intensity training+UTZ groups, only a small share of farmers deliver the majority of UTZ certified coffee. For medium intensity training+UTZ group the 2011/12 season is the first where they sell UTZ certified coffee, so their situation may be affected by inexperience or lack of trade relations. For the low intensity training+UTZ group however we see that 95% of UTZ certified coffee is supplied by 25% of the UTZ certified farmers. Concurrently, this implies that a majority of farmers do neither contribute to, nor benefit from selling UTZ certified coffee.

After controlling for the share of certified coffee that is not sold as such, premiums received by farmers range from 60,000VND/Mt for the low intensity training + UTZ group to around 140,000VND/Mt for the other 2 groups. When cash certification costs made by farmers are factored in, the margin (premiums received minus costs is around nil. Cash costs mostly consist of administration and documentation costs and PPE expenses at the start of becoming certified. Farmers indicate they spend from 0.6 to 2.6 days extra per year on certification related work, excluding attending agronomy trainings. If that time is valued at an opportunity cost equal to the going rate for casual labour (120,000VND/day), then the certification margin at farm level is negative for all treatments (Figure 21).
Figure 21: Certification premiums received by farmers that are UTZ certified and sell certified coffee against a premium, corrected for their total certified volume, minus average costs, labour and other expenses, all in VND/Mt green coffee. Labour is valued at an opportunity cost of 120,000VND/day which was the going rate for casual labour in the 2011 crop year.

In the general absence of significant productivity and efficiency gains from UTZ certification and training and slight negative margin on certification related economic aspects, the overall direct economic effect of being UTZ certified translates in a slight negative pressure on earnings that ranges from -0.33% to -0.76%.

In conclusion, no convincing overall impact on farm economics was found for any of the treatments. Some treatments score better on aspects of farm economics and in some cases the treatment groups fare worse than their peers in the control group. The latter phenomenon seems to increase as training intensity decreases. The changes in efficiency that we expected to find did not materialize, on the contrary, UTZ certified groups have significantly higher labour costs and as a result 2 of the 3 UTZ certified group have lower earnings. We suspect this may be a selection effect, although we have tried to control for that. Implementation of UTZ certification at farm level appears to be cost neutral, but after controlling for share of certified coffee sold as such and factoring in opportunity costs for the amount of time farmers spend on certification related work and meetings (excluding agronomy trainings) the margin in fact is negative. The net contribution to farmer earnings of UTZ certification ranges from -0.33% to -0.76%. Beyond farm level we have reason to suspect that a significant share of the UTZ certified volume traded as such is in fact conventional coffee in at least 1 of the cases.
3.1.1 Assets

UTZ certification is expected to result in better living conditions. To operationalize that concept we look at the asset base of farmers and, in the next section, at living conditions of children. We look at 6 indicators that reflect ownership of productive means, housing, communication means and transportation. Figure 22 shows the significance of change in asset ownership over time from 2008 to the 2012 by treatment, relative the amount of change in the control groups.

![Impact of treatments on change in asset ownership from 2008 to 2012, relative to the control group. 0, -1 and -2 indicate no, moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact.](image)

The FFS+UTZ group shows a positive impact in change of the ownership of hulling machines over time. Other indicators remain static, irrespective of treatment. When we look at current asset ownership a slightly different picture emerges (Figure 23).
Mobile phone ownership for the medium intensity training+UTZ group is significantly and much higher than of its control group. If this indicates that farmers in group T4 have more than one mobile phone, it is unclear whether this points to additional value, but it could point to greater wealth. The FFS+UTZ group performs identical to its control group. The low-intensity training group performs worse on the mobile phone ownership indicator, but not significantly different on any of the others. The FFS-only group shows lower pump ownership and a lower performance on the mobile phones indicator. Impact is found on the t-test and the all the PSM analyses. The latter show an average treatment effect on the treated (ATT) of between -0.10 to -0.11 on a scale of 0 to 1.
Figure 24: Amount and direction of change from 2008 to 2012 in asset ownership for all treatments and control groups. Blue indicates the fraction of farmers not owning the asset in 2008 nor in 2012; Red the fraction owning an asset in 2008 but not anymore in 2012; Green the fraction owning an asset in both 2008 and 2012, and; purple the fraction owning an asset 2012 but not in 2008. The sum of green and purple bars also indicates the share of farmers owning an asset in 2012.

Asset loss over time is negligible, most farmers, regardless of which group they belong to, show a positive or positive change status. The largest amount of positive change for all groups is in the acquisition of mobile phones. On a provincial level, tractor-ownership is less prevalent in Gia Lia province. The medium-intensity training and UTZ group stands out with a lower share of farmers owning pumps, tractors and hulling machines. Their financial capital is nonetheless high. Linked with their greater reliance on hired labour we suspect these farmers to make more use of third-party services for irrigation and transport. Aside from these exceptions, the share of farmers indicating asset ownership (the sum of green and purple bars) shows a largely identical picture for all groups. Not shown in Figure 24 but of interest nonetheless is the relatively large share of farmers that indicate they have a computer at home (Table 14).
Table 14: Share of farmers that indicate they own 1 or more computers and have internet access at home in 2012 by treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Computer</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS (T1)</td>
<td>32%</td>
<td>9%</td>
</tr>
<tr>
<td>FFS+UTZ (T2)</td>
<td>24%</td>
<td>9%</td>
</tr>
<tr>
<td>Medium intensity training+UTZ (T4)</td>
<td>61%</td>
<td>28%</td>
</tr>
<tr>
<td>Low intensity training+UTZ (T3)</td>
<td>37%</td>
<td>15%</td>
</tr>
</tbody>
</table>

The medium intensity training+UTZ group stands out for the high share of farmers with computers, we suspect this difference is due to their higher financial capital at t=0 and not attributable to the intervention.

In conclusion, we do not see major significant impact of UTZ certification or training on the asset base of farmers. Change over time for the treatment groups is comparable to the amount of change in asset ownership of the control groups. Both show a positive development over time. The actual asset bases differ significantly on some indicators but we fail to see a clear effect across the board of training types and UTZ certification.

3.1.2 Living conditions of children

Besides assets, the second aspect of our operationalizing of living conditions is reviewing the educational status of farmers’ children and the amount and type of farm work done by these children. Pesticide application is included specifically as a proxy for dangerous work, which children are not allowed to do (Utz Certified, 2010), (Figure 25).
Figure 25: Impact of treatments on living conditions of children in 2012, relative to the control group. 0, -1 and -2 indicate no, moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact (i.e. less children working).

None of the treatment groups performs better or worse when it comes to having children of school-going age (until 16 years old) attending school. There is no significant difference between the genders: boys and girls are equally likely to attend school. The number of children helping on the farm, irrespective of school hours is low on all accounts and significantly lower still for the FFS group. Across the entire population, including control groups, 3 farmers indicate that their children work on the farm during school time, an insignificant share, although 2 of them happen to be UTZ certified.

All treatments perform similarly on child labour during school hours and on the indicator for biocide application by children. Despite the absence of significant difference, it should be noted that of the 4 children that apply biocides 3 of them belong to households that are UTZ certified, all of which are part of the low intensity training+UTZ group (Figure 26).

Table 15: Share of children of school-going age that attend school and help on the farm in 2012 by treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Attending school</th>
<th>Helping on farm outside school hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS (T1)</td>
<td>98%</td>
<td>7%</td>
</tr>
<tr>
<td>FFS+UTZ (T2)</td>
<td>87%</td>
<td>29%</td>
</tr>
<tr>
<td>Medium intensity training+UTZ (T4)</td>
<td>96%</td>
<td>15%</td>
</tr>
<tr>
<td>Low intensity training+UTZ (T3)</td>
<td>88%</td>
<td>29%</td>
</tr>
<tr>
<td>Control group Dak Lak</td>
<td>95%</td>
<td>21%</td>
</tr>
<tr>
<td>Control group Gia Lai</td>
<td>90%</td>
<td>23%</td>
</tr>
</tbody>
</table>
The low intensity training+UTZ group does show a tendency to make more use of child labour than the control group and the other treatment groups. While we do not know exactly what tasks children are performing when they assist with biocide application and weeding and irrigation we feel it goes against the intention of the UTZ certified of code of conduct. Pesticide applications because of the danger involved or the heaviness of the work in case children only carry water to the field. And irrigation and weeding both for the physical strain they are associated with (Kuit, et al., 2010).

In conclusion, the FFS treatment sees significantly lower use of child labour. School attendance rates are high across all groups and neither training nor UTZ certification therefore has an effect. Contrary to its code of conduct, a very small minority of children of UTZ certified farmers continue to be engaged in dangerous and heavy work.

3.1.3 Occupational health and safety (OHS)

The trainings and the UTZ code of conduct pay particular attention to OHS. We have measured this dimension by 4 indicators: change in the number of workplace accidents from 2008 to 2012, the actual number of workplace accidents in 2012, the use of safe biocide application techniques and the use of PPE during biocide application. We try to exclude minor accidents, by asking farmers to list only those workplace that required first-aid or medical attention. Application techniques refer to best practices when applying biocides and include for example not eating or smoking during application, observing hygiene standards, taking wind direction into account, putting up warning signs, storage and not spraying close to waterways. Each farmer has an application techniques and PPE score where each aspect carries equal weight. Compared to their respective control groups, none of the treatment groups performs significantly different (Figure 27).
A large majority of farmers indicate that no workplace accidents that require first aid or medical attention took place on their farm in the 2011 crop year (Figure 28). Between 16% to 21% of farmers indicate they had between 1 and 6 such incidents on their farm.

While treatments do not have a significant effect on the number of workplace accidents we do see a correlation between actual number of workplace accidents and wealth as indicated by a proxy ownership of household appliances where additional ownership relates to a 0.37...
lower accident rate. Coffee farmers that indicate they grew up on a coffee farm themselves report a 0.27 lower accident rates. These farmers are on average 9 years younger than those that did not grow up on a coffee farm, but age is found not to be a significant factor affecting the accident rates. We thus suspect experience and more exposure to farming activities from a young age are causing this effect. Gender of the interviewee is also of influence, with female farmers reporting 0.47 lower rates. Farmers that have owned irrigation pumps in 2008, and therefore mostly still do so today (section 3.1.1), show an increase of 0.25 accidents to those that do not own irrigation pumps. We suspect uncovered fast-moving drive belts could be to blame for this.

Table 16: Share of farmers that use biocides in the 2011/12 crop year by treatment and control groups

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS (T1)</td>
<td>38%</td>
</tr>
<tr>
<td>FFS+UTZ (T2)</td>
<td>79%</td>
</tr>
<tr>
<td>Medium intensity training+UTZ</td>
<td>48%</td>
</tr>
<tr>
<td>Low intensity training+UTZ (T3)</td>
<td>77%</td>
</tr>
<tr>
<td>Control group Dak Lak</td>
<td>57%</td>
</tr>
<tr>
<td>Control group Gia Lai</td>
<td>83%</td>
</tr>
</tbody>
</table>

Not all farmers apply biocides (Table 16). The share of those that do varies with treatment. Treatment however is to some degree location specific, so there might be a link with local pest and disease pressure, but we are not sure of that. Of those that do use biocides, all use at least 1 and usually more safe application techniques and precautions. We do not see much variation in uptake of the number of techniques between the treatments (Figure 29).

Figure 29: Uptake of safe biocide application techniques by cumulative share of farmers in the 2011/12 crop year.

In detail, those farmers whose fields border on waterways less than 60% refrain from spraying nearby. Another notable aspect putting up of warning signs after spraying. The UTZ certified groups perform notably better than the FFS-only group. Still, not all the mandatory control points that UTZ lists are adhered to by UTZ certified producers and there seems to be a tendency where low intensity training sees worse performance (Figure 30).
The use of PPE is often something that farmers improvise on by using rain coats and boots instead of officially sanctioned spraying outfits. We see mostly similar performance between the groups. What is notable is that a minority of farmers does not use any waterproofs at all (Figure 31).

Given the sub-tropical climate this is perhaps understandable, but from a safety perspective not advisable. Furthermore, this is in conflict with the labelling on most commercially available biocides, which UTZ certified farmers are supposed to comply with. As such, those UTZ certified farmers that indicate they do not use protective clothing, ideally in the form of a one-piece waterproof suit, or if interpretation of labelling allows some pragmatism, a combination of rain pants and rain coat, are in violation of the code of conduct. About 4% of all farmers indicate to wear helmets as a safety measure during biocide application. One farmer indicates that to protect himself during biocide application he hires others to do it for him.
In conclusion, no significant impact was detected on occupational health and safety performance for any of the treatments, relative to their own control groups. Comparing the treatments, there seems to be a tendency for the low intensity training+UTZ group to perform worse than the others in terms of applying selected safe application techniques. In all the UTZ certified groups together, around 20% of the farmers violate of the code of conduct.

3.1.4 Waste management

The waste management dimension is covered by 3 indicators that together cover the majority of farm waste materials, including fertiliser bags, biocide packaging material and waste material from coffee processing (Figure 32). Materials from the 3 waste streams can be disposed of in different ways, some of which are preferable to simply throwing it away. The performance of farmers is split in two: i) those throwing empty bags and packages away; and ii) those that either dispose of them responsibly or re-use them on the farm in case of fertiliser bags.

![Figure 32: Impact of treatments on waste management performance. All indicators cover actual state in 2012 relative to the control group. 0, -1 and -2 indicate no, moderately- moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact.](image)

No significant impact is found on any of the waste management indicators for any of the groups compared to their control groups. Figure 33 shows what farmers across the different treatment groups do with their waste.
A lot of waste material gets re-used on farm, except for biocide packaging which is mostly either burned or buried. Central collection points are few and far in between which explains why little use of these is made. The wisdom of burning or burying biocide packaging is doubtful. Burning plastics releases toxins into the air and can be detrimental to those in vicinity. Burying packaging does keep it out of the hands of children and away from animals but it also pushes the disposal to the future. In the absence of a central collection system the UTZ code of conduct proscribes disposal in a way that minimizes exposure and risk to humans, the environment and food, but does not provide further hints on how to do that. Given the limited availability of central collection points farmers must make do. Contrary to what the training messages and the UTZ code of conduct state some, but in fact very few, farmers indicate they re-use biocide packaging or throw it away.

In conclusion, no significant impact is found on waste management, the majority of waste is re-used on the farm. Mandatory control points from the UTZ code of conduct are violated in some cases.

### 3.1.5 Labour relations

The FFS programmes and general agronomy trainings tend not to pay too much attention, if any at all, to labour relations between farmers and casual workers, but the UTZ code of conduct does. Farmers do rely on casual workers for a large share of the work, in some cases a majority of the work is done by hired workers. At producer level the focus is primarily on voluntariness of participation in labour and on payment levels. We opted to look at contracting in writing to see if a shift to more formalised contracting takes place which could be expected if the professionalization that UTZ seeks to promote takes place. The labour relations dimension is covered by 2 indicators\(^8\): the first in the type of contracting used to hire casual workers and the second is a comparison of salary level relative to the legal minimum compared to the control groups.

---

\(^8\)As there are only 2 indicators to this dimension we can't produce a spider web graph showing significance.
The 2 contracting options used are verbal agreements and written contracts. We find no significant difference in the use of either for any of the treatment groups. By far the majority of all farmers rely on verbal agreements with casual workers. Less than 3% of farmers in the FFS+UTZ group and the Medium training intensity+UTZ group use written contracts. Here it should be realized that in Vietnamese culture written contracts not necessarily are seen as more binding than verbal contracts.

On wage levels we do find a significant effect: the FFS-only group pays significantly lower wages than its control group: 2.7 times the legal minimum versus 3.0 times for the control group. Virtually all farmers pay substantially above the legal minimum wage, on average around 3 times more (Figure 34). Farmers tend to calculate with daily wages for their casual workers. Taking the 830,000VND per month legal minimum wage for state employees as a reference, gives at 20 working days per month an average daily wage rate of 41,500VND, which currently corresponds to about 1.5 Euro.

Those that pay lower wages are more likely to offer free lunch and sometimes lodging at no extra charge. Markets for casual labour are said to be competitive in the Central Highlands (Jansen, 2012) as witnessed by a quintupling of wages over 9 years. Inflation on the other hand ran at 18% annually during that same period, which explains 80% of the increase. Still, the vicinity of Ho Chi Minh City is said to result in labour competition; indeed the daily wage arbitrage between HCMC and the Central Highlands is virtually nil (AmCham Vietnam, 2013 and authors’ calculations).

In conclusion, no significant effect was found for any of the treatments, except for the FFS-only group that pays lower wages than its control group by about 10%.

3.1.6 Natural resources

Application of the UTZ code of conduct is expected to result in a lower environmental footprint of production. Partly through better farm management and efficiency gains (see section 3.1.2) but also through a number of prescriptions on land use. The natural resource dimension is covered by 3 indicators. The first one relates to taking previously non-agricultural land into cultivation for coffee, the second covers change from 2008 to 2012 in whether or not growing coffee immediately next to water ways and the third the actual share of farmers cultivating coffee immediately next to waterways.
Figure 35: Impact of treatments on selected natural resource indicators relative to the control group. 0, -1 and -2 indicate no, moderately- moderately negative and strongly negative impact. 1 and 2 indicate moderately positive and strongly positive impact.

No significant change is observed from any of the treatments. Actual numbers on the land expansion for coffee indicator show that none of the groups, treatment nor control have engaged in expansion over the past 5 years, except for 1 farmer in the FFS-only group. We suspect this is primarily due to the settled nature of the area in which the research took place, particularly since expansion continues to take place at the fringes of the coffee areas despite official efforts to control it. According to Nguyen & Tuan, (2012) overall area growth from 2011 to 2012 was estimated at 8%. Dak Nong province alone saw an expansion in area of 49%.

Cultivation immediately next to water ways sees very little change over time. Those farmers that cultivated next to waterways in 2008 continue to do so in 2012. None has ceased doing so, which given land value is unsurprising. Actual numbers are also not significantly different between the groups and show 20 to 47% of farmers engaging in it (Figure 36).
Figure 36: Amount and direction of change from 2008 to 2012 in coffee cultivation next to waterways for all treatments. Negative (blue bar) indicates a farmer cultivated immediately next to a water way in 2008 or in 2012; Negative change (red bar) indicates a farmer did not cultivate immediately next to a waterway in 2008 but does so in 2012; Positive (green bar) indicates a farmer did not cultivate next to waterway in 2008 nor in 2012, and; Positive change (purple bar) indicates a farmer did cultivate next waterways in 2008 but not anymore in 2012. The sum of blue and red bars indicate the share of farmers that cultivates next to waterways in 2012.

Average farm size is 1.59ha. Of this on average 1.35ha is planted with coffee, the remainder is typically occupied by the house plot and the drying yard with occasional vegetable plots, pepper stands or small rice fields. We did not ask farmers why they continue to cultivate coffee immediately next to waterways and do not use a natural vegetation strip as a buffer to limit leaching of fertilisers and crop protection products into waterways while UTZ certified requires this. UTZ does not state the minimum width of such a vegetation strip, but if we assume 5m to be adequate, then a farm that shares a 150m border with a waterway would have to re-allocate 150m*5m=750m² of coffee to natural vegetation. This translates to a 5.5% reduction of its cultivatable area. This may explain why we find no change on this indicator.

In conclusion, we find no positive impact on natural resources. Expansion of cultivated area is limited among all groups, including the control group, but at the fringes of the coffee area expansion continues. Contrary to code of conduct requirements cultivation immediately next to waterways continues unabated. There appear to be sound economic arguments for farmers to maintain coffee immediately next to waterways.

3.2 Impact of UTZ code compliance and training

In this section we describe the outcomes of 4 explorative models of increasing sophistication that we used to estimate the effects of UTZ code compliance and training quantity and quality of training and trainer. We do this across 3 dimensions that represent what we think are the core elements of the theory of change in logical order: the application of training by farmers, changes in farm management and changes in farm economics. Results are presented in tables that show the regression co-efficient and whether an effect is significant at 10%, 5% or 1%.

3.2.1 Training

Application of training is registered on a scale with 3 levels. Farmers indicate whether they apply none or some (0), about half (1), or more than half (2) of the practices that were associated with a training on specific topics. We identified 6 main agronomy related training areas: pruning, soil management, biocide application, irrigation, harvesting and processing.
The analytical model sections 2.5.2 and 2.5.3 and describe the construction of and our assumptions about training amount, training quality and background of the trainer. Originally, an index value on experience of the trainer was included as a variable but this was found to present multicollinearity issues and thus had to be dropped. Testing 2 models, 3a \( Y_t = \beta_0 + \beta_1 Utz + \beta_2 Tr + \beta_3 x_t + \varepsilon_i \) and 3b \( Y_t = \beta_0 + \beta_1 Utz + \beta_2 Tr Qn + \beta_3 Tr Ql + \beta_4 TB + \beta_5 x_t + \varepsilon_i \) shows the relative contributions of UTZ certification, training amount, training quality and background of the trainer (Table 17).

Table 17: Effects of UTZ code compliance and training (model 3a) and the role of training amount, quality and trainers on 6 training application indicators. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact at 1%, medium shaded green shows positive impact at 5% and light green positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively. Coefficients indicate the amount of change of y with being certified or with 1 additional unit in the training aspect indicated.

| Application of training on: | Model 3a | | | Model 3b | | |
|-----------------------------|---------|---------|---------|---------|---------|
| UTZ | Training | UTZ | Training amount | Training quality | Trainers’ background |
| Y10.3 Pruning | - | 2.65** | - | 0.07*** | 1.10*** |- |
| Y10.4 Soil management | - | - | -0.51* | 0.05*** | - | 1.55*** |
| Y10.5 Biocide application | 0.62** | - | - | 0.08*** | -4.02** | 4.39** |
| Y10.6 Irrigation | - | - | -0.64** | 0.09*** | 1.91*** | - |
| Y10.7 Harvesting | 0.76*** | - | - | 0.08*** | - | 1.36*** |
| Y10.8 Processing | 0.44*** | - | - | 0.06*** | - | 0.96** |

Model 3a is a simple test where both UTZ code compliance and training are modelled as dummy variables. In that model we see that UTZ code compliant farmers are more likely to apply a greater share of the biocide application techniques that are promoted by the different treatments. Farmers compliant with the UTZ code are also more likely to apply more of the harvesting and processing practices. Training on its own contributes significantly to uptake of pruning techniques.

With model 3b we breakdown training as a concept into 3 different components: training amount, training quality and trainers’ background. All variables have been rescaled from 0 to 1. In this model the role of being compliant with the UTZ code diminishes to a negative effect on the application of soil management and irrigation practices disseminated in trainings. Training amount contributes significantly to uptake of all trained practices, with every additional training session shows small but significant increase in uptake, all other things being equal. The background of the trainer also matters and so does training quality, but not on all topics. Pruning and irrigation are often practices where farmers are hesitant to change their ways. Cheesman, et al. (2007) for example identify excessive irrigation by farmers as a hedging strategy against potential yield loss. Against that background it could well be that better quality training or trainers with a background in local specifics are required to convince farmers to take up training messages that tend to emphasise a reduction in irrigation water use. Coefficients of change in uptake are largest for training quality and background of the trainer, suggesting that while increasing amount of training will give change in uptake on all topics, it is the quality of the training and the background of the trainer that can accelerate the process of uptake.

Model 3c
\( Y_t = \beta_0 + \beta_1 Utz + \beta_2 Tr Ql + \beta_3 Tr Qn + \beta_4 Tr Bg + \beta_5 (Ut z * Tr Ql) + \beta_6 (Ut z * Tr Qn) + \beta_7 (Ut z * Tr Bg) + \beta_8 (Tr Ql * Tr Qn) + \beta_9 (Tr Ql * Tr Bg) + \beta_{10} (Tr Qn * Tr Bg) + \beta_{11} x_t + \varepsilon_i \) is essentially the
same as model 3b, but adds interaction effects between model variables to see if they mutually reinforce one another or not (Table 18).
Table 18: Effects of UTZ code compliance and training quality, amount and trainers’ background and interaction effects (model 3b) on 6 training application indicators represented by regression coefficients. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact (at1%), medium shaded green shows positive impact at 5% and light green positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively.

<table>
<thead>
<tr>
<th>Application of training on:</th>
<th>Model 3c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTZ</td>
</tr>
<tr>
<td>Y10.3 Pruning</td>
<td>-</td>
</tr>
<tr>
<td>Y10.4 Soil management</td>
<td>-</td>
</tr>
<tr>
<td>Y10.5 Biocide application</td>
<td>-</td>
</tr>
<tr>
<td>Y10.6 Irrigation</td>
<td>-</td>
</tr>
<tr>
<td>Y10.7 Harvesting</td>
<td>-</td>
</tr>
<tr>
<td>Y10.8 Processing</td>
<td>-</td>
</tr>
</tbody>
</table>
As in model 3b, model 3c shows a slight negative correlation with the interaction effect of UTZ code compliance and training quality on irrigation, and in addition for the application of pruning and biocide application techniques. Training amount continues to contribute significantly to uptake of training content. Where the trainers’ background plays a role its influence tends to be large. Effects of the trainers’ background do not increase with more training as the interaction term shows. For training quality and training amount the reverse can be observed for uptake of training messages on pruning and harvesting. There, more exposure to better quality training results in more uptake still. Compliance with the UTZ code and better training quality do not show that effect with negative coefficients on 3 out 6 aspects. Overall, as in model 3b, training amount and background of the trainer are driving uptake of trained techniques on most topics. The additional positive effect of UTZ code compliance on application of training content is limited.

In conclusion, contrary to what we found in the group comparison on application of training techniques (3.1.1) the simple regression model 3a appears to show that UTZ code compliance leads to significant use of trained biocides application techniques and harvesting techniques. However, more sophisticated modelling reveals that this uptake of techniques is primarily attributable to the trainers’ background, training amount and amount of training with the contribution of UTZ code compliance slightly negative. Model 3c confirms this and also shows that success factors do not necessarily reinforce one another. Drivers for change in uptake of training content are training quality, amount and the profile of the trainers involved. When it comes to uptake of training content, UTZ code compliance is no replacement for good quality training by trainers with a relevant background.

3.2.2 Farm management

Farm management analysis is done with selected indicators on change in productivity, actual productivity, efficiency ratios of N, P and K application and irrigation water use applying the same 4 models as in section 3.2.1.

Model 3a shows the relative contribution of being UTZ certified and receiving training on farm management and model 3b aims to show in more detail which aspects lead to impact (Table 19).
Table 19: Effects of UTZ code compliance and training (model 3a) and the role of training amount, quality and trainers’ background on 6 farm management indicators. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively.

<table>
<thead>
<tr>
<th>Farm management indicators</th>
<th>Model 3a</th>
<th>Model 3b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTZ</td>
<td>Training</td>
</tr>
<tr>
<td>Y2.2 Change in productivity</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.2a Productivity, Mt green coffee per ha</td>
<td>-0.23**</td>
<td>0.41***</td>
</tr>
<tr>
<td>Y2.12a Amount N (kg) per Mt green coffee</td>
<td>-23*</td>
<td>1.9**</td>
</tr>
<tr>
<td>Y2.12b Amount P (kg) per Mt green coffee</td>
<td>-11*</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12c Amount K (kg) per Mt green coffee</td>
<td>-16*</td>
<td>-</td>
</tr>
<tr>
<td>Y2.5 Irrigation water, m³ per Mt green coffee</td>
<td>-184**</td>
<td>-162**</td>
</tr>
</tbody>
</table>

Model 3a identifies significant positive effects of having access to training on 4 out of 6 farm management efficiency ratios. Farmers with training tend to be more productive than those without, but this is not reflected in change in productivity from 2008/09 to 2011/12. Farmers that have access to training and are more productive today were also more productive in 2008. The overall impact of training on productivity is hence not significant. UTZ code compliance does not show positive impact in model 3a on any of the farm management indicators. When we try to investigate which training aspects are driving farm management change, our model does not provide a satisfactory answer. None of the training aspects that we have quantified contribute positively to farm management efficiency and 5 out of 18 show a negative tendency. With the suggestion of model 3a that training does make a difference, we suspect other training aspects or phenomena not included in the model but correlated with training, are responsible for the observed change in model 3a.

Change in productivity is showing significant effect from tree age (-0.039Mt per additional year of age) and interestingly from the use of shade trees. Farmers that indicate they use shade trees have 0.11Mt higher productivity, all other things being equal. Another interesting finding is that the amount of nitrogen applied per Mt green coffee correlates negatively with productivity, indicating that there is tremendous scope for efficiency improvement. Ethnicity is strongly significant, with members of the Kinh ethnic majority being on average 1.05Mt/ha more productive than otherwise identical farmers that belong to an ethnic minority group.

By adding interaction effects to model 3b we hope to obtain more insight in effects of training aspects on farm management (Table 20) but based on the failure of model 3b (Table 19) we suspect interaction effects will not provide more clarity.
Table 20: Effects of UTZ code compliance and training amount, quality and trainers’ background and interaction effects (model 3b) on 6 farm management indicators represented by regression coefficients. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively.

<table>
<thead>
<tr>
<th>Farm management indicators</th>
<th>Model 3c – Model terms and interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTZ</td>
</tr>
<tr>
<td>Y2.2 Change in productivity</td>
<td>-</td>
</tr>
<tr>
<td>Y2.2a Productivity, Mt green coffee per ha</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12a Amount N (kg) per Mt green coffee</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12b Amount P (kg) per Mt green coffee</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12a Amount K (kg) per Mt green coffee</td>
<td>-</td>
</tr>
<tr>
<td>Y2.5 Volume irrigation water per Mt green coffee</td>
<td>-256***</td>
</tr>
</tbody>
</table>
As expected the explanatory capacity of model 3c on the effects of training aspects and UTZ code compliance on farm management is very limited. Where we do find effects, the tendency is for UTZ code compliance and training quality to negatively reinforce one another. The lack of consistently better performance on farm management for the UTZ certified groups in section 3.1.2 helps to explain the observed outcomes where UTZ code compliance is concerned. On training aspects we remain unclear as to why we do not find the explanations we expected. Perhaps the index values for training aspects insufficiently denote differences. Or perhaps the linearity of the model does not sufficiently capture the underlying processes due to their nonlinear character. Aside from UTZ code compliance and training effects we see a significant positive and consistent relation with membership in farmer clubs and all the efficiency ratios expect change in productivity and irrigation water use. A third explanation could therefore be that farmers were already well-trained by others prior to UTZ certification or other interventions.

In conclusion farm management is primarily positively affected by amount of training but our current models do not explain which aspects of training lead to change. We do not find any effect on farm management and efficiency resulting from UTZ code compliance.

3.2.3 Farm economics

Farm economics is analysed on basis of 6 indicators covering turn over, production cost and earnings per ha and per Mt green coffee. The turnover per Mt indicators represents the coffee price per Mt. Per ha the turnover per Mt is multiplied by productivity. Production cost per unit coffee and per ha is the sum of costs of labour, inputs and energy and interest paid on production-related credit divided by total production (Y3.4) or acreage under coffee (Y3.4). Deducting the production costs from the two turnover measures gives the earnings per unit coffee and per ha before taxes, depreciation and amortization. Model 3a shows the relative contribution of being UTZ code compliance and receiving training on actual productivity and model 3b aims to show in more detail which aspects of training lead to impact on farm economics (Table 21).
Table 21: Effects of UTZ code compliance and training (model 3a) and the role of training amount, quality and trainers’ background (model 3b) on 6 farm economic indicators. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively.

<table>
<thead>
<tr>
<th>Farm economic indicators</th>
<th>Model 3a</th>
<th>Model 3b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UTZ</td>
<td>Training</td>
</tr>
<tr>
<td>Y3.2 Turnover per Mt green coffee</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.3 Turnover per ha</td>
<td>-</td>
<td>1.65e+07 ***</td>
</tr>
<tr>
<td>Y3.4 Production cost per Mt green coffee</td>
<td>1,415,825 **</td>
<td>-</td>
</tr>
<tr>
<td>Y3.5 Production cost per ha</td>
<td>5,881,172 **</td>
<td>-</td>
</tr>
<tr>
<td>Y3.6 Earnings per Mt green coffee</td>
<td>-1,668,144 **</td>
<td>-</td>
</tr>
<tr>
<td>Y3.7 Earnings per ha</td>
<td>-1.57e+07 ***</td>
<td>1.05e+07 *</td>
</tr>
</tbody>
</table>

Compliance with the UTZ code shows a moderate to strongly significant negative impact on production costs and earnings, both per unit coffee and per ha. Coffee prices, as measured by turnover per unit coffee remain stable across both models, but training is positively associated with a higher over per ha. This is driven by the strongly significant higher productivity that we found in Table 19. According to model 3a production costs are not affected by training, and earnings show a significant upward tendency. Model 3b identifies the amount of training as responsible for better earnings, both per Mt and per ha. In that model change is driven by improved efficiency, captured by production cost per unit coffee, as a result of training. However, while the outcomes are significant statistically, their absolute size is very small. Training quality and trainers’ background are negatively associated with several aspects of farm economics. Training quality sees a negative coefficient for turnover per ha, resulting in lower earnings per ha while trainers background is associated with slightly higher costs per Mt and lower earnings per Mt.

In model 3c we explore the effects of term interactions on farm economic impacts (Table 22).
Table 22: Effects of UTZ code compliance and training amount, quality and trainers’ background and interaction effects (model 3b) on 6 farm economic indicators represented by regression coefficients. Significance of impact is denoted by *** at 1%, ** at 5% and * at 10% where dark green shows positive impact at 10%. From dark to medium and light, red shades show negative impact at 1%, 5% and 10% respectively.

<table>
<thead>
<tr>
<th>Farm economic indicators</th>
<th>Model 3c – Model terms and interactions</th>
<th>UTZ</th>
<th>Training amount</th>
<th>Training quality</th>
<th>Trainers’ background</th>
<th>UTZ* Training quality</th>
<th>UTZ* Training amount</th>
<th>UTZ* trainers’ background</th>
<th>Training quality* Training amount</th>
<th>Training quality* trainers’ background</th>
<th>Training amount* Trainers’ background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y3.2 Turnover per Mt green coffee</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-6,277,652**</td>
<td>35,067**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.3 Turnover per ha</td>
<td>1.18e+07*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.4 Production cost per Mt green coffee</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>4.49e+07***</td>
<td>-138,791*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.5 Production cost per ha</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>1.61e+08***</td>
<td>-542,789*</td>
<td>-2.24e+08**</td>
<td>-</td>
<td>-3.18e+09***</td>
<td>-</td>
</tr>
<tr>
<td>Y3.6 Margin per Mt green coffee</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-5.62e+07***</td>
<td>161,008**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.7 Margin per ha</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>726,800*</td>
<td>4,264,458*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Single terms in model 3c do not account for any of the impact, except for an effect from UTZ code compliance on turnover per ha. Interestingly, the interaction effect of UTZ code compliance and training quality is moderate to strongly significant negatively, whereas UTZ code compliance and training amount shows a positive correlation. Some of the other terms of interactions now show positive contributions, but this is somewhat inconsistent with models 3a and 3b.

Taken together we arrive at the conclusion that training and amount of it create impact on all 6 farm economic aspects. Taken on its own, UTZ code compliance appears to have negative influence on production costs and earnings but in combination with more training this effect disappears. The impacts of interaction effects of UTZ code compliance and training quality on farm economics is negative, suggesting that UTZ code compliance does not negate effects of low quality training or, vice versa that good quality training alone is enough to generate positive impact from UTZ code compliance. A sufficient amount of training remains required.

3.3 Cost of implementation

By far the majority of UTZ certified coffee farmers in Vietnam are certified with the support of an exporting company who acts as certificate holder and arranges for the necessary administration and control mechanisms and provides a certain level of services to these farmers. Some of these companies receive direct financial support from donors or coffee roasting companies to implement projects, others manage to obtain longer term off-take agreements with important clients that gives them some security to make required investments. We suspect that a large majority implements certification with their own funds.

Aside from costs at farmer level (3.1.4), certificate holders bear the majority of costs to implement UTZ certification. We make a distinction between system costs, training costs and premiums paid to collectors and farmers. System costs cover the establishment and maintenance an internal control system, conducting self-assessments, annual audits, and non-training services provided to farmers such as weather forecasts to assist with irrigation timing, soil analysis and provision of signs to mark fields as well as training related directly to code compliance and an estimation of the direct staffing cost associated with these activities. Training costs are costs made to provide on coffee production. Premiums are self-explanatory, collectors are often used, and indeed a pre-requisite for foreign companies who are not allowed to buy directly from farmers although some do under the guise of running a project. The UTZ certification margin that remains after deducting these costs from premiums received (adjusted for certified coffee that ends up in conventional market channels is the margin for the certificate holder (Figure 37).

Note that this calculation does not factor in costs of higher management, nor inefficiencies resulting from maintaining separate product flows of certified and un-certified coffee in transport, factories, storage and shipping.
The FFS-only group (T1) obviously performs negatively and in effect the cost per Mt green coffee represents the donor investment that was made to implement the project. The FFS and UTZ certified group (T2) is also donor funded, but has a better commercial linkage and the UTZ certification allowed the certificate holder to recoup more of the costs. Training costs for this group came in at 15USD/Mt green coffee. For T4 a similar scenario holds, the big difference is that the certificate holder is a farmer group and not a commercial company. In cost per farmer, this does not make much difference, but they have more difficulty marketing their certified coffee, resulting in a smaller margin. The low intensity training and UTZ certification group (T3) is the only without donor funding and with a substantial positive margin. Savings by T3 are made by spending 4 to 5 times less on training farmers (2.46USD/Mt) and having slightly lower systems costs but also by managing to sell a greater share of their certified volume against a premium. The total of premium paid by the certificate holders is comparable, but by its reliance on middlemen, farmers in T3 receive about a third less than those in the other groups.

In conclusion, implementing UTZ certification cost effectively is certainly possible as T3 demonstrates, but it appears to come at the expense of quality of implementation and impact.
4 Conclusions

Conclusions are presented in 2 sections, 1 around the group comparison and the other on the extended analysis around training and UTZ certification impact irrespective of group membership.

4.1 General outcomes

Overall the performance of the 4 treatment groups relative to their control group shows a link between investments made and results achieved. The performance of the FFS supported groups, with or without UTZ certification is best. The medium intensity training group performs comparably at first glance, but we have to bear in mind that this group is biased towards better-of farmers. This is confirmed by the failure to create a matching control group with PSM procedures (2.6.1.2). The low intensity training group meanwhile performed worse than any of the other treatment groups, scoring positively on 12% and negatively on 8% of the indicators (Figure 38).

![Figure 38: Positive (blue) and negative (red) significant effects on all indicators (outcome plus impact) by treatment group. The difference between a group's performance and 100% represents the share of indicators where no effect was found.](image)

The other 2 groups perform comparably with around 20% of the indicators scoring positively and less than 5% negatively. We have to bear in mind that most of the impact is caused by better performance on outcome indicators that do not necessarily lead to impact. Outcomes are, for example, farmers receiving more training than their peers in the control group, or applying more of training content and doing more record keeping and investment planning. On these aspects all the treatment groups outperform their control group (Table 23). As Table 23 shows better performance on outcome indicators does not necessarily lead to positive impact.
Table 23: Effects of treatments on 16 outcome and 47 impact indicators by share of indicators and type of effects found (none, positively and negatively significant) as well as overall effects.

<table>
<thead>
<tr>
<th>Effect Description</th>
<th>Outcome Indicators (16)</th>
<th>Impact Indicators (47)</th>
<th>All Indicators (16+47)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FFS (T1)</td>
<td>FFS + UTZ (T2)</td>
<td>Medium training intensity+UT Z (T4)</td>
</tr>
<tr>
<td>Significant positive effect</td>
<td>63%</td>
<td>75%</td>
<td>69%</td>
</tr>
<tr>
<td>No effect</td>
<td>38%</td>
<td>25%</td>
<td>31%</td>
</tr>
<tr>
<td>Significant negative effect</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect Description</th>
<th>Outcome Indicators (16)</th>
<th>Impact Indicators (47)</th>
<th>All Indicators (16+47)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FFS (T1)</td>
<td>FFS + UTZ (T2)</td>
<td>Medium training intensity+UT Z (T4)</td>
</tr>
<tr>
<td>Significant positive effect</td>
<td>6%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>No effect</td>
<td>87%</td>
<td>91%</td>
<td>94%</td>
</tr>
<tr>
<td>Significant negative effect</td>
<td>6%</td>
<td>4%</td>
<td>2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect Description</th>
<th>Outcome Indicators (16)</th>
<th>Impact Indicators (47)</th>
<th>All Indicators (16+47)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FFS (T1)</td>
<td>FFS + UTZ (T2)</td>
<td>Medium training intensity+UT Z (T4)</td>
</tr>
<tr>
<td>Significant positive effect</td>
<td>21%</td>
<td>22%</td>
<td>21%</td>
</tr>
<tr>
<td>No effect</td>
<td>74%</td>
<td>75%</td>
<td>78%</td>
</tr>
<tr>
<td>Significant negative effect</td>
<td>5%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

4.2 Outcome analysis 1: comparison of treatments
A framework of 10 dimensions is used to logically group 63 outcome and impact indicators. The dimensions are: training, farm management, coffee trade and product quality, farm economics, assets, living conditions of children, occupational health and safety, waste management, labour relations and natural resources. The 3 dimensions where most change was observed are training, farm management and farm economics.

Training
Training content on topics such as pruning and irrigation that are expected to have a large potential effect on productivity and efficiency see better uptake as training intensity increases irrespective of being compliant with the UTZ code.

Regardless of treatment, be it certification or training, the capital asset base has influence on uptake with more labour intensive techniques seeing better uptake among those farmers with greater human and social capital. Financial capacity is a determining factor for the application of more capital intensive techniques.

Record keeping
All the treatments result in significantly more record-keeping relative to the control groups. Most farmers indicate that they try to analyse their own records, a slightly smaller, but still large share keeps records only for certification inspection purposes. A large majority of farmers in each group indicate that record keeping is useful to them.

Farm management
For irrigation, efficiency ratios are only positively affected in the FFS+UTZ treatment, although all UTZ certified groups are operating around the advised dose. Significant
differences on other farm management indicators where change was observed are negative. For the low intensity training + UTZ group this is on N usage and the FFS-only group performs worse on irrigation efficiency. The FFS+UTZ group shows a tendency towards more efficient nutrient management, but not yet significantly so. Various social and environmental appear to have far greater influence on efficiency and productivity than any of the treatments.

The expected professionalization of farm management that UTZ certification claims to bring about is not reflected in the way farmers make decisions nor in the majority of efficiency ratios. In nutrient management one would expect an increasingly professional farmer to move from experience and tradition (basically applying what one applied the previous year) to more quantitative measures where field observations inform the decision-making process on how much fertiliser to apply. Yield assessments to determine nutrient application rates is a common way to make predictions on how much to apply in the absence of access to more sophisticated soil and leaf analysis instruments. Around 30 to 40% of farmers rely on yield analysis but this share is mostly static over time and an expected shift to more sophisticated instruments does not seem to take place.

Coffee trade and product quality
Trade relations are not significantly affected by training or UTZ certification. Some of the UTZ certified groups show a tendency to rely on fewer buyers, but reasons for this are found primarily in the value of existing relations. While quality improves across the board, farmers that receive training and are UTZ certified have a tendency to indicate they receive better prices for better quality.

Farm economics
No convincing overall impact on farm economics was found for any of the treatments. Some treatments score on aspects of farm economics and in some cases the treatment groups have significantly lower performance than their peers in the control group. This phenomenon seems to be more prevalent among the lower intensity training group. The changes in efficiency that we expected to find did not materialize, on the contrary, UTZ certified groups have significantly higher labour costs and as a result 2 of the 3 UTZ certified group have lower earnings. We can not directly attribute these additional costs to labour required for code compliance.

Implementation of UTZ certification at farm level appears to be cost neutral, but after controlling for share of certified coffee sold as such and factoring in opportunity costs for the amount of time farmers spend on certification related work and meetings (excluding agronomy trainings) the margin is negative. The net contribution to farmer earnings of UTZ certification ranges from -0.33% to -0.76%.

Assets
We do not see major significant impact of UTZ certification or training on the asset base of farmers. Change over time for the treatment groups is comparable to the amount of change in asset ownership of the control groups. Both show a positive development over time, which may also be attributed to relatively high prices that coffee fetched in the period 2010-2011. The actual asset bases differ significantly on some indicators but we fail to see a clear effect across the board of training types and UTZ certification.

Living conditions of children
Farmers in the FFS treatment make significantly lower use of child labour. School attendance rates are high across all groups and therefore neither training nor UTZ certification has an
effect. Contrary to what the code of conduct stipulates, a small minority of children of farmers supposedly compliant with the UTZ code continue to be engaged in dangerous and heavy work.

**Occupational health and safety**

No significant impact was detected on occupational health and safety performance for any of the treatments, relative to their own control groups. Comparing the treatments, there seems to be a tendency for the low intensity training+UTZ group to perform worse than the others in terms of applying selected safe pesticide application techniques. In all the UTZ certified groups violations of the code of conduct take place regarding pesticide application.

**Waste management**

Impact on waste management, labour relations and natural resources is limited. Expansion of cultivated area is limited among all groups, including the control group, but we should take into consideration that all groups are located in areas where almost no ‘free’ land is available. Contrary to UTZ certified code of conduct requirements, cultivation immediately next to waterways continues unabated. There are sound economic arguments for farmers to continue to maintain coffee immediately next to waterways.

**Labour relations**

No significant effect was found for any of the treatments on contracting modalities and wages paid. All groups pay at least twice the legal minimum wage and we find no differences between treatment and control groups, except for the FFS-only group that pays lower wages than its control group by about 10%.

**Natural resources**

A positive impact of treatments on natural resources is absent. Expansion of cultivated area is limited among all groups, including the control group, but at the fringes of the coffee area expansion continues. Contrary to UTZ code of conduct requirements cultivation immediately next to waterways continues unabated. There appear to be sound economic arguments for farmers to maintain coffee immediately next to waterways.

4.3 Outcome analysis 2: Effects of aspects of treatment

In conclusion, contrary to what we found in the group comparison on application of training techniques (3.1.1), UTZ code compliance appears to lead to significant use of trained biocides application techniques and harvesting techniques. However, more sophisticated modelling suggests that this is primarily attributable to the trainers’ background, training amount and amount of training with the role of UTZ code compliance being slightly negative. Drivers for change are training quality, amount and the profile of the trainers involved; however these aspects not necessarily reinforce one another. When it comes to uptake of training content, compliance with the UTZ code is no replacement for good quality training by trainers with a relevant background.

Confirming the view that emerges from section 4.1, farm management seems to be primarily positively affected by more intensive training and specifically by the amount of training that farmers receive. We have failed to establish a link between training quality and trainer quality and impact on farm management. We do not find any effect on farm management and efficiency resulting from UTZ code compliance alone.

Training quality and training amount also create impact on all 6 farm economic aspects. Taken on its own, UTZ code compliance appears to have negative influence on production
costs and earnings but in combination with more training this effect disappears. The impacts of interaction effects of UTZ code compliance and training quality on farm economics is negative suggesting that being compliant with the UTZ code does not enhance effects of low quality training or vice or that good quality training alone is enough to generate positive impact. In all cases a sufficient amount of training remains required.

4.4 Cost of implementation
In conclusion, implementing UTZ certification cost effectively appears possible as the low intensity training and UTZ group demonstrates. Even after factoring in a few USD per Mt green coffee in additional costs as a result of inherent supply chain inefficiencies that certification brings about (separating product flows for example) UTZ certification can pay for itself. But cost effective implementation comes at the expense of quality of implementation and impact at farm level, as witnessed by the lack of performance on impact indicators. This seems to defeat the purpose of becoming UTZ certified in the first place, at least from a farmers’ perspective. The FFS-based methods that do lead to more impact, although not consistently across the board, are more costly and push down profit margins on certified coffees for certificate holders which means a disincentive for exporting companies to apply them.
5 Recommendations

In answering the research questions a number of recommendations are arrived at.

1. Does quality and intensity of trainings on sustainable coffee production (and processing) practices of small-scale Robusta farmers have an effect on changes in crop management by these farmers and on improvements of the economic and environmental performance of their crop management in addition to certification by UTZ Certified?

We conclude that intensity of training as measured by the amount given to farmers has a positive effect on some of the crop management practices but that it affects few of the impact indicators. We suspect this may be partially caused by a rising and steady coffee price level up until the first half of 2011 which limits the necessity for farmer to adapt their farm management, especially when it concerns cost savings on fertilizer costs and irrigation water. When we analyse the relative contribution to impact of training and certification aspects such as training amount, quality and being compliant with the UTZ code we find the role of the UTZ code in improving farm management to be very limited. We conclude that compliance to the UTZ code as such is no replacement for training of farmers and on its own does little to deliver the promised benefits.

Although the UTZ certified code of conduct states that training should be given, it does not give any indicators to describe the minimum level of quality and intensity that the trainings should adhere to. UTZ certification however, does play a facilitating role by allowing certificate holders to recoup (part of) the implementation cost by selling UTZ certified coffee against premiums. However, due to the lack of requirements on quality of trainings, certificate owners do not have a financial incentive to go for the more expensive higher quality and intensity trainings.

2. How do costs and benefits of the trainings compare for the different levels of quality and intensity of trainings?

The most intensive FFS model in the study can be operated for about 15USD per Mt green coffee per year. As yields may vary from year to year, a better measure is to look at training cost per farmer. With 4-6 sessions a year, an average productivity of 3.68Mt/ha and a coffee acreage of 1.35ha, this amounts to training costs of about 75USD per farmer per year. The main driver for impact is training amount of the FFS type in particular. Unlike the FFS approach, lower cost models as applied by the low intensity training group do not yield much impact at farm level but have the merit of being fundable from purely commercial revenue stream that result from premium payment for certified coffees.

3. What recommendations can we drawn by policy makers in and outside Vietnam on how to roll out certification and/or productivity trainings?

The message of certification agencies like UTZ Certified, Rainforest Alliance and 4C is appealing to coffee roasting companies seeking ways to shape their sustainability policies. However, this study in Vietnam with small scale Robusta farmers operating in a complex farming reality, shows that compliance with the UTZ code fails to deliver impact consistently on the measured indicators. Results are only attained when sufficient training on professionalization of farmers is provided, e.g. with the help of donor funding, as is the case in 2 of our research groups and even then performance is not consistent. The requirement
for and reliance on donor funding renders the UTZ certification in combination with more intensive training approaches inherently unsustainable.

This may have implications for rolling out of these practices across the Vietnam coffee sector. Certification still has a role to play as long as coffee roasting companies continue to build their sustainability policies around it. Certification will also continue to be of importance as long as NGOs continue to require coffee roasting companies to use it. Despite the push effect from NGOs to use certification as a means to improve farming and living conditions in origin, we find that UTZ certification in this study leads primarily to access to some training, uptake of management tools such as record keeping and investment planning but not to improvements in farming efficiencies and better farm economics. As such, in Vietnam, UTZ certification largely fails to address the main challenges such as over-irrigation and excessive fertiliser applications that coffee sector is facing.

The main positive benefit of UTZ certification is that it allows certificate holders to make some investments in the farmers in its supply chains. This is made possible by the reliance of coffee roasting companies on the assurance that UTZ certified coffee is produced in accordance with certain standards for which they are willing to pay extra. However, we find that the assurance on standard compliance by producers is not water-tight. On some mandatory control points, such as not using child labour for heavy and dangerous work a few isolated farmers are not compliant. For other aspects non-compliance can reach 30% of the UTZ certified producers. This could endanger the credibility of UTZ Certified’s assurance.

The case of Vietnam is to some extent also illustrative for governments and companies in countries with less productive farmers than the Vietnamese coffee producers. This particularly relates to the business case for farmers and certificate holder: as costs for certification are accrued per farmer, volumes per farmer are critical to the return on investment of the certificate holder. The 10 to 20 USD profit margin obtained by exporters in Vietnam because of the premium, will quickly evaporate at lower levels of production per farmer. This will lead to certificate holders having even less incentives in financing intensive training activities from their own pocket. For coffee roasters, a realisation of these economic realities is critical against their desire to continue growing certified volumes. Assuming that certification remains important for them, it will become important to seek ways with certification agencies and possibly other stakeholders to generate more impact at farm level and make implementation cost-effective for low-volume producers.

On the other hand, in areas with low productivity, the professionalization activities may contribute to much improved yields and efficiency of input use. In several projects of the DE Foundation such effects are clear, and the implementing organisations attribute them almost completely to the quality and intensity of the professionalization activities (personal comment Don Jansen).

We suggest certification agencies in general and UTZ certified in particular to seek ways of embedding more intensive training approaches in certification schemes and use existing revenue streams from premium payments to pay for it.
6 References

Available at: http://www.4c-coffeeassociation.org/become-a-member/membership-benefits/for-producers.html
[Accessed 11 11 2012].


Available at: http://www.amchamvietnam.com/5741/private-sector-minimum-wage-adjustment-for-2013/
[Accessed 20 February 2013].


Bennet, J., Cheesman, J., Tran, V. H. S. & Tran, T. H., 2009. Managing ground water access in the central highlands (Tay Nguyen), Vietnam, Canberra: ACIAR.


Annex I: Case studies

Case studies are the result of additional interviews with selected farmers. Interviewed farmers provide a view of the extreme ends of the performance spectrum in terms of productivity and also in view of project satisfaction and duration of certification. Categories are:

1. Farmers that have been certified for 5 years or more, high yield
2. Farmers that have been certified for 5 years or more, low yield
3. Farmers that recently became certified
4. Farmers that have received project support for 5 years or more
5. “Good” farmers, meaning high yields and income
6. “Bad” farmers, meaning low yields and income
7. Certified, but not satisfied

In light of the frank responses of several farmers and to safeguard their privacy, fictitious names are used.

1. Farmers that have been certified for 5 years or more, high yield

*Mr Luong Van Tang (T2)*

Born and grew up in Thanh Hoa Province, Tang took up his parents’ job as a farmer, got married and had 3 children. However, until about fifteen years ago, he decided to move the whole family to Gia Lai when he heard from some relatives that industrial crops in the Central Highlands gave quite a good profit. Settled down in Gia Lai, Tang bought a coffee field as he thought that coffee was the most suitable crop for the area and it would give him a good income.

To some extent, Tang has been quite satisfied with his decision as his life is somehow better than before thanks to the “stable income that the coffee has been bringing” as he said.

Tang was one of the farmers who participated in the T2 project since the beginning. His expectations to learn good practices and improve his coffee quality and productivity have been satisfied. Tang was very happy with the trainings provide by the project: “I think my knowledge and skills for coffee cultivation have been much approved. My coffee productivity has been quite stable over the past years thanks to the sustainable production techniques that I have learnt. Also, the coffee quality is better and I always can sell my coffee at the best price without being deducted for defect and foreign matters”.

According to Tang, he has been doing his best to comply with the UTZ code and he was happy to do so “it is good for the environment and good for farmers ourselves to follow the code, protecting the environment and protecting ourselves”. Therefore, Tang would be happy to continue his participation if the project would continue. However, for an unknown reason, the company didn’t buy the certified coffee with a premium this year. Tang said: “I went to the warehouse but they only paid the same or even lower price than the market, so I just sold to the collectors who came to my house to buy coffee. The collectors even paid me higher price (about USD2/ton of green beans).” Tang also said that the T2 buyer used to pay a premium of USD15/ton of green beans during previous years: “For a farmer like me, a single penny is always appreciated. But it would be great if they can define a better premium as USD15/ton is just not worth it for transporting the coffee to the company while we have put in a lot of efforts to comply with the code”

Nevertheless, Tang still keeps on doing what he was taught to do as if the code is being complied. He explained: “I believe that following the code means that our health and environment are protected and the coffee give more stable yield and good quality. So, I just
continue what I am doing not hoping for a premium but for a long-term reputation and benefits”.

Tang is enjoying his life of a grandfather with three children and four grandchildren. His sons are continuing to build on his career as coffee farmers. He believes that his experience and knowledge will be helpful for them to take care and further develop their coffee farms.

**Mr Le Ngoc Giang (T4)**

Le Ngoc Giang and his family moved from Hai Duong to Dak Lak 30 years ago. They have planted coffee simply because the soil and climate are suitable and their neighbours did the same. Apart from coffee, they have been planting annual crops but income from other crops is insignificant. Giang belongs to the group of farmers whose coffee has been giving high yield over the past years.

When asked about the T4 project and UTZ Certified, Giang could not figure out what is what. He said: “Two years ago, the farmers union invited me to join a project, saying that we will enjoy premium on the certified coffee. I registered. But I haven't seen anything happened. I don’t know what the project is about and haven’t seen anybody from the project since then”.

Therefore, according to Giang, there is no relation between his high yield and any project. What he has done was just because he learnt from his neighbours and relatives though when he signed the registration form, he expected that the project would bring technical trainings and financial support for farmers like him. Giang said, sometimes he was invited to the commune meeting hall for trainings but for him it was not much more than fertilizer advertisements and also he normally cannot figure out who the training organisers are. “I don’t know who the project owner is, who and where the staff are from. I thought they should have come and organize trainings, set up demonstration farm to teach us better farming techniques but in the end nothing happened.”

Giang’s 15ha farm has been certified UTZ with the registered yield of 5 tons of green beans. However, according to him he used to sell more or less 1 ton (maximum 2 tons) as UTZ Certified coffee each year. Explaining the reasons, he said: “The premium of VND200,000 (equivalent to USD10) is too small to cover the transportation costs for transporting the coffee from my farm to the company’s warehouse. Moreover, the procedures for selling coffee to the company are too complicated and annoying so I’d prefer selling to collectors around”.

Answering the question about what he had to do as extra effort since he joined the UTZ Certification Program, Giang strongly emphasized: “As I said, nothing happened, I have been doing what I used to do in the past, learning from my own experiences and friends and other sources like television”. He has been keeping record of his financial investment, and man days invested for the farm, but “I have been doing this for about 10 years to calculate the profit and loss of my work, it has nothing to do with the project”.

Having two young children who are going to school, Giang dreams of a day when his children will get into a university and will have a good job somewhere but not to come back as a coffee farmer. “Who would want his children to become farmers? I am a farmer because I was not good at studying and I didn’t have money to do other things. My children must live a different life” – claimed Giang, saying that he would be happy to sell his coffee farm when he retires.
For present, Giang and his wife are doing their best on the coffee farm to make a better life for their children. He is eager to learn new technology to be a better farmer and, like many other farmers, he would wish to have more money to better invest for his crops.

2. Farmers that have been certified for 5 years or more, low yield

Mr Nguyen Ngoc Anh (T2)

In 1989 Nguyen Ngoc Anh left his home town in Nghe An Province to head for the Central Highlands (Gia Lai) to start a different life as he heard that it would be easier to make a living there with the industrial crops.

Settled down in Gia Lai, Anh bought a farm and planted coffee expecting that the coffee farm will bring him wealth. However, it was not in the right time, the coffee crisis in 1990s disappointed him. Still he continued his coffee farm and became one of the first farmers who joined T2 project since the project start-up. Expected to receive generous support, including financial assistance from the project, Anh was soon disappointed with the project, especially since he was certified UTZ together with his colleagues in the project area. “I didn’t find any benefits, most of the time we (farmers) gathered together occasionally and chatting nonsense”. This explains his confession: “My coffee yield is low in comparison to others may be because I haven’t really mastered the best practices”.

According to Anh, he is not convinced about the key farmers who give training on behalf of the project. He would be more interested if the trainers are agriculturalists or project staff. Also, it has been found out from the interview that he didn’t understand about the project objectives and activities, but put too much emphasize on the allowance that he thought the farmers should receive for participating the training (a logical concept for him and many other farmers in Vietnam but not elsewhere). Consequently, he did not make much progress from the project participation and his yield was low until he cut off all his coffee.

Anh couldn’t recall when he was first certified UTZ and couldn’t differentiate the trainings offered by the projects with those offered by UTZ Certified. He confirmed he was trained on the UTZ Certification code of conduct but “we didn’t have to do anything different, we were doing it the same way as before. I experienced no impacts on my coffee farming. All I was hoping for was to have a better income from the premium”. It is easily understandable that Anh soon became disappointed with both the project and the UTZ Certified program. “Even with the premium, my coffee price was not higher than any others” – he claimed clearly aware that price is negotiable plus premium.

Also, the unstable coffee price led to his dissatisfaction “Price is low and unstable. With the income from my coffee farm, I could not even afford hospital for my family” (his wife and children have been sick for several years and they have to go to Hanoi for treatment quite often).

Gradually, Anh was replacing his coffee with pepper since 2002. Until 2010, he has no coffee more. He is very confident with his decision as pepper price has been good recently. “Pepper is more productive and my income has been increased and stable”.

Answering the question “What are you going to do if the pepper price drops?”, Anh comfortably said “I believe that pepper is always better than coffee. You can only plant 1000 coffee trees per hectare but can plant 2000 pepper trees on the same area, so even if the pepper price drops to the level of coffee price, my income is still better”. With such a strong believe, Anh confirmed that he would never become a coffee farmer again. However, it is quite clear that such a farmer will sooner or later cut down his pepper and plant either coffee
or any other crops that would give him better income at a certain stage when pepper price is no longer profitable for him.

3. Farmers that recently became certified

*Mr Pham Van Tien (T2)*

Leaving behind the life of a rice farmer in Thai Binh because of the low income, Nguyen Van Tien and family migrated to Daklak in 1993 and bought some land for cultivation, dreaming of a change in life. Six years later, his family once more decided to move to Gia Lai province as it was a newly established province at that time. Following other farmers in the region, he started growing coffee believing that coffee was the most suitable crop. So far, Tien hasn’t become rich as he dreamt but he has been quite satisfied with the income from coffee.

Recently, Tien observed the good price of pepper and he has gradually replaced the old and unproductive coffee trees by pepper. At the moment, Tien already has 1,000 pepper trees and 1,000 coffee trees on his field. Tien estimated that pepper will be his main source of income in one or two years instead of coffee.

Tien started to join the T2 project mid 2011 and was certified right after that. He enjoyed very much the trainings which have helped him to do more proper fertilization, irrigation and pruning, etc. “my cultivation knowledge and skills have been much improved. For example, I used to put fertilizer on the ground without covering it with soil. I understand now that a big portion has been wasted when I did that”. He also added: “I think my production is more efficient, I also save time and energy for irrigation as I know now when my trees need water and I can calculate the volume.”

Apart from that, Tien really enjoyed the way he can sell coffee now to a big international buyer: “I like the consignment, I just have to bring my coffee to the warehouse and can fix the price whenever I want to sell. They are taking care of the storage and I don’t have to worry about loss, defects or thieves, etc.” He was not too demanding on the premium “The premium was not much but fine to me”.

However, Tien said that he quitted the project this year: “They were talking about establishing a cooperative, but all and the very first thing they did was asking us to contribute VND2,000,000 (USD100) without any interest. I don’t trust in that, it might be “easy to deposit but hard to withdraw”. I don’t know what they are going to do with our money. So I just quitted.” Moreover, Tien was also afraid that: “who knows, after we have contributed our money, the project will ask for more contribution. It’s very important to create a trust before asking that. Even if I trust the project, I don’t know if the people who will keep our money are credible.”

Tien strongly recommends that “the project staff should clearly explain the benefits from contribution and how the money would be used. Seeing means believing, they should make us believe in the model before asking us to give our money”.

“Who would dream of a future when their children are farmers? I hope my children can study well and get good jobs so they won’t have to live such a hard life like mine” – Tien emphasized his view on the future. He is dreaming of a day when his children become successful and he can sell his coffee to live an easy life of a retired person.

*Mr Le Van Giang (T3)*

Le Van Giang came from Gia Lai province, he was the first one to start growing coffee in Tra Da Commune in 1995 and planted coffee there. With a farm of 1hectare, Giang planted his
coffee and has been very proud with his work “My coffee yield is high because I know how to take care of my trees. I am always eager to learn new technologies and good experiences from different sources like television, books and newspapers, etc.” Coffee is the main source of income for his family because: “I have only 1 hectare, so I planted with coffee, no pepper though I know that pepper is also suitable in the area because I think pepper is more sensitive to diseases and it’s risky while coffee is more stable”.

Giang got to know about the certification since last year, he did all the paper works to register. “Of course, I hope they will buy our coffee at reasonable prices as they advertised and also hope that they will transfer new technologies for more effective production.” – Giang explained his expectations when joining the project. However, Giang was very disappointed with the project because all his experience with the project was: “after participating in 2-3 trainings, I have heard nothing from them”. About the training contents, he said: “There was nothing different. It was just more or less the same with what we've been doing here. They didn't give us any training materials or handbooks. If they want us to follow strictly the requirements as they said, they should have deliver guidelines or handbooks or so”.

Regarding the premium, Giang said: “The group leader told me to sell my coffee as UTZ or whatsoever. I sold totally 4 tons of green beans to him last year at different time and rates. At the end of the year he give me VND500,000 (USD25) explaining me that it’s the premium for the coffee I sold”. Of course, Giang was by no means happy with that premium: “It's like VND100,000 (USD5) per ton. That's nonsense. I don't believe in the way they organize it. It seems like they just did it for fun.” This made Giang doubtful about the premium he received: “I had no voice in the premium, no negotiation. The project didn't came but bought through the group leader. It's not transparent”. He also strongly raised his voice: “They were talking a lot about such things as fertilizing and irrigating at the right time and with the right volume as well as harvesting at the right time, etc. You know, it’s very labor intensive and costly to do all that while the premium is not transparent and not rewarding at all.”

Still Giang said that he would continue his participation if the project will be more active and provide good technical trainings: “I’m always open to new technologies and very much eager to learn to increase the production effectiveness. I will participate in any project that wants to help farmers like me”.

Giang is looking forward to a stable life with coffee but he doesn’t want his children to be farmer at all as “it's too hard for them”. Therefore, none of his two children is working as coffee farmer. He has no idea yet what would happen to his coffee farm when he retires but like many others, he probably will sell his coffee farm or hire workers to work for him.

**Mr Nguyen Van Manh (T3)**

Being unsatisfied with the life of a rice farmer, Nguyen Van Manh and his family moved from Thai Binh Province to Gia Lai 7 years ago, expecting to make a better living from coffee as he heard that many people have changed their life. Settled down in Tra Da commune, Pleiku City, Manh bought 1.25 hectares of coffee as he had consulted with people around and found out that coffee was the most suitable crop. Manh’s coffee has been giving high yield. But unlike others who normally blame weather for the yield loss, Manh strongly believed that “it’s a crop circle, there is not much to do with the weather. For example, two years ago, I got 9 tons of green beans but with the same acreage I got only 7 tons last year. So if you give better care to your coffee you can reduce the loss but the circle is still there”.

Joining in the UTZ certification project, Manh had expected not only good trainings but also good premium for his certified coffee. Therefore, Manh didn’t mind to follow the UTZ code for
being certified because he hoped that the return would have been satisfactory. However, the offered premium of USD15/ton of green beans could not satisfy him and other farmers in the project: “We have been investing significant extra time, efforts and money to comply with the code and to have high quality coffee. For example, we had to buy canvas for sun drying the coffee, follow strictly their requirements in fertilization, irrigation and pesticide application, etc. However, in the end, the premium was simply not rewarding at all”.

On the other hand, Manh was quite happy with the trainings he received: “I think my farming techniques have been improved significantly, especially in terms of timely and appropriate irrigation and fertilization and timely harvesting. It was from the trainings that I learnt that harvesting when the cherries are ripe enough would bring higher yield because of the better bean size and weight”. However, Manh also shared his suspicion: “For the best quality and as required by the code, we should only harvest when the cherries are ripe enough. It’s very harmful for the coffee trees which will be exhausted and will not be able to give a good yield in the next crop unless they are much better fed”.

Still, Manh appreciated the change in the project farmers’ awareness on environment protection: “It’s a remarkable difference. We know now that it’s important to keep not only ourselves but also the environment clean and safe”.

Manh said he would still continue his participation in the project but it’s more for maintaining the relationship for future opportunities than for the premium. He would still be happy to attend trainings if there would be new topics or techniques but he strongly raised his voice against the premium level offered.

Apart from that, according to Manh, the project told farmers to continue advance money from the local collectors as the project hasn’t been able to give financial support or credit access support to its farmers. “It’s too complicated to get a loan from the bank while local collectors can easily give us a loan but their interest rates are 2-3 times higher than the bank interest rates. We really need the project to do something on this”.

Manh has 3 children who are still at schools. He doesn’t want his children to become farmers because “it’s too hard for them. I will sell my coffee farm or employ somebody to take care of it when I retire” – said Manh.

4. Farmers that have received project support for 5 years or more

**Mr Hoang Hoang Lanh (T1)**
Born in Ha Tay Province, Hoang Van Lanh and his family moved to Dak Lak in 1992 hoping to make a better living. They have been working with coffee since then. Though Lanh’s coffee yield was not at a high level in comparison to others in the area, he has been quite satisfied with the income from coffee which has been relatively stable over the past years. “My coffee yield has been not too bad except for last year when there were too many storms during the flowering period which caused a significant yield loss”.

Lanh didn’t remember how long he has participated in the project “it has been like several years, I can’t remember since when”. The reason for his participation was very simple: “I joined the local Farmer Union and participated in some meetings. When they said that there was a project, we were just happy to join”.

Since his participation, Lanh has participated in a number of trainings and he was happy that he could learn new farming techniques from the trainings and from experience sharing with
his peers: “I’ve learnt to irrigate, fertilize and apply pesticides on the coffee more properly and timely. It’s always good to have opportunities to learn from others”.

However, he was disappointed with the project because: “They promised to buy our coffee but they haven’t. All we have been looking for is someone that could help us with credit access at the reasonable interest rates and to collect coffee for us at reasonable price. The project couldn’t do that yet”. Especially, Lanh really needs financial support at the moment for replanting or rejuvenating his farm because his coffee trees are getting old and stunted.

According to Lanh, he will continue participating in the project as long as it is there: “Normally, such projects that help farmers are good in one or another way. I will continue. If they can’t help us with the financial capital or coffee collection, they can still help us produce coffee more efficiently”.

Lanh’s children are just at school age. “It’s too soon to say anything about their future, but I hope they will study well and find good jobs. For the moment, we are doing our best to create a better life for them.” However, Lanh doesn’t mind if his children can’t go further with schooling: “They can always stay at home and work on the farm if they would choose to do so”.

Lanh is still working hard on his field, learning from his own and his neighbors’ experiences, hoping to be able to afford the replanting of his coffee trees. He said he would continue with coffee until he retires and didn’t have any ideas yet about what would happen to his coffee farm after his retirement.

Mrs Tran Thi Hoai (T1)
Tran Thi Hoai and her family moved to Dak Lak from Binh Dinh (a southern province) in 1997, dreaming that coffee would bring them a better life: “I think coffee brings quite stable income and it’s easy to take care of”. Hoai has been quite satisfied with what coffee has been bringing over the last 16 years though her coffee’s yield was often just at the level of above average: “It used to be about 3 tons/ha but last year we got only 2 tons/ha because there was too much rain during the coffee flowering period”.

Hoai just took over her husband’s participation in the T1 project and she could not remember exactly when they started “it’s about 3-4 years. I took over since my husband got sick and became quite weak”. Since her participation, Hoai has experienced several trainings which she appreciated because she have learnt good farming practices, especially on application of pesticides, fertilizers as well as pruning and harvesting. “It is of course better for the coffee trees and for the long-term sustainable yield when I follow the trainings” – said Hoai.

As a matter of fact, Hoai and her husband used to apply less fertilizers and pesticides than normal because she based on her affordability rather than the needs of the coffee trees. Therefore, she complained that she couldn’t afford to follow 100% what she has learnt from the project: “If I follow them strictly, I’ll have to apply for fertilizers and pesticides. I can’t afford that”.

Having three children, of which one is at university while her husband is sick, Hoai has to be very cautious with any expense she wants to make but still have to advance money from the local collectors: “I still have to borrow money from the local collectors to cover my children’s schools and other expenses. So, I have to sell them my coffee when comes the harvest to pay the debt. I know they are making use of that to pay me a lower price or so, but I can’t do anything different. If only the project could provide some kind of financial support, I would be very grateful.” Therefore, for Hoai, a good project is one that could provide not only technical support and trainings but also should support farmers in terms of credit access and selling the products (coffee).
Yet, Hoai still wants to continue her participation in the project as long as the project is still there. “At least I can learn to produce coffee more efficiently and in a sustainable way. It’s always good to learn new things. The more I can learn, the better I can be” – explained Hoai. All she is wishing at the moment is that she will stay strong physically and mentally to be able to subsidize her children until they finish schools. “I hope they could be successful at studying to be able to get a good job elsewhere but not to come back as a farmer like me. It’s a hard life”. Her plan is to sell the coffee farm and live an easy life when her children all have a good job.

Mr Hoang Linh (T2)

Eighteen years ago, Hoang Linh, who was born in Phu Tho - a northern province, migrated to Gia Lai together with his family. As many other farmers, they planted coffee and pepper for a living. For Linh, he prefers growing coffee rather than pepper: “I think coffee always brings about rather good return on investment. I am happy with coffee because it’s stable and easy to do. Pepper may be more profitable in terms of price but it’s much more risky because pepper is sensitive to pest and disease.”

Having participated in the T2 project for around 4 years, Linh’s crop yield is quite high in comparison to others in the area. However, he is still very modest: “I am not yet a good farmer; there are a lot of better ones out there. As a coffee farmer, it’s important that we apply fertilizers and irrigation at the right time and with the right amount.” - said Linh. He was not one of the farmers who joined the project from the beginning but “some people in the area joined already when the team leader (key farmer) informed me that I could also join. I was very happy and expected that I would be able to learn new techniques, so I joined.” Linh also added that unlike others, he didn’t expect too much from the project apart from technical assistance. However, for him, it seemed like more for fun rather than serious training. “We had opportunity to meet the project staff at the group leader’s house once or twice and then nothing else happened. Sometimes ago, they tried to persuade me to join in the cooperative but I refused because I was not totally convinced about the fact that farmers have to contribute VND2 million (USD100) with no interest for the operation of the cooperative. So, I think they’ve forgotten about me” - Linh said. He also added that not only him but many others were skeptical about contributing money “We are just farmers, if something happens we will surely lose our money. Also, maybe today they try to convince us to contribute VND2 million but tomorrow they will ask for more. I would not be willing to take that risk.”

Linh is now happy living his non-project farmer’s life and occasionally participating trainings organized by fertilizer companies. Although the technical trainings were not as he expected, he still appreciate that part of the project as that is critical for farmers. However, he strongly recommended that the project should be better at listening to the expectations from farmers and reflect to design the practical activities. If possible, the project should support farmers to have access to credits to cover the fertilizer cost as well as create linkages to the markets. “If the price offered by collectors is the same as the project does, we will surely sell to the project” he said.

For his two children, he expects they will do different jobs with better income and high reputations rather than a farmer like him. “In case they will not be able to “leave” home, I will let them take care of the farm. Even then, they should be better than their parents technically and financially, owning more land and being better off” – Tien shared his dream.

Mr Hoang Ngoc Thanh (T4)

Hoang Ngoc Thanh was born and grew up in Quang Nam Province in a poor family who migrated to Dak Lak during the “new economy” trend. In 1996, he decided to move to Gia Lai
when the province was newly established, with an ambition to enjoy favorable conditions of a new development area to make a better life.

Thanh does not remember the date he joined in the project but it seems several years ago and he has been satisfied with the technical trainings provided by the project. It was highly appreciated by Thanh that the project offered him and other farmers opportunities to learn and share experiences through the trainings. "My farming techniques have been improved, I know now how to apply fertilisers and pesticides and irrigate according to the trees' needs which is far different from my practices in the past when I used to push the coffee to blossom, stripping coffee and apply pesticides in an uncontrolled way. Therefore, the productivity and the quality of coffee are higher than those in the past".

Thanh commented that he made a good progress not only in terms of fertilization and irrigation but also in terms of harvesting: "I understand now that selective picking is labour intensive but rewording because of the better size and weight of the ripe coffee beans". He observed an increase in his farm’s coffee yield since the participation in UTZ Certification.

On the other hand, Thanh soon found out that the premium offered was just too little and not so attractive. So even though he registered 5 tons of green beans for his 1-ha farm, Thanh, in the end, sold only a small part of his coffee as UTZ Certified, the rest still came to collectors as normal. “As you can see VND200,000/tons of green beans (USD10) is simply nothing, it cannot even cover the transportation costs to bring my coffee to the company while we have to invest a lot more time and efforts to comply with the code." As a consequence, Thanh is now doing his own way “it’s much more convenient to sell to the collectors around and I do not have to worrying about failing some requirements anymore”.

However, he was still in the project and he confirmed that he would still continue his participation to learn more from the trainings and experience sharing of other project farmers. It was the trainings that make the most interesting part of the project for him. And, he has been keeping records of any investments he made on the field but “for calculating profits and loss not for the project”. Still, he would expect that he could sell his coffee as UTZ Certified coffee with a satisfactory premium.

Thanh laughed in a very relaxed way when being asked about the future of his coffee field when he retires: “It is a far future. I haven’t thought about it yet. But I of course don’t like my children to be farmers. They are still very small and I and my wife are doing our best to facilitate their studying. However if any of the three cannot pursue a good job, they can always come back and take care of my farm if they want. Otherwise, I really don’t know yet what will happen to my farm”

5. “Good” farmers, meaning high yields and income

Mr Nguyen Ngoc Tan (T1)

Ten year ago, Nguyen Ngoc Tan and his family left his home country side in Quang Nam and headed for Dak Lak as he heard some success stories from his friends and relatives who selected to settle down in the Central Highlands and plant coffee for a living. Tan has been quite happy with this decision because his coffee has been given him quite a stable income over the past years thanks to the stable and good yield.

Therefore, even though he highly appreciated the trainings he received from the project from which he learnt better practices especially for “timely and appropriate volume of irrigation and fertilization” he denied the impact from the project on the good yield he got. "My coffee yield was already good before the project came and have been doing my best on the field."
Tan explained that he was not totally satisfied with the project because he did not really trust in the key farmers’ knowledge, he said: “I am not convinced about the fact that all the trainings were given by the group leaders (key farmers). If it would be the project’s expert, the training quality must be much higher”. Therefore, one of the things he said he would change if he could do is to organize trainings where the project would directly send some experts to come and train farmers directly. “That would make farmers like me believe in the project.” Moreover, he also recommended that “It would be perfect if the project could support farmers with financial credit and purchase our coffee at reasonable price”.

According to Tan, he has heard about certification and he would love to participate in a certification program because he has been trained and has been doing good but the price for his coffee is by no means higher than a non-project farmer’s coffee of which the quality is lower. “Without a certificate, nobody knows that I have been trained and have produced sustainable coffee” – said Tan.

However, Tan is still willing to continue his participation simply because he takes it very ease “I will continue of course because it’s just the matter of learning good things and having fun, I don’t lose anything for this kind of participation”.

Tan has two children, of which one is already married and living on coffee the younger one is still at school. Tan said that he would live it for his children to decide whether they would like to plant coffee or not and he doesn’t mind if his children would all become coffee farmers: “it’s their lives and I will be supportive to any decision they will make on their career”

Mr Tran Huu (T1)
Tran Huu and his family moved from Quang Nam Province to Dak Lak in 1990s in response to the “new economy” immigration trend at that time. Like many others, he followed his neighbours to plant coffee. After several years looking for the land, he started a coffee farm in 1993. Gradually, he has now become the owner of 3 coffee farms, of which the total acreage is one hectare. Through the past 20 years Huu and his family have been doing quite well with their coffee farms.

“Normally, my coffee yield is quite good in comparison with my neighbours. Only this year, it is lower because of the weather. But I still believe that I belong to the above-average group in my village”.

Huu started to join T1 project in mid-2011, “I was told by the team leader (key farmer) that the project will help us improve our knowledge to be more effective coffee producers, and that the project is helping us to form a coffee cooperative.” However, over the past one and a half year, not much has been experienced by Huu except for the monthly FFS where the key farmers organize and deliver trainings to the group members. “There was only one training about cooperative and then they just stopped mentioning it”. For Huu, his group leader is quite good; still he thinks it will be more convincible for farmers to be trained by someone from the project or the extension network.

It was difficult for Huu to say whether he was satisfied with the project as he hasn’t seen any difference. “We have been doing more or less the same, training contents is not really something new”. Still he said he will continue to participate in the project because he believed that “when farmers can sell coffee directly to the big companies in bulk, we’ll get better price. For farmers like me, better coffee price is always the most important thing. I still hope the project could help us on that.” Also, Huu suggested that “the project staff should be more on the ground, meet with farmers to help us understand more about the project and to better understand our needs”.

Page | 104
Like some other successful farmers, Huu has sent his 3 children downtown for schools and universities, looking forward to a bright future when his children will be successful elsewhere but not as a coffee farmer. “They are busy studying; only my wife and I are taking care of the coffee. In the end, we are doing everything for the next generation. Unless my children fail at school or can’t find a job in the city, I would not love to see them become a coffee farmer like me.” – smiled Huu, not caring much about the future of his coffee farms when he and his wife retires.

**Mr Tran Van Thi (T2)**

Grown up in Hai Phong, a northern province, Tran Van Thi could not find a good job in his hometown. Therefore, he decided to head for the Central Highlands in 2004, dreaming of making his own life easier. After discussing with his friends and relatives and checking around, he decided to settle down in Gia Lai and started his life as a coffee and pepper farmer. He has now 500 coffee plants and roughly 700 pepper plants. Coffee and pepper have been satisfying him with the stable income they brought over the past years.

According to Thi, he has participated in the project for almost two years. Since then, he has participated in one or two workshops by the project. “They were explaining and convincing us to join the cooperative” – he said – “But after one or two trainings, they just disappeared. We didn’t see any project staff over the past year. I don’t even know where the project office is”. As a matter of fact, impacts could not be generated through only two trainings. So, for Thi, all his knowledge about coffee production is the result of his own study through different sources like: newspapers, books, radio and television.

Due to the late participation, Thi couldn’t participate in any technical training offered by the project. Therefore, he could not evaluate any impacts of the project so far.

Thi is one of the farmers who are always eager to improve his knowledge: “Knowledge is always of the first priority for me. I will participate in any project that would come and help us produce more efficiently. The second priority is financial capital to do necessary investments for the crops. It would be great if a project could support farmers like me with that but knowledge is always the most important.”

Thi has two young children who are just at the age of 7 and 3. He is not ambitious about his children: “They are too small to talk about any career and I haven’t thought about it yet. It’s up to them but would be good if they can do something about agriculture to support farmers like me” – smiled Thi. He believes that his children will take care of the far when he retires.

**Mrs Nguyen Thi Nga (T4)**

Over the past 29 years, Nguyen Thi Nga and her family have been quite happy with coffee as the main source of income for them. “I think coffee is the best choice because it’s a long-term crop, which doesn’t require regular investment on variety and replanting. My coffee gives quite stable yield” – Nga was happy with the decision she and her family made 29 years ago to move from a poor rural area of Nam Dinh province to Dak Lak and settled down there.

Explaining the reasons for the success on her farm, Nga said that she and her husband have been always doing their best. Moreover, since she participated in the farmers’ union and has experienced numerous trainings, she applies fertilisers and irrigates her coffee more timely and appropriately. However, “there have been too many trainings and organisers, I don’t know which project I am participating anymore”. Nga’s confusion was not an exceptional,
through the interview with farmers, it has been found out that farmers in some areas received support from more than one project at the same time while fertiliser companies organise trainings at commune level quite often. This leads to the fact that farmers are confused about the projects and the reliability of impact assessment reduces.

In Nga’s case, she has been trying to participate any training organised in the commune and that she is invited. So, it’s difficult to say if her achievements are thanks to a certain project or program, even UTZ Certification.

One clear thing to Nga is that she had been taking records as one of the requirements of the participation in UTZ Certification program. However, the so-called record keeping doesn’t really appears as it should be as Nga explained: “Normally, the group leader keeps my records, sometimes, he brings to me for putting in information otherwise he comes and asks me the information to put in the book”.

According to Nga, the best thing from her participation during the past years is the technical knowledge she has learnt from the trainings though she is not sure which trainings come from the UTZ Certification. However, Nga is quite happy with the way her coffee is being collected. She consigned her coffee to the company’s collecting network and decided the time to sell her coffee whenever she wanted. She confirmed that all the consigned coffee had been sold with premium even though the premium of USD10 to 15 per ton is still not really satisfactory to her.

Nga can be considered a successful farmer with 6 children, among whom 5 are working in companies as workers or accountants, etc. The youngest one is studying at a university in Buon Ma Thuot City. She is happy that none of her children “have to experience a hard life of the farmers” like hers.

Confirming that she will continue with coffee for her lifetime, Nga never counts her children as those who will take care of the coffee farm when she retires: “I will contract someone else to work for me, my children have their own lives and they can’t give up everything to come back here to take care of the coffee”. However, Nga and her husband have recently sold 2 out of their 3 ha of coffee because “it’s too much of work for us while our children are away with their own jobs” - she explained.

6. “Farmers with low yields and income

Mr Nguyen Van Giang (T1)

Nguyen Van Giang was born and grown up in Dak Lak. Like other farmers in the area, Giang just follow his parents to grow coffee as the main source of income for the family. Apart from coffee Giang also have a rice paddy field which provide enough rice for his family during the year. Son has been quite happy with coffee though his farm’s yield has been lower than normal for 2 years: “Planting a coffee field is a long-term investment. It’s like a stable job. Though there are good and bad crops, my family’s income has been quite stable”.

Having participated in the project since the beginning, Giang has been participating in any trainings that the group leader invited: “He invited us to come for a training, maybe at his house or at the commune meeting hall, including trainings from the project and from fertilizers companies or other organizations. We only know about the contents and the organizers when we are at the trainings”. But in general he has been happy with the project as he has learnt good farming practices which helped him produce coffee more effectively and in a sustainable way. “I’ve learnt to apply fertilizers and pesticides as well as irrigate at
the right time and with the right volume. So, to some extent, it’s kind of cost saving especially for irrigation. Also, timely harvesting plays an important role in having good quality coffee”. Therefore, Giang really appreciated the trainings provided by the project and said that he would continue his participation to continuously improve his farming techniques.

However, Giang was not totally convinced by the trainers who were key farmers. “Of course, they have been trained by the project but they are not expert. If the project can send their experts or staff to directly deliver the trainings that would be much more reliable.”

Giang noted that the climate change has been quite significant during the past 3-4 years but the project hasn’t made any movement on that to help farmers to cope with the situation: “I haven’t heard anything from the project about this but would be great if they could help us to find out what should be done to help the coffee develop and produce well”. Also he recommended that the project could be in closer contact with farmers to understand farmers’ needs to provide practical assistance.

Giang has 5 children, all are at school. All he wishes for is to continue successfully with coffee to afford his children’s schools and prepare a better future for them. “I have no idea if they will become farmer or not. It’s their right to choose their own way of life, I respect their decisions on that”. Giang also shared that “I am saving some money day after day for the future. So, if everything runs smoothly I could be able to contract some employees to take care of the coffee farm when I retire.

Mr Y Luong (T1)
Born and grew up in EaYong, Y Luong became a farmer like most of his neighbours in a very natural way.

Started his coffee farm in 2000, as other poor farmers in the area, he didn’t expect too much but “I have to do something with the farm to feed my family. And I think coffee is much better than rice and other annual crop because it doesn’t require too much investment in terms of labour and finance.”

Therefore, for him, satisfaction comes quite easily. Even his yield is low in comparison with his colleagues in the project. Being quite confident about his technical knowledge because he believes that the knowledge that he learned from the project is already the best, Luong identifies the main reason of the low yield in his farm as limited labour and financial investment. Still, he is happy with what he earns on the farm: “I’m happy with my farm. Coffee surely gives me a better life than what rice or other annual crops can do.”

Luong cannot remember exactly if he started to join the project 5 or 6 years ago but recalled very vividly that he was so eager to join the project when he saw “so many people around joining”. All the benefits he gained from the participation were the technical trainings provided by the project which covers many different topics such as: pruning, irrigation, fertilization, harvesting, post-harvest processing, etc.

In terms of technical assistance, Luong is satisfied with the benefits from the project. However, he stopped in 2010 with a very simple reason: “I’m poor and have to go to the market and do other work for a living, so I don’t have time to continue participating in the project activities”. Also, he believes that what he learnt from the project are enough to be a good farmer. Anything else he would need to be a good farmer is either money or inputs. “If the project could provide inputs support, I will participate again” –said Luong without being
aware of the current phase of the project which is trying to organize farmers together for that purpose.

Still, he wants to further improve his knowledge and skills and to be able to “prolong the life and productivity of the coffee trees and maintain the farm in sustainable way”

Having four children with quite a few grandchildren, Luong dreams of a future when his children and grandchildren become good coffee farmers. He believed that his experience and knowledge will be helpful for his children who will take care of his coffee farms when he retires.

7. Certified, but not satisfied

Mr Ngo Hung (T2)

Ngo Hung and his family have been living in Gia Lai for 10 years with coffee since they moved in from Hai Duong Province. The income from coffee has been quite satisfactory for Hung and the family over the past years even though the yield was not always good: “My coffee yield used to be good but last and this crop was just at average level or so due to the unfavorable climate condition. But in general, the annual income has been quite ok and stable”.

Hung was one of the farmers that join the T2 project since the beginning. “All my expectations were to learn better farming practices and to be able to sell my coffee at higher price. So I was very happy when they said that we could get a rewarding premium for our certified coffee” – Hung said about his expectations when joining T2 project.

Hung explained that before he join the project, he used to apply fertilizers, pesticides and irrigation based on his affordability but not on the trees’ needs. “It’s a big difference, I have to apply more pesticides and I have to wait until the cherries are mostly ripe enough to harvest” – he commented. Still, Hung was happy with the trainings offered by the project: “I believe that the coffee quality has been improved when I apply the knowledge I learnt on the farm. Also, proper application of fertilizers, pesticides and irrigation, and especially timely harvesting play an important role in increasing the yield, which is very good”.

Hung could not distinguish the difference between the technical trainings organized by the project and the trainings on the UTZ code of conduct: “I just know that I have participated in a number of trainings; and they informed us about the requirements to be certified but I don’t remember when”. According to Hung, he is applying the knowledge he learnt from the trainings quite strictly. Therefore, he was very disappointed with the premium offered which was around USD15 (VND300,000) per ton of green beans. “That cannot even cover the transportation costs to bring my coffee to the company’s warehouse while we have to follow their requirements very strictly and the procedures for selling is quite complicated. They should have paid a more reasonable premium because our coffee quality must be better than the non-certified coffee” – Hung strongly emphasized.

Like other farmers, Hung wished that the project could provide input support so that they can buy inputs from reliable sources and at reasonable prices. Hoping that the “project should do research on what farmers really needs to give more practical and effective support”, Hung confirmed that he would continue his participation as long as the project continued.

Having three children, all are at school age, Hung hasn’t thought too much about a far future when he retires. “My children can take over if they want. But of course, nobody would want...
his children to become farmers. All I am concerned about now is to do my best on the farm so that the coffee yield will be higher and the income will be rewarding.” – concluded Hung.

Mr Hoang The Doan (T4)
Hoang The Doan was not born in Dak Lak but has been living in the area for 20 years since his family moved from Nam Doan during the “new economics” trend. Even though, his yield was quite low last year he comfortably explain “because of the storms during the flowering season, yield loss happened to all in the region, not only me”. Doan has been happy with coffee over the last years: “I’m happy because the income from coffee has been quite stable”.

Doan couldn’t remember exactly when he started the participation in the UTZ Certification program (T4 group) “It’s about 3-4 years ago. I don’t remember exactly”. Explaining the reason for his participation, Doan simply said: “Farmers are all interested to any project with an expectation to be supported in terms of technical knowledge, financial investment or better prices for our coffee”.

However, Doan hasn’t seen any difference since his participation: “No difference, the yield are just similar though I followed their advices on application of fertilization, pesticides, irrigation and harvesting but it’s labor intensive and costly to follow them strictly so I just follow selectively the reasonable requirements.” As a consequence, Doan was not happy with the project: “They talked a lot but did little. Farmers can only believe in what we see, not what we hear. I don’t know who the project staff is while too many of the local collectors now stating that they are “Sustainable coffee collector” or “Organic coffee collector”. I don't even know if they are really from the project.”

Over the last 3-4 years, Doan got the premium of VND200,000 to VND300,000 (USD10-15/ton of green bean). Like many others, he was not happy with that premium: “It’s just nothing. Especially, we can’t negotiate but can only accept that premium. Sometimes, even with the premium, the price is still lower than the market prices.”

Doan wished to have opportunities to participate in a project that could offer not only technical trainings but also could help farmers organize the buying of fertilizers and the selling of coffee: “Apart from technical knowledge, farmers like me only care about good quality and good prices of fertilizers and good prices for our coffee”. He is now not too eager with the participation but “will participate in any project that could offer something beyond certification and more practical”.

Doan has 4 children, of whom 2 are working on coffee. He is thinking of continuing with coffee and will pass the farm on his children to take care when he retires in the future.

Mr Ngoc Anh (T3)
Ngoc Anh is one of the T3 group members who started to participate in the UTZ Certification program in 2011.

Migrated from Quang Nam Province to Gia Lai about 13 years ago, Anh and his family settled down in Tra Da Commune and bought some land for cultivation. He owns now 0.7 hectares, of which 0.6 ha has been planted with coffee. Anh is planning to plant pepper on the piece of 0.1ha, which has been grown with some short-term crops, to diversify his income sources and also because pepper price has been good recently.
Anh’s expectation to “receive the technical trainings to improve farming practices to make a better income” has been fulfilled to some extent. “I have learnt quite a few things which are helpful. For example, I know now to apply fertilisers and to irrigate at the right time and with the right amount. It is appreciated that through the participation in UTZ Certification, I have learnt that it is important not only to increase productivity but also to protect the environment”. This explains his willingness to continue his participation “If the project continues to support, surely I will participate in. I will try to learn to improve farming techniques to have higher productivity.”

Even though, Anh didn’t believe that his coffee yield has been improved thanks to his participation: “It’s like one or two year and another, and coffee relies a lot on climate. My farm used to have quite good yield 2-3 years before but last year due to the unfavourable weather conditions, the yield was not good. But I always do my best on my farm.”

Anh is quite disappointed when it turned out that he hasn’t been able to sell any single coffee bean as UTZ Certified coffee. He complained: “It sounded very attractive when they call for our participation; I imagined that I would not only learn best farming practices but also be able to sell my coffee at a rewarding price. However, it seemed that the project could not find good buyers; some buyers came offering the premium of VND300/kg (equivalent to USD15/ton) green beans. According to Anh he had to sell to the collectors at the beginning of the harvest to pay the debt. So even when he heard that the project found a buyer who was willing to pay premium, he was not interested as the premium was too low for him. “That doesn’t mean anything to us and cannot cover our extra investments like the net to protect the coffee from chickens and ducks that I am raising and canvas for drying coffee, etc.” Anh also added that following UTZ code requirements, he had to put extra efforts on the field. “It is good in general to do all that in one or another way, but it is labour intensive while those efforts could not bring me a better income in comparison to those who are not following the code.” As a consequence, Anh has never got out of a farmer’s virsus circle to advance money from collector for inputs and other expenses and quickly sell his coffee as soon as harvest season come to pay the debt.

“It would be great if they (the project) could help us to access better credit for investing in coffee. They should also buy our certified coffee at a reasonable price”

Without knowing a clear reason, Anh said: “I heard that the project has been closed down. A new project has come, so we are moving to the new one”. The new project is, according to Anh, a 4C project with support from ACOM. And farmers in the project area are happy with the new project simply because they still get premium while the 4C code is not too strict as the UTZ code.

Having two children, Anh expects his children will have a better life than his. He doesn’t want his children to be farmers like him but if they would fail to study further, they would be welcome by their farther to come home and take care of the coffee and pepper. “Until my retirement, I hope my children can find good jobs so I will be able to contract workers to work for me. But I will also be willing to transfer my knowledge to my children for continuing with coffee if they would fail to study further”

Mrs Nguyen Thi Thuyet (T4)
Nguyen Thi Thuyet and her husband moved from Binh Dinh to Dak Lak 15 years ago in response to the “new economic” trend at that time following her parents and siblings. Expecting that coffee would bring stable productivity and income, they selected coffee to plant as the main source of income for the family when settled down there. Over the past 15
years, they have been quite satisfied with what coffee has brought about “I’m quite happy because our family’s income has been stable. We are still poor but at least we can afford raising 3 children” – smiled Thuyet.

In fact, Thuyet's coffee farm has been given quite good yield over the past years. She explained: “mostly because we apply fertilisers and irrigation at the right time and appropriate volume”

Thuyet recalled “4-5 years ago, the group leader convinced us to join the UTZ Certification and I just register because I thought it would be a good opportunity to learn better farming practices and to sell coffee at a higher price”. In fact, Thuyet also expected that she could access some credit when joining the program.

Thuyet appreciated the trainings provided by the project which helped her know about the “timely application and right volume for fertilization and irrigation” that she learnt. However, she recognized that she cannot afford to follow strictly the requirements as trained because “more fertilizers and pesticides are required and we cannot afford the advised volume”. It should, however, be noted that Thuyet and other farmers participated different trainings including trainings of fertilizers companies, so it is difficult to evaluate the accuracy of this statement. However, Thuyet and her husband both denied the relation between the participation in UTZ Certification program and production efficiency improvement. She said: “It’s too labour intensive to follow the requirements, and as I said more investments needed. So if any improvement in production efficiency happened, it is because we have been doing our best to manage the farm and learn from our own experiences and others.”

Apparently, the premium of VND200/kg green beans (USD10/kg) “was simply nothing and of course not worthy” to Thuyet. Thus, they only sold their coffee as UTZ Certified coffee during the first harvest and turned back to the collectors soon after recognizing that the benefits did not make sense.

“Capital is very important to farmers like me, the investment for a crop is big while we normally cannot afford it, we often have to borrow from collectors around and sell coffee to them when comes the harvest time to pay the debt. Therefore, it would be great if someone can lend us the money at the bank interest rate and would not ask for collateral” – added Thuyet.

Regarding her opinion about the future, Thuyet strongly said: “No one on earth would want his/her children to become farmer, I am not an exception. My children are small, but we are doing our best to create the best conditions for them to study. We hope that they will succeed with the study and can find a good job”. She explained that farmer’s life simply means “hard and poor” and she would ever want her children to live such a lie. She also added that she and her husband would still continue the farm so in the worst case when one or more of their children failed to get into universities or to find a good job; they can always come back home and work on the farm.
## Annex II: Commune selection criteria

<table>
<thead>
<tr>
<th>Commune</th>
<th>Altitude (m)</th>
<th>Rainfall (mm/year)</th>
<th>Av temp (°C)</th>
<th>average farm size (#)</th>
<th>acreage under coffee at commune level (#)</th>
<th>total population (#)</th>
<th>Nr of input shops (#)</th>
<th>Nr of coffee traders (#)</th>
<th>Nr of processing facilities (#)</th>
<th>Distance to nearest research station (km)</th>
<th>Distance to district capital (km)</th>
<th>Extension budget earmarked for coffee</th>
<th># of MARD proj.</th>
<th>Nr (micro) credit institutions (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia H'Lop</td>
<td>260-700</td>
<td>2000-2500</td>
<td>21.8-25</td>
<td>0.5-1</td>
<td>758</td>
<td>9235</td>
<td>4</td>
<td>10</td>
<td>-</td>
<td>45</td>
<td>45</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Hoa Tien</td>
<td>536</td>
<td>1500-1699</td>
<td>n.a.</td>
<td>0.5</td>
<td>590</td>
<td>8696</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>35</td>
<td>35</td>
<td>n.a.</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Ea Yong</td>
<td>800</td>
<td>1400-1500</td>
<td>n.a.</td>
<td>1.08</td>
<td>2196</td>
<td>3854</td>
<td>3</td>
<td>20</td>
<td>-</td>
<td>30</td>
<td>30</td>
<td>n.a.</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Ea Kenh</td>
<td>694</td>
<td>1500</td>
<td>n.a.</td>
<td>0.5</td>
<td>1886</td>
<td>12867</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>24</td>
<td>24</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Ea Phe</td>
<td>430</td>
<td>1400-1500</td>
<td>n.a.</td>
<td>0.61</td>
<td>800</td>
<td>23446</td>
<td>20</td>
<td>5</td>
<td>-</td>
<td>38</td>
<td>38</td>
<td>n.a.</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Quang Tien</td>
<td>468</td>
<td>1800-1900</td>
<td>n.a.</td>
<td>1.4</td>
<td>1861</td>
<td>6638</td>
<td>2</td>
<td>20</td>
<td>-</td>
<td>25</td>
<td>25</td>
<td>n.a.</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Ea Tam</td>
<td>800</td>
<td>1600</td>
<td>n.a.</td>
<td>0.8-1</td>
<td>4325</td>
<td>10250</td>
<td>18</td>
<td>12</td>
<td>-</td>
<td>80</td>
<td>80</td>
<td>n.a.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Buon Trap</td>
<td>439</td>
<td>1891</td>
<td>23-24</td>
<td>0.4-0.5</td>
<td>255</td>
<td>25000</td>
<td>15</td>
<td>1</td>
<td>-</td>
<td>40</td>
<td>40</td>
<td>n.a.</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Ea Kao</td>
<td>536</td>
<td>1740-1920</td>
<td>20</td>
<td>0.5</td>
<td>1758</td>
<td>16140</td>
<td>13</td>
<td>2</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>n.a.</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>CuEbua</td>
<td>536</td>
<td>1550</td>
<td>20</td>
<td>0.8-1</td>
<td>1758</td>
<td>16199</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>n.a.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dun</td>
<td>260-700</td>
<td>2000-2500</td>
<td>21.8-25</td>
<td>0.5-1</td>
<td>335</td>
<td>3684</td>
<td>3</td>
<td>6</td>
<td>-</td>
<td>45</td>
<td>45</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Chu Se</td>
<td>260-700</td>
<td>2000-2500</td>
<td>21.8-25</td>
<td>0.5-1</td>
<td>1800</td>
<td>26628</td>
<td>9</td>
<td>24</td>
<td>-</td>
<td>40</td>
<td>40</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Ia Tiem</td>
<td>450-550</td>
<td>1787</td>
<td>21.6</td>
<td>1-1.2</td>
<td>914</td>
<td>7186</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Chu Pong</td>
<td>450-550</td>
<td>1787</td>
<td>21.6</td>
<td>1-1.2</td>
<td>604</td>
<td>3775</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Nghia Hung</td>
<td>416</td>
<td>2360</td>
<td>23.1</td>
<td>0.3-0.4</td>
<td>1766</td>
<td>8602</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>20</td>
<td>20</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Tra Da</td>
<td>780</td>
<td>2234</td>
<td>22</td>
<td>0.2-0.3</td>
<td>200</td>
<td>4137</td>
<td>n.a.</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Ia Sao</td>
<td>630</td>
<td>2306</td>
<td>25</td>
<td>0.4-0.8</td>
<td>?</td>
<td>7797</td>
<td>13</td>
<td>4</td>
<td>-</td>
<td>25</td>
<td>25</td>
<td>n.a.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ia Yok</td>
<td>630</td>
<td>2306</td>
<td>25</td>
<td>0.5</td>
<td>?</td>
<td>7844</td>
<td>13</td>
<td>4</td>
<td>-</td>
<td>25</td>
<td>25</td>
<td>n.a.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>260-720</td>
<td>2000-2500</td>
<td>21.8-25</td>
<td>0.5-1</td>
<td>902</td>
<td>5316</td>
<td>1</td>
<td>9</td>
<td>-</td>
<td>45</td>
<td>45</td>
<td>n.a.</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>----</td>
<td>----</td>
<td>------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Al Ba</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ea Kuang</td>
<td>800</td>
<td>1400-1500</td>
<td>n.a.</td>
<td>0.3-0.4</td>
<td>804</td>
<td>13066</td>
<td>9</td>
<td>4</td>
<td>-</td>
<td>5</td>
<td>5</td>
<td>n.a.</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
Annex III Map of interview locations
Figure 39: Map of interview locations (green markers), area planted with coffee (pink polygons) and district level acreage and production (2010)
Annex IVa: Questionnaire farmers

Guidance notes:
1. Answer options in the white areas should not be read out loud to the man
2. Of answers in white areas only 1 option can ever be selected
3. Answer options in grey (e.g. q93-109) can be read out loud to the man unless indicated otherwise
4. Of answers in grey areas multiple options can be selected
5. Don’t know=-88
6. Not applicable=-99

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Interview nr</td>
</tr>
<tr>
<td>2.</td>
<td>Name of interviewer</td>
</tr>
<tr>
<td>3.</td>
<td>Date of interview</td>
</tr>
<tr>
<td>4.</td>
<td>Name of supervisor</td>
</tr>
<tr>
<td>5.</td>
<td>Date checked</td>
</tr>
</tbody>
</table>

1 General information

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Name of respondent</td>
</tr>
<tr>
<td>7.</td>
<td>Phone number</td>
</tr>
<tr>
<td>8.</td>
<td>What is the gender of respondent</td>
</tr>
<tr>
<td>9.</td>
<td>What is the marital status of the respondent?</td>
</tr>
<tr>
<td>10.</td>
<td>Is respondent household head?</td>
</tr>
<tr>
<td>11.</td>
<td>If not, what is relationship of respondent to household head?</td>
</tr>
<tr>
<td>12.</td>
<td>What is the name of the village you live in?</td>
</tr>
<tr>
<td>13.</td>
<td>What is the name of the commune you live in?</td>
</tr>
</tbody>
</table>

Options:
- Male
- Female
- Married
- Single
- Divorced
- Widow(er)
- Wife
- Husband
- Daughter
- Son
- Other relative
- Other, specify
- Ea Quang
- Hoa Tien
- Ea Yong
- Ea Kenh
| 14. | What are the coordinates of the farmer’s house? | Zone ( )
X m ( )
Y m ( )
O (-88) Don’t know |
| 15. | What is the altitude above sea level? | Meters ( )
O (-88) Don’t know |

## 2 Assets

### 2.1 Human capital

| 16. | What is your and your partner’s year of birth? | Man ( )
Wife ( ) |
| 17. | What is your and your partner’s ethnicity? | Man O (1) Kinh
Specify:
O (2) Hoa
O (3) Ede
O (4) Gia Rai
O (5) Nung
O (6) Tay
O (7) Muong
O (-99) Not applicable
Wife O (1) Kinh
Specify:
O (2) Hoa
O (3) Ede
O (4) Gia Rai
O (5) Nung
O (6) Tay
O (7) Muong
O (-99) Not applicable |
| 18. | Education level man | O (0) none
O (1) primary school not finished
O (2) primary school finished |
### 19. Education level wife

- (3) secondary school not finished
- (4) secondary school finished
- (5) highschool, not finished
- (6) highschool, finished
- (7) more advanced

### 20. How many children do you have?

(____________________)

### 21. How many children <16?

(____________________)

### 22. How many children >= 16?

(____________________)

### 23. How many people are dependent on the farm for a living, excluding hired labour?

(____________________)

## 2.2 Social capital

### 24. Were you born in the same district that you currently live in?

<table>
<thead>
<tr>
<th>Man</th>
<th>Wife</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0) No</td>
<td>(0) No</td>
</tr>
<tr>
<td>(1) Yes</td>
<td>(1) Yes</td>
</tr>
<tr>
<td>(-88) Don’t know</td>
<td>(-88) Don’t know</td>
</tr>
</tbody>
</table>

### 25. Are you working on the same farm that your parents did?

<table>
<thead>
<tr>
<th>Man</th>
<th>Wife</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0) No</td>
<td>(0) No</td>
</tr>
<tr>
<td>(1) Yes</td>
<td>(1) Yes</td>
</tr>
<tr>
<td>(-88) Don’t know</td>
<td>(-88) Don’t know</td>
</tr>
</tbody>
</table>

### 26. Were your parents coffee farmers?

<table>
<thead>
<tr>
<th>Man</th>
<th>Wife</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0) No</td>
<td>(0) No</td>
</tr>
<tr>
<td>(1) Yes</td>
<td>(1) Yes</td>
</tr>
<tr>
<td>(-88) Don’t know</td>
<td>(-88) Don’t know</td>
</tr>
</tbody>
</table>

### 27. How many years have you been active in coffee?

(____________________)

### 28. How many years have people been growing coffee in this village?

(____________________)

### 29. Where did you obtain your first working experience in coffee?

<table>
<thead>
<tr>
<th>Man</th>
<th>Wife</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0) Worked by myself</td>
<td>(0) Worked by myself</td>
</tr>
<tr>
<td>(1) Worked on parent’s farm</td>
<td>(1) Worked on parent’s farm</td>
</tr>
<tr>
<td>(2) Worked on farm of other family</td>
<td>(2) Worked on farm of other family</td>
</tr>
<tr>
<td>(3) Worked as hired labour on someone else’s farm</td>
<td>(3) Worked as hired labour on someone else’s farm</td>
</tr>
<tr>
<td>(4) Worked as employee on coffee state farm</td>
<td>(4) Worked as employee on coffee state farm</td>
</tr>
<tr>
<td>(5) Other, please specify:</td>
<td>(5) Other, please specify:</td>
</tr>
</tbody>
</table>

(____________________)
<table>
<thead>
<tr>
<th></th>
<th>Are you member of any coffee related organization, programme or project, if so, which?</th>
<th>2008</th>
<th>Last season (11/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.</td>
<td>Cooperative</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>31.</td>
<td>Farmer club</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>32.</td>
<td>Research project</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>33.</td>
<td>Training project</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>34.</td>
<td>Certification project</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>35.</td>
<td>Other, please specify</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Are you member of any association, union, group, organization, programme or project, if so, which?</th>
<th>2008</th>
<th>Last season (11/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.</td>
<td>Farmer club</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>37.</td>
<td>Extension club</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>38.</td>
<td>Savings group</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>39.</td>
<td>Youth Union</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>40.</td>
<td>Women Union</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>41.</td>
<td>Elder club</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>42.</td>
<td>Other, please specify</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
</tbody>
</table>

2.3 Natural capital

<table>
<thead>
<tr>
<th></th>
<th>What was/is the size of your farm in ha?</th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.</td>
<td></td>
<td>(</td>
<td>(</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>How much was/is planted with coffee in ha</th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.</td>
<td></td>
<td>(</td>
<td>(</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>How many coffee trees did/do you have per ha?</th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.</td>
<td></td>
<td>(</td>
<td>(</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Did/do you have access to irrigation water?</th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.</td>
<td></td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>Question</td>
<td>Options</td>
<td>2008</td>
<td>Last season (2011/12)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>47. What is/was the color of your soil in your coffee field (use largest field if more than one field)?</td>
<td>O (1) Red, O (2) Black, O (3) Grey</td>
<td>O (1) Red, O (2) Black, O (3) Grey</td>
<td></td>
</tr>
<tr>
<td>48. Did/do you use shade trees in your coffee field(s)?</td>
<td>O (0) No, O (1) In some of my fields, O (2) In all of my fields</td>
<td>O (0) No, O (1) In some of my fields, O (2) In all of my fields</td>
<td></td>
</tr>
<tr>
<td>49. Did/do you use windbreaks in your coffee field(s)?</td>
<td>O (0) No, O (1) In some of my fields, O (2) In all of my fields</td>
<td>O (0) No, O (1) In some of my fields, O (2) In all of my fields</td>
<td></td>
</tr>
<tr>
<td>50. How much green bean coffee in Mt did you produce then and now?</td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>51. In what year was the current farm first planted with coffee? (In case of &gt;1 field, ask for largest field)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52. What is the average age of your coffee trees (In case of &gt;1 field, ask for field with most trees planted)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| 2.4 Physical capital                                                                 |
| 53. Did/do you irrigate your coffee (if both years “no”, go to question 56)      | O (0) No, O (1) Yes, O (-99) Not applicable                              | O (0) No, O (1) Yes, O (-99) Not applicable |
| 54. Did/do you own an irrigation pump?                                          | O (0) No, O (1) Yes, O (-99) Not applicable                              | O (0) No, O (1) Yes, O (-99) Not applicable |
| 55. Did/do you own the pipes required for irrigation?                            | O (0) No, O (1) Yes, O (-99) Not applicable                              | O (0) No, O (1) Yes, O (-99) Not applicable |
| 56. Did/do you own a 2 or 4-wheeled tractor                                     | O (0) No, O (1) Yes                                                     | O (0) No, O (1) Yes                                                     |
| 57. Did/do you have access to electricity at the farm house? (on the coffee field!) | O (0) No, O (1) Yes                                                     | O (0) No, O (1) Yes                                                     |
| 58. Did/do you own a hulling machine                                            | O (0) No, O (1) Yes                                                     | O (0) No, O (1) Yes                                                     |
| 59. Did/do you have sufficient drying yard                                      | O (0) No                                                               | O (0) No                                                               |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60. Space to dry your coffee?</td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>60. In 2008, what was the size of your drying yard compared to now?</td>
<td>O (1) Smaller</td>
<td>O (2) Same</td>
</tr>
<tr>
<td></td>
<td>O (3) Larger</td>
<td>O (88) Don’t know</td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>2.5 Financial capital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61. Did/do you need credit to pay for inputs and labour for coffee?</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>62. If you needed credit, were/are you able to obtain it?</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>63. If so, what was/is the main source of credit for you?</td>
<td>O (1) Bank</td>
<td>O (1) Bank</td>
</tr>
<tr>
<td></td>
<td>O (2) People’s Credit Fund</td>
<td>O (2) People’s Credit Fund</td>
</tr>
<tr>
<td></td>
<td>O (3) Collector</td>
<td>O (3) Collector</td>
</tr>
<tr>
<td></td>
<td>O (4) Exporter</td>
<td>O (4) Exporter</td>
</tr>
<tr>
<td></td>
<td>O (5) Projects from social organisations</td>
<td>O (5) Projects from social organisations</td>
</tr>
<tr>
<td></td>
<td>O (6) Family</td>
<td>O (6) Family</td>
</tr>
<tr>
<td></td>
<td>O (7) Friends</td>
<td>O (7) Friends</td>
</tr>
<tr>
<td></td>
<td>O (8) Other, please specify</td>
<td>O (8) Other, please specify</td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>64. If you use(d) credit, how did/do you repay it?</td>
<td>O (0) Not able to repay</td>
<td>O (0) Not able to repay</td>
</tr>
<tr>
<td></td>
<td>O (1) Cash + interest after harvest</td>
<td>O (1) Cash + interest after harvest</td>
</tr>
<tr>
<td></td>
<td>O (2) By selling coffee in advance</td>
<td>O (2) By selling coffee in advance of harvest, price set at date of receiving credit</td>
</tr>
<tr>
<td></td>
<td>of harvest, price set at date of</td>
<td>O (3) By paying in coffee at prevailing</td>
</tr>
<tr>
<td></td>
<td>receiving credit</td>
<td>prices of creditor at time of harvest/processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
65. In 2008 and now, what type of ownership did you have of the farm?

- O (1) Red book
- O (2) Rent or lease
- O (3) Traditional land use right
- O (4) Squatting
- O (5) Other, please specify

66. How important was coffee as a source of income for you in 2008 and now?

- O (1) all or almost all income from coffee
- O (2) more than half of the income from coffee
- O (3) about half of the income from coffee
- O (4) less than half of the income from coffee
- O (5) very little from coffee

67. Can you estimate how much cash savings for investment in coffee you had in 2008 and today?

- ( )

---

2008 | Last season (2011/12)
--- | ---

68. Stone/cement house

- O (0) No
- O (1) Yes

69. Nr of floors in your house

- #

70. Washing machine

- O (0) No
- O (1) Yes

71. Fridge

- O (0) No
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Option 1 (Yes)</th>
<th>Option 2 (No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>72.</td>
<td>Gas cooker</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>73.</td>
<td>Access to electricity</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>74.</td>
<td>Electric rice cooker</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>75.</td>
<td>(Mobile) phone</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
<tr>
<td>76.</td>
<td>Computer</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
<tr>
<td>77.</td>
<td>Access to internet at home</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1) Yes</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>78.</td>
<td>Bicycle</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
<tr>
<td>79.</td>
<td>Motorbike</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
<tr>
<td>80.</td>
<td>Car</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
<tr>
<td>81.</td>
<td>Tractor</td>
<td>O (0) No</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td># ( )</td>
<td># ( )</td>
</tr>
</tbody>
</table>

3 Farm management

3.1 Types of production

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity</th>
<th>Option 1 (Yes)</th>
<th>Option 2 (No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.</td>
<td>Keeping livestock</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>83.</td>
<td>Growing food crops</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>84.</td>
<td>Growing pepper</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Question</td>
<td>Answer Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85. Growing fruit trees</td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>86. Growing other cash crops</td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes, please specify</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(</td>
<td></td>
<td></td>
</tr>
<tr>
<td>87. Can you estimate how much you and your wife earned from off-farm</td>
<td>(</td>
<td></td>
<td></td>
</tr>
<tr>
<td>income during the last season?</td>
<td>VND</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2 Agricultural practices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1 Production level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88. Compared to 2008, your coffee production was</td>
<td>O (1) Higher (go to q89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) The same (go to q108)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Lower (go to q100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>89. If your production increased, what caused it? (Do NOT read out</td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>options!)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90. Planted more trees that now bear fruit</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91. Change in planted area</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92. Good Agricultural Practices</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>93. Coffee production cycle (bi-annual bearing)</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>94. Good weather conditions</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95. Better access to inputs</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96. More money to invest</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>97. Participation in certification programme</td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.2.2 Irrigation practices

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>108. Do you irrigate your coffee (if no, continue to q126)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>109. How do you determine how much water your trees need?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2008</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (1) Visual observation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (2) Past experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (3) Measure soil moisture content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (4) Dig test pit to observe soil moisture content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (5) Other, please specify</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Last season 2011/12</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (1) Visual observation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (2) Past experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (3) Measure soil moisture content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (4) Dig test pit to observe soil moisture content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (5) Other, please specify</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>2008</td>
<td>Last season 2011/12</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>110. How much water do you apply on average per tree per round of irrigation?</td>
<td>O (-88) Don’t know</td>
<td>O (-88) Don’t know</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>111. On average, how many irrigation rounds do you use per season?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>112. What irrigation methods did/do you use in 2008 and last season?</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
<td></td>
</tr>
<tr>
<td>113. Basin irrigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>114. Flooding</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
<td></td>
</tr>
<tr>
<td>115. Sprinkler</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
<td></td>
</tr>
<tr>
<td>116. Other, please specify:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>117. What was your main source of irrigation water in 2008 and last season?</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
<td></td>
</tr>
<tr>
<td>118. How did/do you measure the amount of water you apply?</td>
<td>O (1) Just fill the basin until it’s full O (2) Count seconds (and multiply with pump debit) to calculate volume applied O (3) Other, please specify:</td>
<td>O (1) Just fill the basin until it’s full O (2) Count seconds (and multiply with pump debit) to calculate volume applied O (3) Other, please specify:</td>
<td></td>
</tr>
<tr>
<td>119. This season, did you use more, the same or less irrigation water than in 2008?</td>
<td>O (0) Less O (1) The same O (2) More O (-88) Don’t know O (-99) Not applicable</td>
<td>O (-88) Don’t know</td>
<td></td>
</tr>
<tr>
<td>120. Do you think this number of irrigation rounds sufficient to realise the yield potential of your trees?</td>
<td>O (0) No O (1) Yes O (-88) Don’t know O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121. Why did your irrigation volume change?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120.</td>
<td>Water shortages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121.</td>
<td>Weather conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>122.</td>
<td>Technical problems (broken pump, etc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>123.</td>
<td>New well, more water available</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>124.</td>
<td>Learnt how much the tree needs from training(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>125.</td>
<td>Others, please specify:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.2.3 Fertilizer use

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>126.</td>
<td>Do you use chemical fertiliser (if not, go to q146)?</td>
</tr>
<tr>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td>O (1) Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>How much chemical fertiliser of which type** did you apply on your coffee area during the last season?</th>
</tr>
</thead>
<tbody>
<tr>
<td>127.</td>
<td>Urea</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>128.</td>
<td>Sulphate Ammonium</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>129.</td>
<td>Phosphorus 16.5%⁹</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>130.</td>
<td>Potassium</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>131.</td>
<td>NPK (<em><strong>/</strong></em>/____) (indicate type)</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>132.</td>
<td>Other, specify:</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>133.</td>
<td>Other, specify:</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>( )</td>
</tr>
</tbody>
</table>

* Also called Lan, Dam Lan
134. Other, specify: (________) (________) (________)  

*If a man answers in units other than kg (e.g. bags, tins, buckets or pockets), find out the conversion factor to kg in 135 to 137  
**If a man doesn’t know the type of fertiliser used, ask to see the bag in which it came and specify the type used in 132 to 134  

135. From (________) to kg, multiply by: (________)  

136. From (________) to kg, multiply by: (________)  

137. From (________) to kg, multiply by: (________)  

---  

<table>
<thead>
<tr>
<th>How did/do you decide how much fertiliser to apply? (Do NOT read out options)</th>
<th>2008</th>
<th>Last season 2011/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>I apply the same as last year, experience and tradition</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>I calculate the amount required based on yield assessment</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>Advice based on soil analysis</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>Advice based on leaf analysis</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>I follow advice from fertilizer dealer</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>I follow advice from trainer</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>Other, please specify</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
</tbody>
</table>

145. Compared to 2008, do you use less, the same or more fertiliser  

<table>
<thead>
<tr>
<th>2008</th>
<th>Last season 2011/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>O (0) Less</td>
<td>O (0) Less</td>
</tr>
<tr>
<td>O (1) The same</td>
<td>O (1) The same</td>
</tr>
<tr>
<td>O (2) More</td>
<td>O (2) More</td>
</tr>
<tr>
<td>O (-88) Don’t know</td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>O (-99) Not applicable</td>
<td>O (-99) Not applicable</td>
</tr>
</tbody>
</table>

3.3 Pesticide use  
Note: Clarify to man that pesticides are chemicals to kill pests or diseases, not weeds. Herbicides (chemicals to kill weeds) are discussed in next section.  

146. Do you use pesticide (if not, go to q152)? | O (0) No O (1) Yes |

---  

<table>
<thead>
<tr>
<th>How do you decide when to spray pesticides? (Do NOT read out options!)</th>
<th>2008</th>
<th>Last season 2011/12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Calendar-based spraying (e.g. every fortnight, in other words, there is no assessment of need for each spraying)</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Following field observation of particular pests or diseases</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Consulting with coffee agronomist, or trainer</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Consulting with pesticide salesperson</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Other source of advice, please specify</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
</tbody>
</table>

3.4 Herbicide use

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use herbicide (if not, go to q158)?</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Calendar-based spraying (e.g. every fortnight, in other words, there is no assessment of need for each spraying)</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Following field observation of particular weeds</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Consulting with coffee agronomist, or trainer</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Consulting with herbicide salesperson</td>
<td>O (1) Yes</td>
<td>O (0) No</td>
</tr>
<tr>
<td>Other source of advice, please specify</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
</tbody>
</table>

3.5 Processing and storage

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you process your coffee?</td>
<td>O (1) No processing (selling fresh cherry)</td>
<td>O (2) Dry processing</td>
</tr>
<tr>
<td>How do you process your coffee?</td>
<td>O (3) Other, please specify:</td>
<td></td>
</tr>
<tr>
<td>Road side</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Concrete drying patio</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Tarpaulins</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>Q</td>
<td>Question</td>
<td>(0) No</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>162</td>
<td>On the ground with nothing in between coffee and soil</td>
<td></td>
</tr>
<tr>
<td>163</td>
<td>Other, please specify:</td>
<td></td>
</tr>
<tr>
<td>164</td>
<td>Do you crush cherries when drying (if not, go to q169)?</td>
<td></td>
</tr>
<tr>
<td>165</td>
<td>To speed up drying</td>
<td></td>
</tr>
<tr>
<td>166</td>
<td>To save labour</td>
<td></td>
</tr>
<tr>
<td>167</td>
<td>Other, please specify:</td>
<td></td>
</tr>
<tr>
<td>168</td>
<td>Does crushing affect the quality of your coffee, if so how?</td>
<td></td>
</tr>
<tr>
<td>169</td>
<td>What is the desired moisture level you want your coffee to be before selling or storing it?</td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>How do you determine if your coffee is sufficiently dry?</td>
<td></td>
</tr>
<tr>
<td>171</td>
<td>If you have difficulty to reach the desired moisture level, what is causing this?</td>
<td></td>
</tr>
</tbody>
</table>

---

**Why do you use crushing?**

- To speed up drying
- To save labour
- Other, please specify:

**Does crushing affect the quality of your coffee, if so how?**

- No, it does not affect quality of coffee
- Yes, it improves quality of coffee
- Yes, it reduces quality of coffee
- Don’t know
- Not applicable

**What is the desired moisture level you want your coffee to be before selling or storing it?**

(\%)%
- Don’t know

**How do you determine if your coffee is sufficiently dry?**

- Bite test
- Moisture meter
- A buyer informs me
- Don’t know

**If you have difficulty to reach the desired moisture level, what is causing this?**

- Weather conditions
- Insufficient drying space
- Theft problems make me bring the coffee in early
- Other, please specify:
172. How do you store your coffee?

O (1) On the ground and against the walls
O (2) Off the ground, on wood, against the wall
O (3) Off the ground and off the wall
O (4) Other, please specify: 

3.6 Management changes

---. Compared to 2008, do you use more, the same or less of:

<table>
<thead>
<tr>
<th></th>
<th>Less</th>
<th>The same</th>
<th>More</th>
<th>Don’t know</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>173. Fertilizer</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>174. Pesticides</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>175. Irrigation water</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>176. Compost or manure</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>177. Labour permanent workers</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>178. Labour temporary workers</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>179. Warehouse facilities</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>180. Renting machines (eg pulper, huller, etc)</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>181. New planting material (if applicable)</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>182. Transportation</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>183. Energy for drying</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>184. Others, please specify</td>
<td>O (1)</td>
<td>O (2)</td>
<td>O (3)</td>
<td>O (-88)</td>
<td>O (-99)</td>
</tr>
</tbody>
</table>

3.7 Record keeping

185. Do/did you keep farm records (if not, go to q198)?

<table>
<thead>
<tr>
<th></th>
<th>O (0) No O (1) Yes</th>
</tr>
</thead>
</table>

---. Please specify what kind of records you keep/kept. (Do NOT read out options!)

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>Last season (2011/12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>186. Yield</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>187. Fertiliser usage</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>188. Pesticide usage</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>189. Production costs (labour costs, fertilizer,...)</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>190. Sales</td>
<td>O (0) No O (1) Yes</td>
<td>O (0) No O (1) Yes</td>
</tr>
</tbody>
</table>
191. Other, please specify:

( _________________________________ )

O (0) No O (1) Yes

---.

If you keep records, how do you use them?
(Do NOT read out options!)

192. I only keep them for certification inspection

O (0) No O (1) Yes

193. I try to analyse the records by myself

O (0) No O (1) Yes

194. A service provider analyses them for me, results are not discussed

O (0) No O (1) Yes

195. A service provider analyses them for me, results are discussed in a group with colleagues

O (0) No O (1) Yes

196. Other, please specify:

( _________________________________ )

197. How useful is farm record keeping for you?

O (1) Not useful at all
O (2) Somewhat useful, the idea is good, but I don't get benefits from it
O (3) Useful, it teaches me how to improve
O (4) Very useful, it teaches me to improve and I see how others work
O (-88) Don't know
O (-99) Not applicable

198. Did you make an investment plan for your coffee production and processing activities during last season?

O (0) No O (1) Yes

4 Farm economics

4.1 Production costs

4.1.1 Nutrients

199. How much money did you spend on chemical fertiliser during the last season?

( _____________________________ ) VND

O (-88) Don't know
O (-99) Not applicable

200. Did you apply compost, mulch or organic manure during the last season?

O (0) no O (1) Yes
201. How much money did you spend on compost, mulch or organic manure during the last season? ( ) VND
O (-88) Don’t know
O (-99) Not applicable

202. Last season, did you apply less, the same or more compost, mulch or manure than in 2008?
O (0) Less
O (1) The same
O (2) More
O (-88) Don’t know

4.1.2 Pesticides

203. How much money did you spend on pesticides during the last season? ( ) VND
O (-88) Don’t know
O (-99) Not applicable

4.1.3 Irrigation

204. Fuel or electricity for pumping ( ) VND
O (-88) Don’t know
O (-99) Not applicable

205. Equipment rental (pumps, pipes) ( ) VND
O (-88) Don’t know
O (-99) Not applicable

206. Rent irrigation service supply (price including labour) ( ) VND
O (-88) Không biết
O (-99) Không áp dụng

4.1.4 Credit

207. During last season, did you use credit (if not, go to q211)?
O (0) No
O (1) Yes

208. How much money did you borrow last season? ( ) VND
O (1) Won’t tell
### 4.1.5 Labour cost

211. During last season, did you use hired labour (if not, go to q214)?
- O (0) No
- O (1) Yes

212. How much money did you spent on labour from permanent workers
- (______________________________ ) VND
- O (1) Won’t tell
- O (-88) Don’t know
- O (-99) Not applicable

213. How much money did you spent on labour from temporary workers
- (______________________________ ) VND
- O (1) Won’t tell
- O (-88) Don’t know
- O (-99) Not applicable

### 4.1.6 Certification costs

214. Are you certified UTZ (if not, go to q223)?
- O (0) No
- O (1) Yes

215. Have you (had) any other certification schemes since 2008?
- O (0) No
- O (1) Yes, 4C
- O (0) Yes, Rainforest Alliance
- O (0) Yes, Fairtrade
- O (0) Yes, other, please specify:
  - (______________________________ )

216. Can you indicate if certification has led to additional costs in cash, and how much per season?
- (______________________________ ) VND
- O (1) Won’t tell
- O (-88) Don’t know
- O (-99) Not applicable
<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
</table>
| 217 | How much labour time do you spend to ensure compliance with the UTZ code and that you would otherwise not have spent? | (___________________________) days  
O (1) Won’t tell  
O (-88) Don’t know  
O (-99) Not applicable |
| 218 | And what is this time spent on?                                          |                                                                       |
| 219 | Administration                                                           |                                                                       |
| 219.1 Additional work time in field (putting signage, etc)               | (___________________________) days  
O (1) Won’t tell  
O (-88) Don’t know  
O (-99) Not applicable |
| 220 | Attending agronomy trainings                                              |                                                                       |
| 220.1 Attending meetings                                                 | (___________________________) days  
O (1) Won’t tell  
O (-88) Don’t know  
O (-99) Not applicable |
| 221 | Other, please specify:                                                   |                                                                       |
| 221.1 |                                                                         | (___________________________) days  
O (-99) Not applicable |
| 4.1.7 | **Other costs**                                                          |                                                                       |
| 4.1.7.1 | How much did you spent last season on…                                   |                                                                       |
| 223. | Warehouse facilities | \( \) VND<br>\( (\quad) \)<br>O (1) Won’t tell<br>O (-88) Don’t know<br>O (-99) Not applicable |
| 224. | Renting machines (excluding for irrigation) | \( \) VND<br>\( (\quad) \)<br>O (1) Won’t tell<br>O (-88) Don’t know<br>O (-99) Not applicable |
| 225. | New planting material (if applicable) | \( \) VND<br>\( (\quad) \)<br>O (1) Won’t tell<br>O (-88) Don’t know<br>O (-99) Not applicable |
| 226. | Transportation | \( \) VND<br>\( (\quad) \)<br>O (1) Won’t tell<br>O (-88) Don’t know<br>O (-99) Not applicable |
| 227. | Drying costs (energy) | \( \) VND<br>\( (\quad) \)<br>O (1) Won’t tell<br>O (-88) Don’t know<br>O (-99) Not applicable |
| 228. | Others, please specify: \( (\quad) \) | \( \) VND<br>\( (\quad) \)<br>O (-88) Don’t know<br>O (-99) Not applicable |

### 4.2 Turn over

| --- | How much did you earn from selling your coffee last season? | Unit | Volume |
| 229. | Production volume (green coffee) | \( (\quad) \) |
### Coffee trade

#### 5.1 Market access

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where did <strong>most</strong> of your market information come from during last season?</td>
<td>O (0) Local traders O (1) Local collector O (2) UTZ certified buyer O (3) Neighbours O (4) Media (TV, radio, newspaper, internet) O (5) Other, please specify:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>How many different buyers are active in your commune?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(____________________________________)</td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>To how many different buyers do you tend to sell your coffee to in a normal year?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(____________________________________)</td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
</tbody>
</table>
| 239. | Who was buying most of your coffee during last season (1 answer only, the rest is “no”!)? | O (0) Private Mill  
O (1) Cooperative  
O (2) Middleman/collector  
O (3) Local exporter  
O (4) International exporter  
O (5) Other, please specify:  
| | |  |
| 240. | For how many years have you been doing business with this entity? | #(___________________________)  
O (-88) Don’t know  |
| --- | Why do you tend to sell to this entity? (Do NOT read out options!) |  |
| 241. | Best price | O (1) Yes  
O (0) No  |
| 242. | Reliable partner | O (1) Yes  
O (0) No  |
| 243. | Demand for certified coffee | O (1) Yes  
O (0) No  |
| 244. | Only buyer available | O (1) Yes  
O (0) No  |
| 245. | Owed them money | O (1) Yes  
O (0) No  |
| 246. | They collect at farm gate | O (1) Yes  
O (0) No  |
| 247. | Other, please specify:  
(___________________________) |  |
| 248. | Compared to 2008 are there more, the same or fewer buyers interested in your coffee? | O (1) Fewer  
O (2) The same  
O (3) More  
O (-88) Don’t know  |
| 249. | Do you feel that the price you receive is fair in relation to the level of your production costs? | O (0) No, price should be higher  
O (1) No, price received was too high  
O (2) Yes, the price I get is good  
O (-88) Don’t know  |
| 5.2 Quality – price linkage | |  |
| 250. | Compared to 2008 did the quality of your coffee change (if no, go to q272)? | O (0) No  
O (1) Yes  
O (-88) Don’t know  |
| --- | How did it change? (Do NOT read out options!) | Worse  
Same  
Better  |

---
<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>251.</td>
<td>Share of red cherries in harvested coffee</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>252.</td>
<td>Defect rate in parchment or green coffee</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>253.</td>
<td>Moisture content</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>254.</td>
<td>Foreign matter</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>255.</td>
<td>Average bean size</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>256.</td>
<td>Other, please specify:</td>
<td>O (1) O (2) O (3)</td>
</tr>
<tr>
<td>257.</td>
<td>If your coffee quality changed, how did you learn that this was the case?</td>
<td>O (0) Feedback from certified buyer O (1) Feedback from other buyer O (2) From my own experience O (3) Other, please specify: (_________________________________) O (-88) Don’t know O (-99) Not applicable</td>
</tr>
<tr>
<td>258.</td>
<td>If you improved the quality of your coffee, what happened to the price you received for better quality coffee?</td>
<td>O (1) Nothing, price was the normal market price, irrespective of quality O (2) Better quality resulted in a better price compared to others with lower quality O (-88) Don’t know</td>
</tr>
<tr>
<td>259.</td>
<td>If you improved the quality of your coffee, where did the information you needed to do so come from? <strong>(Do NOT read out options!)</strong></td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>259.</td>
<td>Media (Newspaper or TV or radio)</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>260.</td>
<td>Neighbouring farmers</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>261.</td>
<td>Training from mass organisation</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>262.</td>
<td>Training from UTZ Certified entity</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>263.</td>
<td>Training from extension service</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
<tr>
<td>264.</td>
<td>Middleman</td>
<td>O (1) Yes O (0) No O (-99) Not applicable</td>
</tr>
</tbody>
</table>
### 6 Health and safety

| 272. | Compared to 2008, are there more, less or the same number of work place accidents that require first aid or medical assistance during last season? | O (0) Less | O (1) The same | O (2) More | O (-88) Don’t know | O (-99) Not applicable |
| 273. | How many work place accidents that required medical assistance did you experience last season? | #( ) | O (-88) Don’t know | O (-99) Not applicable |

### 6.1 Use of pesticides

<p>| 274. | Apply only when no wind | O (1) | O (0) | O (-99) |
| 275. | Walk backwards through the field to avoid contact with sprayed trees | O (1) | O (0) | O (-99) |
| 276. | Eat, drink and/or smoke during application | O (1) | O (0) | O (-99) |
| 277. | Put up a sign to warn passing people not | O (1) | O (0) | O (-99) |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
<th>Not appl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.</td>
<td>Store containers away from food, children and animals</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>279.</td>
<td>Spraying close to water ways</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>280.</td>
<td>Other, please specify: (___________________________)</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
</tbody>
</table>

### 6.2 Protective gear

#### --- When you apply pesticides, which of the following safety measures do you use? (Do NOT read out options!)

<table>
<thead>
<tr>
<th>Question</th>
<th>Safety Measure</th>
<th>Yes</th>
<th>No</th>
<th>Not appl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>281.</td>
<td>Wash hands after application</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>282.</td>
<td>Gloves</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>283.</td>
<td>Boots</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>284.</td>
<td>Glasses</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>285.</td>
<td>Neck cover</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>286.</td>
<td>Rain coat</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>287.</td>
<td>Rain pants</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>288.</td>
<td>One-piece waterproof suit</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>289.</td>
<td>Respirator</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
<tr>
<td>290.</td>
<td>Other, please specify: (___________________________)</td>
<td>O (1)</td>
<td>O (0)</td>
<td>O (-99)</td>
</tr>
</tbody>
</table>

### 7 Waste management

#### --- How do you dispose waste from your farming and processing operations?

<table>
<thead>
<tr>
<th>Question</th>
<th>Method of Disposal</th>
<th>Yes</th>
<th>No</th>
<th>Not appl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>291.</td>
<td>Empty fertiliser bags</td>
<td>O (0) Re-used at the farm</td>
<td>O (1) Burned</td>
<td>O (2) Buried</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (3) Landfill</td>
<td>O (4) Sold</td>
<td>O (5) Thrown away</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 292. | Pesticide containers | O (0) Re-used at the farm  
O (1) Burned  
O (2) Buried  
O (3) Central collection point  
O (4) Thrown away  
O (-99) Not applicable |
| 293. | Coffee processing waste | O (0) Re-used at the farm  
O (1) Sold  
O (2) Thrown away |

8 Labour relations

8.1 Contracting modalities

| 294. | What kind of agreements do you have with your workers? | O (1) Verbal agreement  
O (2) Written contract  
O (3) Other, please specify:  
( ) |

8.2 Payment modalities

| 295. | How much does a casual worker that works for you earn per day in cash? | ( ) VND  
O (-88) Don’t know  
O (-99) Not applicable |

---. Are there other benefits in addition to the cash payment?

| 296. | Free lunch | O (0) No  
O (1) Yes |
| 297. | Free lodging | O (0) No  
O (1) Yes |
| 298. | Other, please specify:  
( ) |

| 299. | How often do you pay your workers? | O (1) Daily  
O (2) Weekly  
O (3) Bi-weekly  
O (4) Monthly  
O (5) Piece rate  
O (-88) Don’t know  
O (-99) Not applicable |

9 Childrens’ living conditions

9.1 Access to education
<table>
<thead>
<tr>
<th>Qn</th>
<th>Question</th>
<th>Options</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>300.</td>
<td>How many sons do you have that are of school-going age?</td>
<td>( )</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>301.</td>
<td>And how many of them went to school?</td>
<td>( )</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>302.</td>
<td>How many daughters do you have of school-going age*</td>
<td>( )</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>303.</td>
<td>And how many of them go to school</td>
<td>( )</td>
<td>O (-99) Not applicable</td>
</tr>
<tr>
<td>---</td>
<td>If not, why not?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>304.</td>
<td>Kid(s) have to work to support the family</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>305.</td>
<td>Kid(s) prefer to work</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>306.</td>
<td>Too little money to pay school fees, uniforms, etc</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>307.</td>
<td>Other, please specify:</td>
<td>( )</td>
<td>O (0) No</td>
</tr>
</tbody>
</table>

* School-going age is until 16

9.2 Child labour

<table>
<thead>
<tr>
<th>Qn</th>
<th>Question</th>
<th>Options</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>308.</td>
<td>Do your children help on the farm?</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>---</td>
<td>If so, what do they do?</td>
<td>(Do NOT read out options!)</td>
<td></td>
</tr>
<tr>
<td>309.</td>
<td>Harvesting</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>310.</td>
<td>Pruning</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>311.</td>
<td>Weeding/irrigation</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>312.</td>
<td>Application of fertilizers</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>313.</td>
<td>Application of pesticides</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>314.</td>
<td>Processing</td>
<td>O (0) No</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td>315.</td>
<td>Others, please specify:</td>
<td>( )</td>
<td>O (0) No</td>
</tr>
</tbody>
</table>
316. If your children help on the farm, do they do so during school time?  O (0) No O (1) Yes O (-99) Not applicable

317. Does that still leave them enough time to do their homework and play?  O (0) No O (1) Yes O (-99) Not applicable

### 10 Natural resources

#### 10.1 Biodiversity, forest preservation

318. Do you cut trees for firewood or other purposes?  O (1) Yes  O (0) No

319. Compared to 2008 do you nowadays cut more, the same or less trees on your farm  
   O (0) Less  
   O (1) The same  
   O (2) More  
   O (-99) Not applicable

320. And outside your farm  
   O (0) Less  
   O (1) The same  
   O (2) More  
   O (-99) Not applicable

321. From 2008 up to now have you cut or burned land that was not previously used for agriculture to expand your coffee plantation?  O (1) Yes  O (0) No

#### 10.2 Waterways

---.  2008  This season (2011/12)

322. Did you grow coffee immediately next to water ways (stream, rivers, lakes) in 2008/09 and this season?  O (1) Yes  O (0) No  O (-99) Not applicable

### 11 Local context

#### 11.1 Institutional environment

323. How many banks are there in your area that provide credit to coffee farmers  
   (__________)  
   O (-88) Don’t know

324. And of how many have you made used over the past season?  
   (__________)  
   O (-88) Don’t know O (-99) Not applicable

---.  Which organisations that you know of provide coffee agronomy training in your area?

325. Extension service  O (1) Yes
<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>326</td>
<td>Farmers’ Union</td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>327</td>
<td>Women union</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>328</td>
<td>Research institute</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>329</td>
<td>Exporting companies</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>330</td>
<td>Plant protection department</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>331</td>
<td>NGO</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>332</td>
<td>Projects</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (-88) Don’t know</td>
</tr>
<tr>
<td>333</td>
<td>Other, please specify:</td>
<td>O (1) Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (0) No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>334</td>
<td>In general, how would you</td>
<td>Compared to 2008,</td>
</tr>
<tr>
<td></td>
<td>describe your trust in the</td>
<td>did this increase</td>
</tr>
<tr>
<td></td>
<td>following groups of people?</td>
<td>(=3), remain the same (=2) or</td>
</tr>
<tr>
<td></td>
<td>(ranging from very poor to</td>
<td>decrease (=1)?</td>
</tr>
<tr>
<td></td>
<td>very good)?</td>
<td></td>
</tr>
<tr>
<td>335</td>
<td>People from your own village</td>
<td>1=Very Poor,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2=Poor, 3=Not poor nor good, 4=Good,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5=Very good</td>
</tr>
<tr>
<td>336</td>
<td>Complete strangers</td>
<td>O (1), O (2), O (3), O (4), O (5),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1), O (2), O (3),</td>
</tr>
<tr>
<td>337</td>
<td>Local government officials</td>
<td>O (1), O (2), O (3), O (4), O (5),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1), O (2), O (3),</td>
</tr>
<tr>
<td>338</td>
<td>Central government officials</td>
<td>O (1), O (2), O (3), O (4), O (5),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1), O (2), O (3),</td>
</tr>
<tr>
<td>339</td>
<td>Agricultural Traders</td>
<td>O (1), O (2), O (3), O (4), O (5),</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O (1), O (2), O (3),</td>
</tr>
</tbody>
</table>
### Input trade network

#### 342. How many farming input shops were there in your commune in 2008 and today?
- 2008: \( \) \( O(-88) \) Don’t know
- Today: \( \) \( O(-88) \) Don’t know

#### 343. And of how many did you make use during last season?
- \( \) \( O(-99) \) Not applicable

### Support mechanisms (access to trainings, research)

#### 344. How many coffee related trainings from which organisation have you attended since 2008?
- Extension service: \( \) \( O(-88) \) Don't know
- Farmers’ Union: \( \) \( O(-88) \) Don’t know
- Women union: \( \) \( O(-88) \) Don’t know
- Research institute: \( \) \( O(-88) \) Don’t know
- Exporting companies: \( \) \( O(-88) \) Don’t know
- Plant protection department: \( \) \( O(-88) \) Don’t know
- NGO: \( \) \( O(-88) \) Don’t know
<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>351. Projects</td>
<td>O (588) Don't know</td>
</tr>
<tr>
<td>352. Other, please specify:</td>
<td>O (588) Don't know</td>
</tr>
<tr>
<td>353. What is the distance to the nearest coffee research station?</td>
<td>(_________________) km</td>
</tr>
<tr>
<td>354. Have you ever made use of the services of a research station?</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>--- If so, what for?</td>
<td></td>
</tr>
<tr>
<td>355. Soil fertility advice</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>356. Buying young coffee trees</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>357. Pest and disease control advice</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>358. Attend training course</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>359. Other, please specify:</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>360. Did you pay for these services?</td>
<td>O (0) No, O (1) Yes</td>
</tr>
<tr>
<td>361. If yes, how much</td>
<td>(_________________) VND</td>
</tr>
<tr>
<td></td>
<td>O (-88) Don't know</td>
</tr>
</tbody>
</table>

**12 Training**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>362. How satisfied are you with regard to your knowledge and skills in coffee cultivation and processing?</td>
<td>O (0) Not satisfied, I need to learn a lot more, O (1) Somewhat satisfied, I know the basics, O (2) Satisfied, O (3) Very satisfied, people ask me for advice</td>
</tr>
</tbody>
</table>

**12.1 Satisfaction and application**

--- For each of the following years please indicate if you received training on Good...
### Agricultural Practices?

<table>
<thead>
<tr>
<th>Year</th>
<th>Satisfaction</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>( ) O (-88) Don’t know</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>( ) O (-88) Don’t know</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>( ) O (-88) Don’t know</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>( ) O (-88) Don’t know</td>
<td></td>
</tr>
</tbody>
</table>

---

For each of the following years please indicate how satisfied you were with the training you received:

<table>
<thead>
<tr>
<th>Year</th>
<th>Satisfaction</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>O (0) Not satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Somewhat satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Very satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>O (0) Not satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Somewhat satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Very satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>O (0) Not satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Somewhat satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Very satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>O (0) Not satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) Somewhat satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Very satisfied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

---

How much of what you have learned do you apply in your farm for the following topics?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruning</td>
<td>O (0) None</td>
</tr>
<tr>
<td></td>
<td>O (1) Some practices</td>
</tr>
<tr>
<td></td>
<td>O (2) Half of practices</td>
</tr>
<tr>
<td></td>
<td>O (3) More than half of practices</td>
</tr>
<tr>
<td></td>
<td>O (4) All practices</td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
</tr>
</tbody>
</table>

---

If you did not apply all pruning practices, please indicate why:

<p>| Reason | |
|--------| |
|        | O (0) Taught techniques too labour intensive |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 373. | **Soil management** | O (1) Taught techniques not applicable  
O (2) Taught techniques too expensive  
O (3) Other, please specify:  
(________________________________  
___)  
O (-88) Don’t know  
O (-99) Not applicable  
O (0) None  
O (1) Some practices  
O (2) Half of practices  
O (3) More than half of practices  
O (4) All practices  
O (-99) Not applicable  |
| 374. | **If you did not apply all soil management practices, please indicate why** | O (0) Taught techniques too labour intensive  
O (1) Taught techniques not applicable  
O (2) Taught techniques too expensive  
O (3) Other, please specify:  
(________________________________  
___)  
O (-88) Don’t know  
O (-99) Not applicable  |
| 375. | **Pesticide application** | O (0) None  
O (1) Some practices  
O (2) Half of practices  
O (3) More than half of practices  
O (4) All practices  
O (-99) Not applicable  |
| 376. | **If you did not apply all fertilising practices, please indicate why** | O (0) Taught techniques too labour intensive  
O (1) Taught techniques not applicable  
O (2) Taught techniques too expensive  
O (3) Other, please specify:  
(________________________________  
___)  
O (-88) Don’t know  
O (-99) Not applicable  |
| 377. | **Irrigation** | O (0) None  
O (1) Some practices  
O (2) Half of practices  
O (3) More than half of practices  
O (4) All practices  
O (-99) Not applicable  |
<p>| 378. | <strong>If you did not apply all irrigation practices, please indicate why</strong> | O (0) Taught techniques too labour intensive |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>379.</td>
<td><strong>Harvesting</strong></td>
<td>O (1) Taught techniques not applicable O (2) Taught techniques too expensive O (3) Other, please specify: (___________________________________) O (-88) Don’t know O (-99) Not applicable</td>
</tr>
<tr>
<td>380.</td>
<td>If you did not apply all harvesting practices, please indicate why</td>
<td>O (0) None O (1) Some practices O (2) Half of practices O (3) More than half of practices O (4) All practices O (-99) Not applicable</td>
</tr>
<tr>
<td>381.</td>
<td><strong>Processing</strong></td>
<td>O (0) Taught techniques too labour intensive O (1) Taught techniques not applicable O (2) Taught techniques too expensive O (3) Other, please specify: (___________________________________) O (-88) Don’t know O (-99) Not applicable</td>
</tr>
<tr>
<td>382.</td>
<td>If you did not apply all processing practices, please indicate why</td>
<td>O (0) None O (1) Some practices O (2) Half of practices O (3) More than half of practices O (4) All practices O (-99) Not applicable</td>
</tr>
<tr>
<td>383.</td>
<td><strong>Community development</strong></td>
<td>O (0) None O (1) Some practices O (2) Half of practices O (3) More than half of practices O (4) All practices O (-99) Not applicable</td>
</tr>
<tr>
<td>384.</td>
<td>If you did not apply all community development practices, please indicate</td>
<td>O (0) Not required in my community O (1) Taught techniques not applicable</td>
</tr>
<tr>
<td>Question</td>
<td>Options</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| 385. Why Community members are not keen to collaborate?                 | 0 (2) Community members are not keen to collaborate  
  0 (3) Other, please specify:                                           |
|                                                                         | (__________________________________)                                     |
|                                                                         | 0 (-88) Don’t know                                                   |
|                                                                         | 0 (-99) Not applicable                                               |
| 386. If you did not apply all business development practices, please indicate why | 0 (0) Taught techniques too labour intensive  
  0 (1) Taught techniques not applicable  
  0 (2) Taught techniques too expensive  
  0 (3) Other, please specify:                                           |
|                                                                         | (__________________________________)                                     |
|                                                                         | 0 (-88) Don’t know                                                   |
|                                                                         | 0 (-99) Not applicable                                               |
| 387. Organisation or cooperative development                             | 0 (0) None  
  0 (1) Some practices  
  0 (2) Half of practices  
  0 (3) More than half of practices  
  0 (4) All practices  
  0 (-99) Not applicable                                                |
| 388. If you did not apply all organisational development practices, please indicate why | 0 (0) Not keen to join a farmer organisation  
  0 (1) Lack of trust among farmers hinders development of organisation  
  0 (2) There is no one to take initiative (and I don’t dare to)  
  0 (3) Other, please specify:                                           |
|                                                                         | (__________________________________)                                     |
|                                                                         | 0 (-88) Don’t know                                                   |
|                                                                         | 0 (-99) Not applicable                                               |
| 12.2 Organisation                                                        |                                                                        |
| 389. Since 2008, how many different trainers have you had?              | (___________________________________)                               |
|                                                                         | 0 (-88) Don’t know                                                   |
| 390. Does the training always take place at the same type of venue?     | 0 (0) No  
  0 (1) Yes                                                        |
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
</table>
| 391. Where does the training normally take place? | O (0) Farmer’s house and field  
O (1) Only meeting room in commune  
O (2) Meeting room in commune and field  
O (3) Only meeting room in district  
O (4) Other, please specify: ____________________________ |
| 392. How far do you normally have to travel to attend the training? | O (0) < 10 minutes  
O (1) 11 to 20 minutes  
O (2) 21 to 30 minutes  
O (3) > 30 minutes |
| 393. Is distance to the training venue an impediment to attend training? | O (0) No  
O (1) Yes |
| 394. How many farmers are usually present for training? | O (588) Don’t know |
| 395. Do you receive a financial compensation to attend training? If so, how much per session? | O (599) Not applicable |
| 396. Do you have a chance to evaluate the trainer? | O (0) No  
O (1) Yes |
| 397. How satisfied are you with the organisation of the training? | O (0) Not satisfied  
O (1) Somewhat satisfied  
O (2) Satisfied  
O (3) Very satisfied  
O (-99) Not applicable |
| 398. If you are not (very) satisfied, can you indicate why? | Please specify: ____________________________ |

12.3 Level of participation

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
</table>
| 399. When you receive training how is the decision made on which topics you will receive training? | O (0) The organiser decides, I have no influence  
O (1) The organiser decides, but I can request other topics as well  
O (2) The group of farmers decide  
O (4) Other, please specify: ____________________________ |
| 400. During a typical training session, how much time is spent on: Lecture in meeting room | O (0) None  
O (1) Less than half  
O (2) Half  
O (3) More than half  
O (4) All |
### 401. Discussion with colleagues
- O (0) None
- O (1) Less than half
- O (2) Half
- O (3) More than half
- O (4) All

### 402. Practice in field
- O (0) None
- O (1) Less than half
- O (2) Half
- O (3) More than half
- O (4) All

### 403. How satisfied are you with the ratio between lecture, discussion and practice?
- O (0) Not satisfied
- O (1) Somewhat satisfied
- O (2) Satisfied
- O (3) Very satisfied
- O (-99) Not applicable

### 404. Lecture
- O (0) Less
- O (1) Same
- O (2) More

### 405. Discussion
- O (0) Less
- O (1) Same
- O (2) More

### 406. Practice
- O (0) Less
- O (1) Same
- O (2) More

### 407. Do you feel there is sufficient opportunity to ask questions during training
- O (0) No
- O (1) Yes

### 12.4 Intensity

### 408. Of the trainings you have received over the last 4 years, how long does the average training take?
- (______________ ) day
- O (-88) Don’t know

### 12.5 Curriculum

### 409. How many different topics (such as pruning, fertilising, etc) are typically discussed during 1 training session?
- O (1) 1
- O (2) 2
- O (3) 3
- O (4) >3

### 410. Does the sequence of topics that you are trained on follow the crop cycle?
- O (0) No
- O (1) Yes

### 12.6 Quality of trainer

### --- How do you rate the trainer that you received most training from in terms of

### 411. Knowledge of the subject
- O (1) Very good
- O (2) Good
| 412. | Preparation for the session | O (3) Not poor, nor good O (4) Poor O (5) Very Poor |
| 413. | Training style | O (1) Very good O (2) Good O (3) Not poor, nor good O (4) Poor O (5) Very Poor |
| 414. | Responsiveness to the group | O (1) Very good O (2) Good O (3) Not poor, nor good O (4) Poor O (5) Very Poor |
| 415. | Ability to guide discussion | O (1) Very good O (2) Good O (3) Not poor, nor good O (4) Poor O (5) Very Poor |
| 416. | Taking care of good learning atmosphere in the group | O (1) Very good O (2) Good O (3) Not poor, nor good O (4) Poor O (5) Very Poor |

12.7 Communication

417. How often do you talk to others about the things you have learned during trainings?
O (0) Never O (1) Rarely O (2) Sometimes O (3) Quite often O (4) Often

418. Can you estimate with how many people you typically discuss what you have learned?

(________________________________________)
O (-88) Don’t know

13 Satisfaction with project/certification

NOT for control group!

---. What expectations did you have prior to joining the project/UTZ (Do NOT read out options!)
O (0) No O (1) Yes

419. None in particular O (0) No O (1) Yes
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>420.</td>
<td>Access to trainings</td>
</tr>
<tr>
<td>421.</td>
<td>Prospect of better prices based on better quality</td>
</tr>
<tr>
<td>422.</td>
<td>Access to farm inputs and/or tools</td>
</tr>
<tr>
<td>423.</td>
<td>Access to finance</td>
</tr>
</tbody>
</table>
|424. | Other, please specify:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>425.</td>
<td>Were your expectations met?</td>
</tr>
<tr>
<td>426.</td>
<td>Little or no training</td>
</tr>
<tr>
<td>427.</td>
<td>Price increase was absent</td>
</tr>
<tr>
<td>428.</td>
<td>Certification is too costly in terms of record keeping, environmental issues, etc</td>
</tr>
<tr>
<td>429.</td>
<td>Promised premium was disappointing</td>
</tr>
</tbody>
</table>
|430. | Other, please specify:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>431.</td>
<td>None in particular</td>
</tr>
<tr>
<td>432.</td>
<td>Access to trainings</td>
</tr>
<tr>
<td>433.</td>
<td>Prospect of better prices based on better quality</td>
</tr>
<tr>
<td>434.</td>
<td>Access to farm inputs and/or tools</td>
</tr>
<tr>
<td>435.</td>
<td>Access to finance</td>
</tr>
</tbody>
</table>
|436. | Other, please specify:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>437.</td>
<td>When did you obtain UTZ certification?</td>
</tr>
</tbody>
</table>
438. **(For the interviewer) Which group does the man belong to?**

|   | Yyyymm (_______ / ______)  
Use numbers only: September 2010 = 2010/09 |
|---|---------------------------------|
|   | (1) Project 1  
(2) Project 2  
(3) Project 3  
(4) Project 4  
(5) Project 5  
(6) Control group Dak Lak  
(7) Control group Gia Lai |
### Annex IVb: Questionnaire trainers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Interview nr</td>
</tr>
<tr>
<td>2.</td>
<td>Name of interviewer</td>
</tr>
<tr>
<td>3.</td>
<td>Date of interview</td>
</tr>
<tr>
<td>4.</td>
<td>Name of supervisor</td>
</tr>
<tr>
<td>5.</td>
<td>Date checked</td>
</tr>
</tbody>
</table>

#### General information - trainer

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Name of respondent</td>
</tr>
<tr>
<td>7.</td>
<td>What year were you born?</td>
</tr>
<tr>
<td>8.</td>
<td>Phone number</td>
</tr>
<tr>
<td>9.</td>
<td>What is the gender of respondent</td>
</tr>
<tr>
<td>10.</td>
<td>Education level respondent</td>
</tr>
<tr>
<td>11.</td>
<td>Educational specialisation, if any</td>
</tr>
<tr>
<td>12.</td>
<td>Who is your regular employer?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>13.</td>
<td>Were your parents farmers?</td>
</tr>
<tr>
<td>14.</td>
<td>Do you have a coffee farm yourself</td>
</tr>
<tr>
<td>15.</td>
<td>Does your partner have a coffee farm</td>
</tr>
<tr>
<td>16.</td>
<td>Did/do your parents have a coffee farm</td>
</tr>
<tr>
<td>17.</td>
<td>How many years have you been giving training on agriculture?</td>
</tr>
<tr>
<td>18.</td>
<td>How many years have you been giving training in coffee?</td>
</tr>
<tr>
<td>19.</td>
<td>Over the past year how much of your working time would you estimate to be spent on giving training?</td>
</tr>
<tr>
<td>20.</td>
<td>Do you live in one of the communes where you give training?</td>
</tr>
</tbody>
</table>

- For which of the projects does this trainer provide training services?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>O (0) No O (1) Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Project 1</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>22.</td>
<td>Project 2</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>23.</td>
<td>Project 3</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>24.</td>
<td>Project 4</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>25.</td>
<td>Project 5</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>26.</td>
<td>Other, please specify:</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>27.</td>
<td>Other, please specify:</td>
<td>O (0) No O (1) Yes</td>
</tr>
<tr>
<td>28.</td>
<td>Other, please specify:</td>
<td>O (0) No O (1) Yes</td>
</tr>
</tbody>
</table>

All subsequent questions refer to trainings the project selected under q22 to q26!

**Training**

**Organisation**
29. When did you start working with this project

---

30. In which of the following communes does the trainer give training?

<table>
<thead>
<tr>
<th>Commune</th>
<th>Yes</th>
<th>No</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ea Quang</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Hoa Tien</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Yong</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Kenh</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Quang Tien</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Tam</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Buon Trap</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Ko</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Cua Bua</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Al Ba</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Iah Lop</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Dun</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Chu Se Township</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ia Sao</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ia Yok</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Phe</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ea Toh</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Hoa Thang</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Ia Tien</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Chu Pong</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Nghia Hung</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Tra Da</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

52. What topics does the trainer give training on?

<table>
<thead>
<tr>
<th>Topic</th>
<th>Yes</th>
<th>No</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of Code of conduct of UTZ</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Good agricultural practices (GAP)</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Processing</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Organisational development</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Community development</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Health and safety</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Business development and entrepreneurship</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Other, please specify:</td>
<td>O</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60.</td>
<td>How many of the above topics are typically given in one and the same farmer training session?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No integration of topics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61.</td>
<td>Application of Code of conduct of UTZ</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62.</td>
<td>Good agricultural practices (GAP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63.</td>
<td>Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64.</td>
<td>Organisational development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65.</td>
<td>Community development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66.</td>
<td>Health and safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67.</td>
<td>Business development and entrepreneurship</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68.</td>
<td>Where are GAP training session usually given?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (1) In village of farmers, communal meeting room</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) In village of farmers, farmer’s house</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Outside the village in commune centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (4) Outside the village in district centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (5) Other, please specify:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.</td>
<td>How many trainers are there normally in a GAP training session?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.</td>
<td>Does the same trainer usually train the same group?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How many participants are there usually in a training session on:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71.</td>
<td>Application of Code of conduct of UTZ</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.</td>
<td>Good agricultural practices (GAP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73.</td>
<td>Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74.</td>
<td>Organisational development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75.</td>
<td>Community development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76.</td>
<td>Business development and entrepreneurship</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77. Do farmers get an allowance to attend the training, if so how much?</td>
<td>O (0) No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(______________________) VND/session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78. What would you estimate is the average annual attendance rate of the</td>
<td>(%)%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>members of the groups you train on GAP?</td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79. Do participants get handouts of the GAP training content to take</td>
<td>O (1) Never</td>
<td></td>
<td></td>
</tr>
<tr>
<td>home?</td>
<td>O (2) Only first time a farmer attends a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>session</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) More than once, but not always</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (4) Every time a farmer attends a session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80. How would you describe the handouts?</td>
<td>O (1) Black and white A4 copy, no pictures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Black and white A4 copy with pictures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Color A4 copy with pictures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (4) Black and white book, no picture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (5) Black and white book, with pictures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (6) Color book</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81. Can you estimate how many pages of handouts or books each</td>
<td>(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>participant receives in a year for the topics you train on?</td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82. Can you estimate how much the training costs are per farmer?</td>
<td>(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>83. Is the training evaluated?</td>
<td>O (0) No O (1) Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84. How often is the GAP training evaluated per year?</td>
<td>(%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-88) Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85. How is the GAP training usually evaluated?</td>
<td>O (1) Verbally during the session</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) In writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Other, please specify:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>()</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>86. By whom is the GAP training usually evaluated?</td>
<td>O (1) Organising entity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (2) Participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (3) Authorities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (4) Other, please specify</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>()</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O (-99) Not applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
87. **By whom are the majority of the decisions on GAP training content made?**
   - O (0) Organizing entity
   - O (1) By the farmer group
   - O (2) By the farmer group and organizing entity
   - O (3) By the lead farmer(s)
   - O (4) By the trainer
   - O (5) By the trainer and the organizing entity
   - O (6) By the trainer and farmers together
   - O (7) Other, please specify

88. **Of all the agricultural training sessions, can you estimate what share of the topics includes field practice?**
   - ( )
   - O (-88) Don’t know

---

**For those sessions that include field practice, how much time is spent on:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>89. Lecturing</td>
<td>(     ) h</td>
</tr>
<tr>
<td>90. Discussion between participants</td>
<td>(     ) h</td>
</tr>
<tr>
<td>91. Discussion between participants and trainers</td>
<td>(     ) h</td>
</tr>
<tr>
<td>92. Practice in the coffee field</td>
<td>(     ) h</td>
</tr>
</tbody>
</table>

---

**For the remaining sessions that do not include field practice, can you estimate how much time is spent on:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>93. Lecturing</td>
<td>(     ) h</td>
</tr>
<tr>
<td>94. Discussion between participants</td>
<td>(     ) h</td>
</tr>
<tr>
<td>95. Discussion between participants and trainers</td>
<td>(     ) h</td>
</tr>
</tbody>
</table>

---

**Topics and timing**

**Which of the following topics are discussed during the (GAP) training?**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Yes (0)</th>
<th>No (1)</th>
<th>Given by colleague (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>96. Planting coffee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97. Nursery management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98. Grafting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99. Soil management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100. Fertiliser/nutrient management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>101. Irrigation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Page | 162
<table>
<thead>
<tr>
<th>Question</th>
<th>Topic</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Weed control</td>
<td>O (0) No O (1) Yes O (2) Yes, but given by colleague</td>
</tr>
<tr>
<td>103</td>
<td>Pest and disease control</td>
<td>O (0) No O (1) Yes O (2) Yes, but given by colleague</td>
</tr>
<tr>
<td>104</td>
<td>Pruning</td>
<td>O (0) No O (1) Yes O (2) Yes, but given by colleague</td>
</tr>
<tr>
<td>105</td>
<td>Harvesting</td>
<td>O (0) No O (1) Yes O (2) Yes, but given by colleague</td>
</tr>
<tr>
<td>106</td>
<td>Processing</td>
<td>O (0) No O (1) Yes O (2) Yes, but given by colleague</td>
</tr>
<tr>
<td>107</td>
<td>How many of the above topics do you</td>
<td></td>
</tr>
<tr>
<td></td>
<td>typically discuss in ONE training session?</td>
<td>(__________________ )</td>
</tr>
<tr>
<td>108</td>
<td>Planting coffee</td>
<td></td>
</tr>
<tr>
<td>109</td>
<td>Nursery management</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>Grafting</td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>Soil management</td>
<td></td>
</tr>
<tr>
<td>112</td>
<td>Fertiliser/nutrient management</td>
<td></td>
</tr>
<tr>
<td>113</td>
<td>Irrigation</td>
<td></td>
</tr>
<tr>
<td>114</td>
<td>Weed control</td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>Pest and disease control</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>Pruning</td>
<td></td>
</tr>
<tr>
<td>117</td>
<td>Harvesting</td>
<td></td>
</tr>
<tr>
<td>118</td>
<td>Processing</td>
<td></td>
</tr>
</tbody>
</table>

### Training of trainers

<table>
<thead>
<tr>
<th>Year</th>
<th>How many technical workshops (also called Training of Trainers) on agri techniques have you attended in each of the following years</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
<td>2008</td>
</tr>
<tr>
<td>120</td>
<td>2009</td>
</tr>
<tr>
<td>121</td>
<td>2010</td>
</tr>
<tr>
<td>122</td>
<td>2011</td>
</tr>
</tbody>
</table>
|   |   | O (-88) Don’t know (but did attend)  
|---|---|---|
| 123. | Which organization gave the majority of the technical trainings you attended? | O (1) WASI/EAKMAT  
|   |   | O (2) UTZ  
|   |   | O (3) CafeControl  
|   |   | O (4) Extension Service  
|   |   | O (5) Project or company staff  
|   |   | O (6) External consultant  
|   |   | O (7) Mass organisation  
|   |   | O (8) Other, please specify  
|   |   | (   )  
|   |   | (   )  

--- How many workshops on training methodology also called training of trainers, have you attended in each of the following years

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 124. | 2008 | (__________) | O (-88) Don’t know (but did attend)  
|   |   |   | O (-99) Not applicable  
| 125. | 2009 | (__________) | O (-88) Don’t know (but did attend)  
|   |   |   | O (-99) Not applicable  
| 126. | 2010 | (__________) | O (-88) Don’t know (but did attend)  
|   |   |   | O (-99) Not applicable  
| 127. | 2011 | (__________) | O (-88) Don’t know (but did attend)  
|   |   |   | O (-99) Not applicable  
| 128. | Which organization gave the majority of the training methodology trainings that you attended? | O (1) WASI/EAKMAT  
|   |   | O (2) UTZ  
|   |   | O (3) CafeControl  
|   |   | O (4) Extension Service  
|   |   | O (5) Project or company staff  
|   |   | O (6) External consultant  
|   |   | O (7) Mass organisation  
|   |   | O (8) Other, please specify  
|   |   | (   )  
|   |   | (   )  


## Annex V: Livelihood capital indices

<table>
<thead>
<tr>
<th>Label</th>
<th>Mean</th>
<th>T1 mean</th>
<th>T2 mean</th>
<th>T3 mean</th>
<th>T4 mean</th>
<th>Control Dak Lak</th>
<th>Control Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>dif</td>
<td>dif</td>
<td>dif</td>
<td>dif</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>sig</td>
<td>sig</td>
<td>sig</td>
<td>sig</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.96</td>
<td>0.94</td>
<td>-0.03</td>
<td>0.99</td>
<td>0.98</td>
<td>0.95</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.84</td>
<td>0.77</td>
<td>-0.07</td>
<td>0.99</td>
<td>1.00</td>
<td>0.88</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.22</td>
<td>0.26</td>
<td>0.05</td>
<td>0.21</td>
<td>0.17</td>
<td>0.22</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.22</td>
<td>0.22</td>
<td>0.00</td>
<td>0.24</td>
<td>0.19</td>
<td>0.25</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.36</td>
<td>0.39</td>
<td>0.03</td>
<td>0.35</td>
<td>0.33</td>
<td>0.36</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.64</td>
<td>0.62</td>
<td>-0.02</td>
<td>0.66</td>
<td>0.74</td>
<td>0.62</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.08</td>
<td>0.13</td>
<td>0.05</td>
<td>0.13</td>
<td>0.05</td>
<td>0.07</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.16</td>
<td>0.23</td>
<td>0.07</td>
<td>0.08</td>
<td>0.00</td>
<td>0.21</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.87</td>
<td>0.88</td>
<td>0.01</td>
<td>0.82</td>
<td>0.94</td>
<td>0.94</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.48</td>
<td>0.49</td>
<td>0.01</td>
<td>0.49</td>
<td>0.48</td>
<td>0.50</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.20</td>
<td>0.06</td>
<td>0.04</td>
<td>0.42</td>
<td>0.23</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.54</td>
<td>0.65</td>
<td>0.11</td>
<td>0.53</td>
<td>0.42</td>
<td>0.52</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.30</td>
<td>0.38</td>
<td>0.08</td>
<td>0.24</td>
<td>0.09</td>
<td>0.32</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.53</td>
<td>0.63</td>
<td>0.10</td>
<td>0.49</td>
<td>0.43</td>
<td>0.56</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.46</td>
<td>0.02</td>
<td>0.33</td>
<td>0.32</td>
<td>0.45</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.28</td>
<td>0.38</td>
<td>0.10</td>
<td>0.47</td>
<td>0.22</td>
<td>0.20</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.19</td>
<td>0.06</td>
<td>0.11</td>
<td>0.10</td>
<td>0.14</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td>0.41</td>
<td>0.08</td>
<td>0.32</td>
<td>0.22</td>
<td>0.34</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.46</td>
<td>0.46</td>
<td>-0.24</td>
<td>-0.70</td>
<td>0.06</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.78</td>
<td>0.67</td>
<td>-0.11</td>
<td>0.74</td>
<td>0.93</td>
<td>0.71</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.12</td>
<td>0.08</td>
<td>-0.05</td>
<td>0.13</td>
<td>0.15</td>
<td>0.15</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.91</td>
<td>0.77</td>
<td>-0.14</td>
<td>0.97</td>
<td>0.97</td>
<td>0.81</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.48</td>
<td>0.43</td>
<td>-0.05</td>
<td>0.55</td>
<td>0.49</td>
<td>0.30</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.32</td>
<td>0.26</td>
<td>-0.06</td>
<td>0.40</td>
<td>0.37</td>
<td>0.32</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>0.44</td>
<td>-0.08</td>
<td>0.56</td>
<td>0.49</td>
<td>0.52</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.33</td>
<td>-0.33</td>
<td>0.17</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.87</td>
<td>0.80</td>
<td>-0.07</td>
<td>0.92</td>
<td>0.93</td>
<td>0.96</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.90</td>
<td>0.85</td>
<td>-0.05</td>
<td>0.97</td>
<td>0.97</td>
<td>0.93</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.68</td>
<td>0.24</td>
<td>0.26</td>
<td>0.56</td>
<td>0.65</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>0.49</td>
<td>-0.03</td>
<td>0.57</td>
<td>0.37</td>
<td>0.37</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.41</td>
<td>0.25</td>
<td>-0.16</td>
<td>0.39</td>
<td>0.67</td>
<td>0.49</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.77</td>
<td>0.82</td>
<td>0.05</td>
<td>0.84</td>
<td>0.83</td>
<td>0.80</td>
<td>0.64</td>
</tr>
<tr>
<td>Label</td>
<td>Mean</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T4</td>
<td>Control Dak Lak</td>
<td>Control Gia Lai</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Physical capital weighted index</td>
<td>0.65</td>
<td>-0.13</td>
<td>0.00</td>
<td>0.66</td>
<td>0.01</td>
<td>1%</td>
<td>0.65</td>
</tr>
<tr>
<td>Physical capital first factor</td>
<td>0.00</td>
<td>-0.13</td>
<td>-0.13</td>
<td>0.14</td>
<td>0.14</td>
<td>1%</td>
<td>0.18</td>
</tr>
<tr>
<td>Creditworthiness</td>
<td>0.63</td>
<td>0.65</td>
<td>0.02</td>
<td>0.56</td>
<td>-0.07</td>
<td>5%</td>
<td>0.66</td>
</tr>
<tr>
<td>Ownership farm</td>
<td>0.79</td>
<td>0.91</td>
<td>0.12</td>
<td>0.93</td>
<td>0.15</td>
<td>1%</td>
<td>0.43</td>
</tr>
<tr>
<td>Housing</td>
<td>0.49</td>
<td>0.50</td>
<td>0.01</td>
<td>0.48</td>
<td>-0.01</td>
<td>5%</td>
<td>0.50</td>
</tr>
<tr>
<td>Electric equipment</td>
<td>0.55</td>
<td>0.51</td>
<td>-0.04</td>
<td>0.64</td>
<td>0.09</td>
<td>1%</td>
<td>0.67</td>
</tr>
<tr>
<td>Communication s</td>
<td>0.30</td>
<td>0.24</td>
<td>-0.06</td>
<td>0.33</td>
<td>0.04</td>
<td>5%</td>
<td>0.35</td>
</tr>
<tr>
<td>Transportation</td>
<td>0.51</td>
<td>0.57</td>
<td>0.06</td>
<td>0.50</td>
<td>-0.01</td>
<td>10%</td>
<td>0.53</td>
</tr>
<tr>
<td>Financial capital weighted index</td>
<td>0.54</td>
<td>0.56</td>
<td>0.02</td>
<td>0.57</td>
<td>0.03</td>
<td>5%</td>
<td>0.52</td>
</tr>
<tr>
<td>Financial capital first factor</td>
<td>0.00</td>
<td>-0.08</td>
<td>-0.08</td>
<td>0.13</td>
<td>0.13</td>
<td>1%</td>
<td>0.27</td>
</tr>
<tr>
<td>Input suppliers in commune</td>
<td>0.10</td>
<td>0.08</td>
<td>-0.02</td>
<td>1%</td>
<td>0.137</td>
<td>0.04</td>
<td>1%</td>
</tr>
<tr>
<td>Distance research station</td>
<td>0.68</td>
<td>0.84</td>
<td>0.16</td>
<td>1%</td>
<td>0.49</td>
<td>-0.19</td>
<td>1%</td>
</tr>
<tr>
<td>Extension budget district</td>
<td>0.42</td>
<td>0</td>
<td>-0.42</td>
<td>1%</td>
<td>0.987</td>
<td>0.57</td>
<td>1%</td>
</tr>
<tr>
<td>Number of government coffee programs</td>
<td>0.07</td>
<td>0</td>
<td>-0.07</td>
<td>1%</td>
<td>0</td>
<td>-0.07</td>
<td>1%</td>
</tr>
<tr>
<td>Credit suppliers in commune</td>
<td>0.29</td>
<td>0.223</td>
<td>-0.06</td>
<td>1%</td>
<td>0.469</td>
<td>0.18</td>
<td>1%</td>
</tr>
<tr>
<td>Institutional Capital Weighted Index</td>
<td>0.25</td>
<td>0.23</td>
<td>-0.02</td>
<td>1%</td>
<td>0.42</td>
<td>0.17</td>
<td>1%</td>
</tr>
<tr>
<td>Institutional Capital Factor 1</td>
<td>0.00</td>
<td>-0.57</td>
<td>-0.57</td>
<td>1%</td>
<td>0.59</td>
<td>0.59</td>
<td>1%</td>
</tr>
</tbody>
</table>
## Annex VI: Training indices

<table>
<thead>
<tr>
<th>I</th>
<th>Label indices (all scaled)</th>
<th>Mean</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>Con Gr. Dak Lak</th>
<th>Con Gr. Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Number of trainers</td>
<td>0.71</td>
<td>0.67</td>
<td>0.67</td>
<td>0.78</td>
<td>0.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same trainer same group</td>
<td>0.33</td>
<td>0.52</td>
<td>0.39</td>
<td>0.67</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Location training distance</td>
<td>0.81</td>
<td>0.76</td>
<td>0.81</td>
<td>0.86</td>
<td>0.85</td>
<td>0.74</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Number of participants</td>
<td>0.54</td>
<td>0.60</td>
<td>0.63</td>
<td>0.61</td>
<td>0.43</td>
<td>0.52</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>Average group size training</td>
<td>0.57</td>
<td>0.92</td>
<td>0.92</td>
<td>0.20</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attendance rate</td>
<td>0.85</td>
<td>0.84</td>
<td>0.80</td>
<td>0.97</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handouts frequency</td>
<td>0.76</td>
<td>0.99</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handouts pages</td>
<td>0.57</td>
<td>0.97</td>
<td>0.74</td>
<td>0.54</td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handout quality</td>
<td>0.59</td>
<td>0.52</td>
<td>0.43</td>
<td>0.33</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Financial compensation (hh)</td>
<td>0.61</td>
<td>0.73</td>
<td>0.32</td>
<td>0.39</td>
<td>0.76</td>
<td>0.81</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>Evaluation training</td>
<td>0.56</td>
<td>0.62</td>
<td>0.57</td>
<td>0.55</td>
<td>0.52</td>
<td>0.58</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Number of evaluations</td>
<td>0.43</td>
<td>0.83</td>
<td>0.55</td>
<td>0.23</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfaction organisation training</td>
<td>0.64</td>
<td>0.67</td>
<td>0.63</td>
<td>0.64</td>
<td>0.63</td>
<td>0.65</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Training index 1A - Training Organisation</td>
<td>0.61</td>
<td>0.74</td>
<td>0.65</td>
<td>0.57</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1A - Training Organisation, without hh</td>
<td>0.60</td>
<td>0.78</td>
<td>0.69</td>
<td>0.55</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Choice of topics producer</td>
<td>0.14</td>
<td>0.18</td>
<td>0.16</td>
<td>0.23</td>
<td>0.11</td>
<td>0.14</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>Choice of topics training</td>
<td>0.58</td>
<td>0.72</td>
<td>0.59</td>
<td>0.25</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Participatory training index producer</td>
<td>0.77</td>
<td>0.80</td>
<td>0.84</td>
<td>0.93</td>
<td>0.63</td>
<td>0.70</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Participatory training index trainer</td>
<td>0.79</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asking questions</td>
<td>0.82</td>
<td>0.86</td>
<td>0.87</td>
<td>0.91</td>
<td>0.72</td>
<td>0.81</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Satisfaction method</td>
<td>0.51</td>
<td>0.56</td>
<td>0.54</td>
<td>0.57</td>
<td>0.37</td>
<td>0.53</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Training index 1A - Training Participation</td>
<td>0.61</td>
<td>0.69</td>
<td>0.67</td>
<td>0.65</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1A - Training Participation, without hh</td>
<td>0.69</td>
<td>0.86</td>
<td>0.80</td>
<td>0.63</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Average nr of trainings in last four years</td>
<td>0.12</td>
<td>0.16</td>
<td>0.16</td>
<td>0.11</td>
<td>0.12</td>
<td>0.06</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Duration training</td>
<td>0.79</td>
<td>0.87</td>
<td>0.97</td>
<td>0.91</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1C - Training Intensity</td>
<td>0.46</td>
<td>0.51</td>
<td>0.56</td>
<td>0.51</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1C - Training Intensity, without hh data</td>
<td>0.79</td>
<td>0.87</td>
<td>0.97</td>
<td>0.91</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Number of topics discussed</td>
<td>0.80</td>
<td>0.94</td>
<td>0.99</td>
<td>0.73</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Logical sequence of topics - trainers</td>
<td>0.58</td>
<td>0.67</td>
<td>0.50</td>
<td>0.48</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Logical sequence of topics - producers</td>
<td>0.60</td>
<td>0.57</td>
<td>0.66</td>
<td>0.66</td>
<td>0.62</td>
<td>0.44</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Training index 1D - Training Curriculum</td>
<td>0.67</td>
<td>0.73</td>
<td>0.71</td>
<td>0.62</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1D - Training Curriculum, without hh data</td>
<td>0.69</td>
<td>0.81</td>
<td>0.75</td>
<td>0.61</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Training index 1 - Training</td>
<td>0.59</td>
<td>0.67</td>
<td>0.65</td>
<td>0.59</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 1 - Training without hh data</td>
<td>0.69</td>
<td>0.83</td>
<td>0.80</td>
<td>0.67</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Average years of agricultural training experience in commune</td>
<td>0.65</td>
<td>0.41</td>
<td>0.60</td>
<td>0.89</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Label indices (all scaled)</td>
<td>Mean</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T4</td>
<td>Con Gr. Dak Lak</td>
<td>Con Gr. Gia Lai</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------</td>
<td>------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average years of coffee training experience in commune</td>
<td>0.58</td>
<td>0.40</td>
<td>0.50</td>
<td>0.60</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average technical trainings received by trainer</td>
<td>0.53</td>
<td>0.74</td>
<td>0.74</td>
<td>0.00</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average methodological trainings received by trainer</td>
<td>0.51</td>
<td>0.69</td>
<td>0.24</td>
<td>0.19</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trainer index 2A - Trainer Experience</td>
<td>0.57</td>
<td>0.56</td>
<td>0.52</td>
<td>0.42</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Average age training in commune</td>
<td>0.81</td>
<td>0.88</td>
<td>0.89</td>
<td>0.71</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average education trainer in commune</td>
<td>0.87</td>
<td>0.65</td>
<td>0.88</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average specialisation trainer in commune</td>
<td>0.59</td>
<td>0.00</td>
<td>0.42</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average ownership coffee farm by trainer or parents in commune</td>
<td>0.56</td>
<td>0.95</td>
<td>0.56</td>
<td>0.26</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average residence trainer in commune from same village</td>
<td>0.66</td>
<td>1.00</td>
<td>0.84</td>
<td>0.67</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trainer index 2B - Trainer Background</td>
<td>0.70</td>
<td>0.70</td>
<td>0.72</td>
<td>0.73</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>Rating trainer - knowledge of subject</td>
<td>0.35</td>
<td>0.35</td>
<td>0.37</td>
<td>0.33</td>
<td>0.34</td>
<td>0.40</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Rating trainer - preparation for the session</td>
<td>0.36</td>
<td>0.37</td>
<td>0.37</td>
<td>0.35</td>
<td>0.35</td>
<td>0.38</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Rating trainer - training style</td>
<td>0.37</td>
<td>0.35</td>
<td>0.38</td>
<td>0.38</td>
<td>0.39</td>
<td>0.38</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>Rating trainer - responsiveness to group</td>
<td>0.38</td>
<td>0.40</td>
<td>0.38</td>
<td>0.35</td>
<td>0.38</td>
<td>0.39</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Rating trainer - ability to guide discussion</td>
<td>0.37</td>
<td>0.37</td>
<td>0.38</td>
<td>0.36</td>
<td>0.36</td>
<td>0.42</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Rating trainer - good learning atmosphere</td>
<td>0.34</td>
<td>0.34</td>
<td>0.33</td>
<td>0.32</td>
<td>0.36</td>
<td>0.37</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>Trainer index 2C - Trainer Evaluation</td>
<td>0.36</td>
<td>0.36</td>
<td>0.37</td>
<td>0.35</td>
<td>0.36</td>
<td>0.39</td>
<td>0.31</td>
</tr>
<tr>
<td>2</td>
<td>Training index 2 - Trainer</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
<td>0.50</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training index 2 - Trainer, without hh data</td>
<td>0.63</td>
<td>0.63</td>
<td>0.62</td>
<td>0.37</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Share training with others</td>
<td>0.08</td>
<td>0.06</td>
<td>0.09</td>
<td>0.08</td>
<td>0.12</td>
<td>0.07</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Application of training</td>
<td>0.56</td>
<td>0.57</td>
<td>0.65</td>
<td>0.66</td>
<td>0.47</td>
<td>0.41</td>
<td>0.49</td>
</tr>
<tr>
<td>3</td>
<td>Training index 3 - Perceived usefullness</td>
<td>0.32</td>
<td>0.31</td>
<td>0.37</td>
<td>0.37</td>
<td>0.30</td>
<td>0.24</td>
<td>0.27</td>
</tr>
<tr>
<td>All</td>
<td>Training Index</td>
<td>0.49</td>
<td>0.51</td>
<td>0.52</td>
<td>0.49</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training Index, without hh data</td>
<td>0.66</td>
<td>0.73</td>
<td>0.71</td>
<td>0.62</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Annex VII: Control Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>Control Dak Lak</th>
<th>Control Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
<td>Max</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Gender</td>
<td>1.15</td>
<td>0.36</td>
<td>1</td>
<td>2</td>
<td>1.08</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90.0</td>
<td>20.5</td>
<td>44</td>
<td>150</td>
</tr>
<tr>
<td>Altitude</td>
<td>516</td>
<td>61</td>
<td>438</td>
<td>644</td>
<td>541</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.2</td>
<td>9.7</td>
<td>0</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.94</td>
<td>0.25</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.77</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2.35</td>
<td>1.96</td>
<td>0</td>
<td>9</td>
<td>1.89</td>
<td>1.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.10</td>
<td>1.02</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5.02</td>
<td>1.88</td>
<td>1</td>
<td>12</td>
<td>4.53</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>4.35</td>
<td>1.34</td>
<td>1</td>
<td>7</td>
<td>4.59</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td>3.2</td>
<td>4.3</td>
<td>0</td>
<td>25</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>0.23</td>
<td>0.42</td>
<td>0</td>
<td>1</td>
<td>0.08</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>0.62</td>
<td>1</td>
<td>4</td>
<td>3.3</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>0.20</td>
<td>0.40</td>
<td>0</td>
<td>1</td>
<td>0.04</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>2.5</td>
<td>22</td>
<td>30</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0.38</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>0.24</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>5</td>
<td>4</td>
<td>32</td>
<td>17</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: The table above lists various control variables and their respective statistics for different datasets.
<table>
<thead>
<tr>
<th>Variable</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>Control Dak Lak</th>
<th>Control Gia Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td>First experience coffee not in own farm</td>
<td>0.46</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
<td>0.33</td>
<td>0.47</td>
</tr>
<tr>
<td>Cooperative 2008</td>
<td>0.10</td>
<td>0.30</td>
<td>0</td>
<td>1</td>
<td>0.14</td>
<td>0.35</td>
</tr>
<tr>
<td>Farmer club 2008</td>
<td>0.82</td>
<td>0.38</td>
<td>0</td>
<td>1</td>
<td>0.82</td>
<td>0.39</td>
</tr>
<tr>
<td>Research project 2008</td>
<td>0.11</td>
<td>0.32</td>
<td>0</td>
<td>1</td>
<td>0.21</td>
<td>0.41</td>
</tr>
<tr>
<td>Training project 2008</td>
<td>0.25</td>
<td>0.44</td>
<td>0</td>
<td>1</td>
<td>0.41</td>
<td>0.49</td>
</tr>
<tr>
<td>Certification project 2008</td>
<td>0.62</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
<td>0.78</td>
<td>0.42</td>
</tr>
<tr>
<td>Farmer club 2008</td>
<td>0.28</td>
<td>0.45</td>
<td>0</td>
<td>1</td>
<td>0.11</td>
<td>0.31</td>
</tr>
<tr>
<td>Extension club 2008</td>
<td>0.18</td>
<td>0.34</td>
<td>0</td>
<td>1</td>
<td>0.03</td>
<td>0.16</td>
</tr>
<tr>
<td>Savings group 2008</td>
<td>0.13</td>
<td>0.33</td>
<td>0</td>
<td>1</td>
<td>0.12</td>
<td>0.33</td>
</tr>
<tr>
<td>Youth union 2008</td>
<td>0.01</td>
<td>0.11</td>
<td>0</td>
<td>1</td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td>Women union 2008</td>
<td>0.24</td>
<td>0.43</td>
<td>0</td>
<td>1</td>
<td>0.21</td>
<td>0.41</td>
</tr>
<tr>
<td>Elder club 2008</td>
<td>0.04</td>
<td>0.19</td>
<td>0</td>
<td>1</td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td>Irrigation access 2008</td>
<td>0.67</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td>0.74</td>
<td>0.44</td>
</tr>
<tr>
<td>Coffee size 2008</td>
<td>0.84</td>
<td>0.44</td>
<td>0.2</td>
<td>3</td>
<td>1.43</td>
<td>1.12</td>
</tr>
<tr>
<td>Soil color</td>
<td>1.53</td>
<td>0.78</td>
<td>0</td>
<td>2</td>
<td>1.95</td>
<td>0.28</td>
</tr>
<tr>
<td>Shade trees</td>
<td>0.86</td>
<td>0.81</td>
<td>0</td>
<td>2</td>
<td>1.09</td>
<td>0.87</td>
</tr>
<tr>
<td>Irrigation pump 2008</td>
<td>0.80</td>
<td>0.40</td>
<td>0</td>
<td>1</td>
<td>0.92</td>
<td>0.27</td>
</tr>
<tr>
<td>Irrigation pipes 2008</td>
<td>0.85</td>
<td>0.36</td>
<td>0</td>
<td>1</td>
<td>0.97</td>
<td>0.16</td>
</tr>
<tr>
<td>Tractor 2008</td>
<td>0.68</td>
<td>0.47</td>
<td>0</td>
<td>1</td>
<td>0.26</td>
<td>0.44</td>
</tr>
<tr>
<td>Electricity access 2008</td>
<td>0.49</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
<td>0.57</td>
<td>0.50</td>
</tr>
<tr>
<td>Hulling machine 2008</td>
<td>0.25</td>
<td>0.44</td>
<td>0</td>
<td>1</td>
<td>0.39</td>
<td>0.49</td>
</tr>
<tr>
<td>Variable</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T4</td>
<td>Control Dak Lak</td>
<td>Control Gia Lai</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
<td>Max</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Drying yard space 2008</td>
<td>0.82</td>
<td>0.38</td>
<td>0</td>
<td>1</td>
<td>0.66</td>
<td>0.48</td>
</tr>
<tr>
<td>Creditworthiness</td>
<td>1.30</td>
<td>0.49</td>
<td>0</td>
<td>2</td>
<td>1.22</td>
<td>0.46</td>
</tr>
<tr>
<td>Ownership farm 2008</td>
<td>1.81</td>
<td>0.53</td>
<td>0</td>
<td>2</td>
<td>0.86</td>
<td>0.93</td>
</tr>
<tr>
<td>Housing 2008</td>
<td>0.50</td>
<td>0.20</td>
<td>0</td>
<td>1</td>
<td>0.50</td>
<td>0.11</td>
</tr>
<tr>
<td>Electric equipment 2008</td>
<td>0.51</td>
<td>0.25</td>
<td>0</td>
<td>1</td>
<td>0.67</td>
<td>0.27</td>
</tr>
<tr>
<td>Communication means 2008</td>
<td>0.24</td>
<td>0.25</td>
<td>0</td>
<td>1</td>
<td>0.35</td>
<td>0.25</td>
</tr>
<tr>
<td>Transportation 2008</td>
<td>0.57</td>
<td>0.19</td>
<td>0.67</td>
<td>0.50</td>
<td>0.53</td>
<td>0.19</td>
</tr>
<tr>
<td>Farm input shops in commune</td>
<td>3.2</td>
<td>2.3</td>
<td>0</td>
<td>17</td>
<td>2.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Distance to nearest research station</td>
<td>17</td>
<td>12</td>
<td>5</td>
<td>35</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Coffee extension budget by district</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.48</td>
<td>1.51</td>
</tr>
<tr>
<td>Nr of government coffee programmes in district</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.88</td>
<td>0.94</td>
</tr>
<tr>
<td>Credit suppliers in commune, Daklak</td>
<td>2.67</td>
<td>1.29</td>
<td>1</td>
<td>6</td>
<td>2.43</td>
<td>2.69</td>
</tr>
<tr>
<td>Daklak province</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Average age coffee trees</td>
<td>18.7</td>
<td>6.1</td>
<td>4.4</td>
<td>32.0</td>
<td>16.0</td>
<td>4.9</td>
</tr>
<tr>
<td>Rainfall commune</td>
<td>1512</td>
<td>39</td>
<td>1450</td>
<td>1600</td>
<td>2234</td>
<td>0</td>
</tr>
<tr>
<td>Distance from community to district capital</td>
<td>8.9</td>
<td>3.9</td>
<td>3</td>
<td>13</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

**Note:** The table above shows statistical data for various variables. Each variable is represented with its mean, SD, min, and max values across different regions.
### Annex VIII: Analysis output summary

<table>
<thead>
<tr>
<th></th>
<th>ttest</th>
<th>psm-s</th>
<th>psm-nn</th>
<th>psm-k</th>
<th>regr-gr</th>
<th>regr-robust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>group</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
</tr>
<tr>
<td>y1.1</td>
<td>T1</td>
<td>0.063</td>
<td>**</td>
<td>0.048</td>
<td>0.051</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.014</td>
<td>-</td>
<td>0.013</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.027</td>
<td>-</td>
<td>0.52</td>
<td>-</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.049</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.1a</td>
<td>T1</td>
<td>0.1</td>
<td>-</td>
<td>-1.19</td>
<td>-</td>
<td>1.101</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.107</td>
<td>**</td>
<td>-0.04</td>
<td>-</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.0265</td>
<td>-</td>
<td>-0.021</td>
<td>-</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.128</td>
<td>**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.2</td>
<td>T1</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>-</td>
<td>0.022</td>
<td>0.026</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.027</td>
<td>-</td>
<td>0.03</td>
<td>0.027</td>
<td>-</td>
</tr>
<tr>
<td>y1.2a</td>
<td>T1</td>
<td>0.027</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.097</td>
<td>-</td>
<td>-1.95</td>
<td>-</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.067</td>
<td>-</td>
<td>0.347</td>
<td>0.347</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.273</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.3</td>
<td>T1</td>
<td>-0.036</td>
<td>-</td>
<td>0.044</td>
<td>0.038</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.028</td>
<td>-</td>
<td>0.066</td>
<td>**</td>
<td>0.066</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.067</td>
<td>-</td>
<td>0.098</td>
<td>**</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.025</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.3a</td>
<td>T1</td>
<td>0.204</td>
<td>**</td>
<td>0.176</td>
<td>-</td>
<td>0.063</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.046</td>
<td>-</td>
<td>-1.24</td>
<td>-</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.24</td>
<td>***</td>
<td>-1</td>
<td>-</td>
<td>-0.93</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.189</td>
<td>**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.4</td>
<td>T1</td>
<td>0.068</td>
<td>*</td>
<td>0.004</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>-</td>
<td>0.013</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.013</td>
<td>-</td>
<td>-0.045</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.013</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.4a</td>
<td>T1</td>
<td>-0.016</td>
<td>-</td>
<td>-0.013</td>
<td>-</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>-</td>
<td>-0.039</td>
<td>-</td>
<td>-0.039</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.53</td>
<td>*</td>
<td>0.033</td>
<td>0.027</td>
<td>-</td>
</tr>
</tbody>
</table>

- **no significant difference**
- na* not applicable (no model run)
- na not enough changes (observations) to analyze
- na not enough variation to analyze; variables are dropped
- * difference significant at 10%
- ** difference significant at 5%
- *** difference significant at 1%
<table>
<thead>
<tr>
<th>Y</th>
<th>group</th>
<th>ttest</th>
<th>psm-s</th>
<th>psm-nn</th>
<th>psm-k</th>
<th>regr-gr</th>
<th>regr-robust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>-0.031</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.5</td>
<td>T1</td>
<td>-0.006</td>
<td>-0.259</td>
<td>0.0228</td>
<td>0.24</td>
<td>-0.112</td>
<td>** -1.18 ***</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.025</td>
<td>0.119</td>
<td>0.105</td>
<td>0.106</td>
<td>0.196</td>
<td>** 2.296 ***</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.053</td>
<td>0.203</td>
<td>* 0.173</td>
<td>0.192</td>
<td>-</td>
<td>na</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.048</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y1.5a</td>
<td>T1</td>
<td>0.47</td>
<td>** -1.71</td>
<td>** -1.18</td>
<td>** -1.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.32</td>
<td>-0.349</td>
<td>0.197</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.48</td>
<td>** -1.351</td>
<td>*** -1.28</td>
<td>** -1.046</td>
<td>** -0.317</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.67</td>
<td>** -</td>
<td>-</td>
<td>-</td>
<td>0.59</td>
<td>***</td>
</tr>
<tr>
<td>y1.6</td>
<td>T1</td>
<td>0.044</td>
<td>-</td>
<td>0.032</td>
<td>-0.013</td>
<td>0.039</td>
<td>-0.076 na</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>-</td>
<td>0.014</td>
<td>0.026</td>
<td>-0.003</td>
<td>- na</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.067</td>
<td>-</td>
<td>0.026</td>
<td>0</td>
<td>0.023</td>
<td>-0.149 na</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.3</td>
<td>-</td>
<td>0.026</td>
<td>0.025</td>
<td>0.023</td>
<td>- na</td>
</tr>
<tr>
<td>y1.6a</td>
<td>T1</td>
<td>0.246</td>
<td>* 0.33</td>
<td>0.19</td>
<td>0.048</td>
<td>-0.448</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.159</td>
<td>-</td>
<td>-0.341</td>
<td>-0.171</td>
<td>-0.179</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.2</td>
<td>-</td>
<td>0.122</td>
<td>0.107</td>
<td>0.2</td>
<td>0.921 ***</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.107</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>y2.1</td>
<td>T1</td>
<td>0.013</td>
<td>-</td>
<td>-0.001</td>
<td>0</td>
<td>-0.002</td>
<td>- na</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.26</td>
<td>*** -0.166</td>
<td>** -0.171</td>
<td>*** -0.164</td>
<td>** -0.209</td>
<td>** na</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.08</td>
<td>** -0.067</td>
<td>-0.067</td>
<td>* -0.067</td>
<td>*  - na</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.093</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- na</td>
<td></td>
</tr>
<tr>
<td>y2.1a</td>
<td>T1</td>
<td>0.067</td>
<td>-</td>
<td>0.191</td>
<td>0.38</td>
<td>0.234</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.255</td>
<td>*** 0.36</td>
<td>0.053</td>
<td>0.239</td>
<td>0.21</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.255</td>
<td>* 0.136</td>
<td>0.145</td>
<td>0.111</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.199</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y2.2</td>
<td>T1</td>
<td>0.212</td>
<td>-</td>
<td>-0.053</td>
<td>-0.147</td>
<td>-0.14</td>
<td>- na</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.567</td>
<td>*** 0.193</td>
<td>0.479</td>
<td>0.284</td>
<td>0.397</td>
<td>*** na</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.108</td>
<td>- 0.383</td>
<td>0.425</td>
<td>0.164</td>
<td>-</td>
<td>- na</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.0638</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- na</td>
</tr>
<tr>
<td>y2.2a</td>
<td>T1</td>
<td>1.23</td>
<td>*** -0.294</td>
<td>-0.389</td>
<td>-0.504</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.339</td>
<td>-</td>
<td>-3.091</td>
<td>-0.321</td>
<td>-1.376</td>
<td>-1.05 **</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-2.43</td>
<td>*** 2.103</td>
<td>2.496</td>
<td>1.652</td>
<td>-1.4</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-1.69</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.32</td>
<td>***</td>
</tr>
<tr>
<td>y2.2b</td>
<td>T1</td>
<td>0.56</td>
<td>*** -</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.42</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y2.3</td>
<td>T1</td>
<td>-0.999</td>
<td>-</td>
<td>0.196</td>
<td>0.205</td>
<td>0.26</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.068</td>
<td>-</td>
<td>-0.32</td>
<td>-0.11</td>
<td>-0.181</td>
<td>-2.61 **</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.147</td>
<td>0.164</td>
<td>0.204</td>
<td>0.212</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.091</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Y2.4</td>
<td>T1</td>
<td>-0.051</td>
<td>0.222</td>
<td>**</td>
<td>0.215</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.09</td>
<td>0.19</td>
<td>***</td>
<td>0.197</td>
<td>**</td>
<td>0.178</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.04</td>
<td>-0.347</td>
<td></td>
<td>-0.347</td>
<td>-0.149</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.103</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.5</td>
<td>T1</td>
<td>-319.57</td>
<td>281.86</td>
<td>450.73</td>
<td>334.78</td>
<td>203.47</td>
<td>** 148.92</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>196.85</td>
<td>120.85</td>
<td>50.84</td>
<td>78.3</td>
<td>-528.05</td>
<td>*** -338.96</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>131.51</td>
<td>-54.03</td>
<td>-58.95</td>
<td>-114.23</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>228.15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.6</td>
<td>T1</td>
<td>0.0195</td>
<td>0.069</td>
<td>0.025</td>
<td>-0.011</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.147</td>
<td>-0.458</td>
<td>** -0.444</td>
<td>* -0.428</td>
<td>**</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.072</td>
<td>0.144</td>
<td>0.154</td>
<td>0.079</td>
<td>-</td>
<td>- 2.33 **</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.153</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>- 0.19 **</td>
</tr>
<tr>
<td>Y2.7</td>
<td>T1</td>
<td>-0.127</td>
<td>-0.19</td>
<td>-0.141</td>
<td>-0.093</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.249</td>
<td>-0.007</td>
<td>-0.013</td>
<td>0.017</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.014</td>
<td>-0.216</td>
<td>-0.193</td>
<td>-0.116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.041</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.8</td>
<td>T1</td>
<td>-0.152</td>
<td>-0.164</td>
<td>-0.115</td>
<td>-0.069</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.224</td>
<td>** -0.025</td>
<td>-0.013</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.014</td>
<td>-0.211</td>
<td>-0.193</td>
<td>-0.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.023</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.9</td>
<td>T1</td>
<td>0</td>
<td>-0.053</td>
<td>-0.013</td>
<td>0.019</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.133</td>
<td>0.158</td>
<td>0.145</td>
<td>0.184</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.068</td>
<td>-0.182</td>
<td>-0.136</td>
<td>-0.063</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.136</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.10</td>
<td>T1</td>
<td>-0.025</td>
<td>0.026</td>
<td>0.025</td>
<td>0.025</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.039</td>
<td>0.053</td>
<td>0.053</td>
<td>** 0.053</td>
<td>**</td>
<td>- 2.98 **</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.032</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.11</td>
<td>T1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>xxx</td>
<td>na²</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>xxx</td>
<td>na²</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>xxx</td>
<td>na²</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>xxx</td>
<td>na²</td>
</tr>
<tr>
<td>Y2.12</td>
<td>T1</td>
<td>0.071</td>
<td>-0.605</td>
<td>** -0.557</td>
<td>* 0.5</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.051</td>
<td>0.073</td>
<td>0.039</td>
<td>0.072</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.147</td>
<td>*** -0.025</td>
<td>-0.027</td>
<td>-0.038</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.088</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12a</td>
<td>T1</td>
<td>-23.56</td>
<td>* -29.51</td>
<td>-15.08</td>
<td>-15.72</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-26.3</td>
<td>** -3.7</td>
<td>22.95</td>
<td>7.77</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-18.31</td>
<td>47.15</td>
<td>46.12</td>
<td>38.65</td>
<td>-138.98</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-42.5</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Y2.12b</td>
<td>T1</td>
<td>-8.79</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>T2</td>
<td>1.4</td>
<td>47.68 **</td>
<td>41.13 **</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>17.15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-16.63</td>
<td>*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.12c</td>
<td>T2</td>
<td>23.55 **</td>
<td>-</td>
<td>34.42 **</td>
<td>65.9 ***</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.13</td>
<td>T1</td>
<td>7.94</td>
<td>47.68 **</td>
<td>41.13 **</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>1.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>17.15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-16.63</td>
<td>*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.13a</td>
<td>T2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>na^2</td>
</tr>
<tr>
<td>T4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>na^2</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>na^2</td>
<td>-</td>
</tr>
<tr>
<td>Y2.14</td>
<td>T1</td>
<td>-0.028</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.014</td>
<td>-</td>
<td>0.015</td>
<td>-</td>
<td>0.028</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-0.029</td>
<td>-</td>
<td>0.027</td>
<td>-</td>
<td>0.027</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.014</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.14a</td>
<td>T1</td>
<td>-0.028</td>
<td>-</td>
<td>-0.772</td>
<td>-</td>
<td>-0.808</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.175</td>
<td>-</td>
<td>-0.035</td>
<td>-</td>
<td>0.353</td>
<td>-</td>
<td>0.237</td>
</tr>
<tr>
<td>T4</td>
<td>-0.224</td>
<td>-</td>
<td>0.603</td>
<td>-</td>
<td>0.661</td>
<td>-</td>
<td>0.35</td>
</tr>
<tr>
<td>T3</td>
<td>-0.23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6.35 **</td>
</tr>
<tr>
<td>Y2.15</td>
<td>T1</td>
<td>-0.19</td>
<td>-</td>
<td>na^2</td>
<td>-</td>
<td>-0.222</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.092</td>
<td>-</td>
<td>-0.046</td>
<td>-</td>
<td>-0.073</td>
<td>-</td>
<td>0.003</td>
</tr>
<tr>
<td>T4</td>
<td>-0.17</td>
<td>-</td>
<td>-0.102</td>
<td>-</td>
<td>-0.132</td>
<td>-</td>
<td>-0.049</td>
</tr>
<tr>
<td>T3</td>
<td>0.062</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.16</td>
<td>T1</td>
<td>-0.026</td>
<td>-</td>
<td>0.014</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-0.176</td>
<td>**</td>
<td>0.205</td>
<td>*</td>
<td>0.202</td>
<td>***</td>
<td>0.193</td>
</tr>
<tr>
<td>T4</td>
<td>-0.419</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.16a</td>
<td>T1</td>
<td>-0.359</td>
<td>***</td>
<td>0.456</td>
<td>***</td>
<td>0.494</td>
<td>**</td>
</tr>
<tr>
<td>T2</td>
<td>-0.377</td>
<td>***</td>
<td>0.44</td>
<td>***</td>
<td>0.466</td>
<td>***</td>
<td>0.44</td>
</tr>
<tr>
<td>T4</td>
<td>-0.293</td>
<td>***</td>
<td>0.414</td>
<td>***</td>
<td>0.427</td>
<td>**</td>
<td>0.401</td>
</tr>
<tr>
<td>T3</td>
<td>-0.527</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.17</td>
<td>T1</td>
<td>-0.025</td>
<td>-</td>
<td>0.026</td>
<td>-</td>
<td>0.025</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-0.213</td>
<td>***</td>
<td>0.213</td>
<td>**</td>
<td>0.213</td>
<td>***</td>
<td>0.213</td>
</tr>
<tr>
<td>T3</td>
<td>-0.5</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.17a</td>
<td>T1</td>
<td>-0.32</td>
<td>***</td>
<td>0.425</td>
<td>***</td>
<td>0.443</td>
<td>**</td>
</tr>
<tr>
<td>T2</td>
<td>-0.537</td>
<td>***</td>
<td>0.633</td>
<td>***</td>
<td>0.645</td>
<td>***</td>
<td>0.634</td>
</tr>
<tr>
<td></td>
<td>test</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
</tr>
<tr>
<td>T4</td>
<td>-0.333</td>
<td>***</td>
<td>0.475</td>
<td>***</td>
<td>0.467</td>
<td>**</td>
<td>0.455</td>
</tr>
<tr>
<td>T3</td>
<td>-0.619</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.18</td>
<td>T1</td>
<td>0</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.015</td>
<td>-</td>
<td>-0.001</td>
<td>-</td>
<td>0.015</td>
<td>-</td>
<td>0.015</td>
</tr>
<tr>
<td>T4</td>
<td>-0.186</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>0.186</td>
<td>***</td>
<td>0.186</td>
</tr>
<tr>
<td>T3</td>
<td>-0.476</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.18a</td>
<td>T1</td>
<td>0.115</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>0.206</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.267</td>
<td>***</td>
<td>0.345</td>
<td>***</td>
<td>0.364</td>
<td>***</td>
<td>0.358</td>
</tr>
<tr>
<td>T4</td>
<td>-0.259</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>0.239</td>
<td>-</td>
<td>0.305</td>
</tr>
<tr>
<td>T3</td>
<td>0.043</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.19</td>
<td>T1</td>
<td>0</td>
<td>-</td>
<td>-0.012</td>
<td>-</td>
<td>-0.013</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.013</td>
<td>-</td>
<td>-0.013</td>
<td>-</td>
<td>-0.013</td>
<td>-</td>
<td>-0.013</td>
</tr>
<tr>
<td>T4</td>
<td>-0.176</td>
<td>***</td>
<td>0.206</td>
<td>**</td>
<td>0.202</td>
<td>-</td>
<td>0.193</td>
</tr>
<tr>
<td>T3</td>
<td>0.045</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.19a</td>
<td>T1</td>
<td>-0.295</td>
<td>***</td>
<td>0.42</td>
<td>***</td>
<td>0.468</td>
<td>***</td>
</tr>
<tr>
<td>T2</td>
<td>-0.56</td>
<td>***</td>
<td>0.647</td>
<td>***</td>
<td>0.657</td>
<td>***</td>
<td>0.647</td>
</tr>
<tr>
<td>T4</td>
<td>0.2</td>
<td>***</td>
<td>0.281</td>
<td>***</td>
<td>0.307</td>
<td>***</td>
<td>0.209</td>
</tr>
<tr>
<td>T3</td>
<td>-0.568</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.20</td>
<td>T1</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.014</td>
<td>***</td>
<td>0.134</td>
<td>**</td>
<td>0.135</td>
<td>***</td>
<td>0.135</td>
</tr>
<tr>
<td>T3</td>
<td>-0.27</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y2.20a</td>
<td>T1</td>
<td>-0.182</td>
<td>***</td>
<td>0.265</td>
<td>***</td>
<td>0.266</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.34</td>
<td>***</td>
<td>0.339</td>
<td>***</td>
<td>0.341</td>
<td>***</td>
<td>0.338</td>
</tr>
<tr>
<td>T4</td>
<td>-0.173</td>
<td>***</td>
<td>0.284</td>
<td>***</td>
<td>0.307</td>
<td>***</td>
<td>0.281</td>
</tr>
<tr>
<td>T3</td>
<td>-0.391</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.1</td>
<td>T1</td>
<td>-0.404</td>
<td>***</td>
<td>0.562</td>
<td>***</td>
<td>0.595</td>
<td>**</td>
</tr>
<tr>
<td>T2</td>
<td>-0.656</td>
<td>***</td>
<td>0.74</td>
<td>***</td>
<td>0.75</td>
<td>***</td>
<td>0.74</td>
</tr>
<tr>
<td>T4</td>
<td>-0.307</td>
<td>***</td>
<td>0.402</td>
<td>***</td>
<td>0.44</td>
<td>-</td>
<td>0.343</td>
</tr>
<tr>
<td>T3</td>
<td>-0.662</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.2</td>
<td>T1</td>
<td>553457.6</td>
<td>**</td>
<td>-560000</td>
<td>**</td>
<td>-593000</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-69193.33</td>
<td>-</td>
<td>-233000</td>
<td>-</td>
<td>-6204.67</td>
<td>-</td>
<td>-43500</td>
</tr>
<tr>
<td>T4</td>
<td>548972.2</td>
<td>**</td>
<td>-1220000</td>
<td>***</td>
<td>-1260000</td>
<td>***</td>
<td>-1120000</td>
</tr>
<tr>
<td>T3</td>
<td>-954806.3</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.3</td>
<td>T1</td>
<td>-2580000</td>
<td>***</td>
<td>-1.10E+07</td>
<td>-</td>
<td>-1.32E+07</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-6974594</td>
<td>-</td>
<td>-6.65E+05</td>
<td>-</td>
<td>3.40E+07</td>
<td>-</td>
<td>1.84E+07</td>
</tr>
<tr>
<td>T4</td>
<td>-6026972</td>
<td>-</td>
<td>-7.73E+06</td>
<td>-</td>
<td>-6.98E+06</td>
<td>-</td>
<td>-1.16E+07</td>
</tr>
<tr>
<td>T3</td>
<td>-1630000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.4</td>
<td>T1</td>
<td>-1617988</td>
<td>-</td>
<td>2.95E+06</td>
<td>-</td>
<td>3.59E+06</td>
<td>3.09E+06</td>
</tr>
<tr>
<td>T2</td>
<td>-3494210</td>
<td>**</td>
<td>9.04E+05</td>
<td>-</td>
<td>-1.61E+06</td>
<td>-</td>
<td>-5.32E+05</td>
</tr>
<tr>
<td>T4</td>
<td>-1508940</td>
<td>-</td>
<td>3.29E+06</td>
<td>***</td>
<td>3.17E+06</td>
<td>2.48E+06</td>
<td>-</td>
</tr>
<tr>
<td>Y</td>
<td>test</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>y3.4a</td>
<td>T3</td>
<td>361039.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-</td>
<td>2.35E+06</td>
<td>**</td>
<td>5019048</td>
<td>***</td>
<td>-394689</td>
<td>**</td>
</tr>
<tr>
<td>T3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.4b</td>
<td>T1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-</td>
<td>420225</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.4c</td>
<td>T1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-1090505</td>
<td>***</td>
<td>1650000</td>
<td>***</td>
<td>1740000</td>
<td>*</td>
<td>1620000</td>
</tr>
<tr>
<td>T3</td>
<td>-1267242</td>
<td>***</td>
<td>1710000</td>
<td>*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-1417744</td>
<td>***</td>
<td>1787071</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.5</td>
<td>T1</td>
<td>2770339</td>
<td>-</td>
<td>4.32E+06</td>
<td>- 4.42E+06</td>
<td>- 4.47E+06</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-1.74E+07</td>
<td>***</td>
<td>8.43E+06</td>
<td>- 1.42E+07</td>
<td>- 1.06E+07</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-7503424</td>
<td>**</td>
<td>7.02E+06</td>
<td>- 6.87E+06</td>
<td>- 3.24E+06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-2481965</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.6</td>
<td>T1</td>
<td>2259219</td>
<td>-</td>
<td>-3.55E+06</td>
<td>- -3.18E+06</td>
<td>- -3.79E+06</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>3331250</td>
<td>**</td>
<td>-1.07E+06</td>
<td>- 1.70E+06</td>
<td>- 5.82E+05</td>
<td>- 2009906</td>
<td>** 5496433</td>
</tr>
<tr>
<td>T3</td>
<td>-1315846</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.7</td>
<td>T1</td>
<td>2.32E+07</td>
<td>***</td>
<td>-1.54E+07</td>
<td>- -1.76E+07</td>
<td>- -1.69E+07</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>9720116</td>
<td>-</td>
<td>-8.95E+06</td>
<td>- 2.04E+07</td>
<td>- 8.04E+06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-1524155</td>
<td>-</td>
<td>-1.47E+07</td>
<td>- -1.38E+07</td>
<td>- -1.47E+07</td>
<td>- -1.02E+07</td>
<td>**</td>
</tr>
<tr>
<td>y3.8</td>
<td>T1</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>-</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>y3.9</td>
<td>T1</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.10</td>
<td>T1</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>y3.11</td>
<td>T1</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y3.12</td>
<td>T1</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>920690.1</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>1500829</td>
<td>***</td>
</tr>
<tr>
<td>Y3.13</td>
<td>T1</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-199041.5</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-149486.6</td>
<td>**</td>
</tr>
<tr>
<td>Y3.14</td>
<td>T1</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.15</td>
<td>T1</td>
<td>0.026</td>
<td>-0.001</td>
<td>-0.013</td>
<td>-0.015</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.214</td>
<td>0.092</td>
<td>0.079</td>
<td>0.094</td>
<td>0.099</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.027</td>
<td>-0.055</td>
<td>-0.053</td>
<td>-0.109</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.181</td>
<td>-</td>
<td></td>
<td>-</td>
<td>0.136</td>
<td>**</td>
</tr>
<tr>
<td>Y3.15a</td>
<td>T1</td>
<td>0.03</td>
<td>-0.165</td>
<td>-0.165</td>
<td>-0.179</td>
<td>0.125</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.043</td>
<td>-0.199</td>
<td>-0.171</td>
<td>-0.194</td>
<td>-0.136</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.16</td>
<td>-0.013</td>
<td>-0.067</td>
<td>0.034</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.16</td>
<td>**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.16</td>
<td>T1</td>
<td>0.002</td>
<td>-0.019</td>
<td>-0.02</td>
<td>-0.018</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.02</td>
<td>-0.019</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.04</td>
<td>-0.024</td>
<td>-0.019</td>
<td>-0.028</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.067</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.09</td>
<td>**</td>
</tr>
<tr>
<td>Y3.16a</td>
<td>T1</td>
<td>-0.126</td>
<td>0.663</td>
<td>***</td>
<td>0.614</td>
<td>* 0.507</td>
<td>* 0.417</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.154</td>
<td>**</td>
<td>0.006</td>
<td>0.02</td>
<td>-0.005</td>
<td>0.225</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.035</td>
<td>-0.174</td>
<td>-0.15</td>
<td>-0.179</td>
<td>* 0.354</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.493</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.17</td>
<td>T1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0</td>
<td>0</td>
<td>0.018</td>
<td>0.019</td>
<td>0.019</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.063</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y3.17a</td>
<td>T1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>0.011</td>
<td>0.038</td>
<td>0.028</td>
<td>-0.173</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.085</td>
<td>**</td>
<td>-0.088</td>
<td>-0.085</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y4.1</td>
<td>T1</td>
<td>0.273</td>
<td>0</td>
<td>-0.414</td>
<td>-0.342</td>
<td>0.279</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.012</td>
<td>0.167</td>
<td>0.046</td>
<td>0.033</td>
<td>-0.515</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.196</td>
<td>0.516</td>
<td>0.502</td>
<td>0.389</td>
<td>0.341</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.088</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y4.2</td>
<td>T1</td>
<td>0.16</td>
<td>0.008</td>
<td>-0.005</td>
<td>-0.086</td>
<td>-0.328</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.005</td>
<td>0.004</td>
<td>0.08</td>
<td>0.33</td>
<td>0.15</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.12</td>
<td>0.02</td>
<td>0.04</td>
<td>0.01</td>
<td>-0.176</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>group</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
</tr>
<tr>
<td>T2</td>
<td>-0.028</td>
<td>-0.325</td>
<td>*</td>
<td>-0.325</td>
<td>-0.288</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-0.26</td>
<td>**</td>
<td>0.498</td>
<td>***</td>
<td>0.443</td>
<td>-</td>
<td>0.364</td>
</tr>
<tr>
<td>T3</td>
<td>0.085</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-533</td>
</tr>
<tr>
<td>T2</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.013</td>
<td>-</td>
<td>0.234</td>
<td>-</td>
<td>0.147</td>
<td>-</td>
<td>0.243</td>
</tr>
<tr>
<td>T3</td>
<td>0.243</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.618</td>
</tr>
<tr>
<td>T2</td>
<td>0.2</td>
<td>na</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.146</td>
<td>-</td>
<td>0.396</td>
<td>-</td>
<td>0.023</td>
<td>-</td>
<td>0.354</td>
</tr>
<tr>
<td>T3</td>
<td>0.341</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.23</td>
<td>-</td>
<td>0.017</td>
<td>-</td>
<td>0.011</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.073</td>
<td>-</td>
<td>0.14</td>
<td>***</td>
<td>0.14</td>
<td>***</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.046</td>
<td>-</td>
<td>-</td>
<td>-0.009</td>
<td>-</td>
<td>-0.505</td>
<td>*</td>
</tr>
<tr>
<td>T2</td>
<td>0.118</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.068</td>
<td>-</td>
<td>0.068</td>
<td>-</td>
<td>0.067</td>
<td>*</td>
<td>-0.161</td>
</tr>
<tr>
<td>T2</td>
<td>0.02</td>
<td>-</td>
<td>-0.009</td>
<td>-</td>
<td>0.043</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.156</td>
<td>**</td>
<td>0.155</td>
<td>*</td>
<td>0.156</td>
<td>***</td>
<td>0.315</td>
</tr>
<tr>
<td>T3</td>
<td>0.0403</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.157</td>
<td>-</td>
<td>0.344</td>
<td>-</td>
<td>0.025</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.318</td>
<td>**</td>
<td>0.363</td>
<td>***</td>
<td>0.313</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.0878</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.107</td>
<td>-</td>
<td>-0.134</td>
<td>-</td>
<td>-0.321</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.166</td>
<td>**</td>
<td>0.274</td>
<td>*</td>
<td>0.259</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.144</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.204</td>
<td>-</td>
<td>-0.111</td>
<td>-</td>
<td>0.065</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.064</td>
<td>-</td>
<td>0.188</td>
<td>-</td>
<td>0.095</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>0.052</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.292</td>
<td>**</td>
<td>0.226</td>
<td>-</td>
<td>0.043</td>
<td>-</td>
<td>0.147</td>
</tr>
<tr>
<td>T4</td>
<td>0.016</td>
<td>-</td>
<td>0.139</td>
<td>-</td>
<td>0.281</td>
<td>-</td>
<td>0.104</td>
</tr>
<tr>
<td>T3</td>
<td>0.156</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.253</td>
<td>-</td>
<td>0.19</td>
<td>-</td>
<td>-0.06</td>
<td>-</td>
<td>0.489</td>
</tr>
<tr>
<td>T2</td>
<td>0.603</td>
<td>***</td>
<td>0.561</td>
<td>**</td>
<td>0.321</td>
<td>-</td>
<td>0.429</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>test</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
<td>coef</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0.065</td>
<td>-</td>
<td>-</td>
<td>0.19</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.276</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>-0.206</td>
<td>-</td>
<td>na</td>
<td>-0.857</td>
<td>-</td>
<td>-0.808</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.815</td>
<td>***</td>
<td>0.072</td>
<td>-</td>
<td>-1.43</td>
<td>-0.328</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>-0.889</td>
<td>**</td>
<td>na</td>
<td>-1.619</td>
<td>-</td>
<td>2.983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-1.15</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-0.03</td>
<td>0</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.039</td>
<td>*</td>
<td>0.039</td>
<td>*</td>
<td>0</td>
<td>0.039</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.019</td>
<td>-</td>
<td>0.022</td>
<td>-</td>
<td>0</td>
<td>0.019</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>-0.04</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0.029</td>
<td>-</td>
<td>0.029</td>
<td>-</td>
<td>0.029</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0.287</td>
<td>***</td>
<td>1.686</td>
<td>*</td>
<td>1.885</td>
<td>*</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>-0.08</td>
<td>-</td>
<td>0.069</td>
<td>-</td>
<td>0.125</td>
<td>-0.092</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>-0.144</td>
<td>*</td>
<td>na</td>
<td>-</td>
<td>-0.044</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0.076</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>-0.004</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>0.044</td>
<td>-0.009</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.035</td>
<td>-</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.032</td>
<td>-</td>
<td>-0.063</td>
<td>-0.044</td>
<td>-0.057</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.14</td>
<td>*</td>
<td>na2</td>
<td>-</td>
<td>-0.41</td>
<td>-0.675</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.2</td>
<td>***</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0.118</td>
<td>-</td>
<td>0.096</td>
<td>0.163</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0.075</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.025</td>
<td>-</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
<td>na2</td>
</tr>
<tr>
<td>T2</td>
<td></td>
<td>0.043</td>
<td>-</td>
<td>0.073</td>
<td>-</td>
<td>0.037</td>
<td>0.07</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T4</td>
<td></td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-ns</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
<td>diff</td>
<td>sign</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y9.1</td>
<td>T1</td>
<td>-0.031</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y9.2</td>
<td>T1</td>
<td>-0.013</td>
<td>-</td>
<td>0.013</td>
<td>-</td>
<td>0.002</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.014</td>
<td>-</td>
<td>0.026</td>
<td>-</td>
<td>0.039</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.013</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.004</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y9.2a</td>
<td>T1</td>
<td>-0.082</td>
<td>-</td>
<td>0.359</td>
<td>***</td>
<td>0.367</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.067</td>
<td>-</td>
<td>-0.154</td>
<td>-</td>
<td>-0.276</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.19</td>
<td>-</td>
<td>0.074</td>
<td>-</td>
<td>0.074</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.008</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.1</td>
<td>T1</td>
<td>-0.29</td>
<td>**</td>
<td>1.008</td>
<td>**</td>
<td>0.993</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.16</td>
<td>-</td>
<td>0.592</td>
<td>-</td>
<td>0.882</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.14</td>
<td>-</td>
<td>0.025</td>
<td>-</td>
<td>-0.027</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.2</td>
<td>T1</td>
<td>-1.9</td>
<td>***</td>
<td>0.987</td>
<td>**</td>
<td>1.402</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-2.02</td>
<td>***</td>
<td>2.097</td>
<td>*</td>
<td>2.273</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-1.19</td>
<td>***</td>
<td>0.0796</td>
<td>**</td>
<td>0.076</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-1.03</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.3</td>
<td>T1</td>
<td>-0.626</td>
<td>***</td>
<td>0.925</td>
<td>**</td>
<td>0.886</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.153</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>-0.236</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.392</td>
<td>**</td>
<td>-0.609</td>
<td>**</td>
<td>-0.742</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.252</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.4</td>
<td>T1</td>
<td>-0.5</td>
<td>***</td>
<td>0.872</td>
<td>***</td>
<td>0.88</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.589</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>1.106</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.13</td>
<td>-</td>
<td>-0.722</td>
<td>*</td>
<td>-0.942</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.523</td>
<td>*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.5</td>
<td>T1</td>
<td>0.294</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>-0.138</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.386</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>-0.17</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.058</td>
<td>-</td>
<td>0.526</td>
<td>-</td>
<td>0.619</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.385</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.6</td>
<td>T1</td>
<td>-0.551</td>
<td>***</td>
<td>0.99</td>
<td>***</td>
<td>0.995</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.804</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>1.083</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.238</td>
<td>-</td>
<td>na2</td>
<td>-</td>
<td>-0.401</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.63</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.7</td>
<td>T1</td>
<td>-5.13</td>
<td>***</td>
<td>0.865</td>
<td>**</td>
<td>1.027</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>-0.788</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>0.217</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>-0.456</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>-0.335</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>-0.789</td>
<td>***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y</td>
<td>group</td>
<td>ttest</td>
<td>psm-s</td>
<td>psm-nn</td>
<td>psm-k</td>
<td>regr-gr</td>
<td>regr-robust</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Y10.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-0.42</td>
<td>**</td>
<td>na2</td>
<td>-</td>
<td>0.632</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.739</td>
<td>***</td>
<td>na2</td>
<td>-</td>
<td>0.453</td>
<td>-0.192</td>
<td>0.812 **</td>
</tr>
<tr>
<td>T4</td>
<td>-0.395</td>
<td>**</td>
<td>na2</td>
<td>-</td>
<td>0.206</td>
<td>0.753</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-0.619</td>
<td>**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.99</td>
<td>*** 4.99 ***</td>
</tr>
<tr>
<td>Y10.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-0.45</td>
<td>*</td>
<td>na2</td>
<td>-</td>
<td>0.857</td>
<td>-0.864</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>-0.598</td>
<td>*</td>
<td>na2</td>
<td>-</td>
<td>1.125</td>
<td>1.18</td>
<td>** -</td>
</tr>
<tr>
<td>T4</td>
<td>-0.139</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>0.143</td>
<td>0.363</td>
<td>-0.681 ***</td>
</tr>
<tr>
<td>T3</td>
<td>-0.583</td>
<td>*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>0.066</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>-0.045</td>
<td>0.362</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.03</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>1.03</td>
<td>0.855</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>0.21</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>-0.699</td>
<td>-1.395</td>
<td>*</td>
</tr>
<tr>
<td>T3</td>
<td>0.77</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Y10.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>0.32</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>0.657</td>
<td>0.54</td>
<td>-</td>
</tr>
<tr>
<td>T2</td>
<td>0.37</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>0.705</td>
<td>0.684</td>
<td>** 0.523 ***</td>
</tr>
<tr>
<td>T4</td>
<td>0.033</td>
<td></td>
<td>na2</td>
<td>-</td>
<td>-0.557</td>
<td>-1.409</td>
<td>* 0.654 **</td>
</tr>
<tr>
<td>T3</td>
<td>-0.815</td>
<td>**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>