

Annex E: Survey results report

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Introduction

This paper presents the data collected by the PASS survey in the regions of Morogoro, Mbeya, Ruvuma and Mtwara, on rice, cashew, coffee and maize. The survey was designed as follows, following the Inception report and later updates.

Methodology: sample framework

The aim is to develop insight into the impact of the financial and non-financial services offered to farmers (and SMEs). Key variables are productivity, production, employment generation, wellbeing and food security. Ideally a Difference in Difference or similar methodology would be applied, where farmers who have been supported (treatment) are compared with non-supported farmers (control) over time. The two groups, initially very similar, should show divergence on major economic and social variables due to the fact that only one of them has access to these services.

In the absence of such a baseline study, and after a skype call on 25 September 2018 on a preliminary version of the Inception Note, the Evaluation Team developed two disparate versions of a survey framework based partly on the ToR, partly on the results of this Skype call. In both instances, the database developed by PASS from the Navision system was used to select the main crops cultivated by PASS farmers for which they obtained a loan, and to select farmers within those crop-related datasets that had obtained a loan in the first two quarters of 2018 and the last two quarters of 2017.

Survey type I

The first survey framework consisted of a comparison of two groups of farmers in one particular value chain; **rice**. On the one hand the Evaluation Team selected farmers who accessed a loan from a financial institution through the financial and non-financial support of PASS in the past season (treatment). These farmers were compared to farmers who had not received such support (control) yet, though they have recently applied for a loan, have been accepted by the financial institution, and therefore can be considered comparable in most of the relevant dimensions. Both groups should of course consist of farmers who without the assistance of PASS would not have been able to access a loan but are assisted by the business plan development and loan guarantee of PASS (they should indeed lack sufficient collateral for a regular non-guaranteed loan). The latter was checked through specific questions on this issue.

The former group (treatment) went through a complete crop cycle using the PASS supported loan. Questions pertaining to the previous crop cycle refer to the situation with a PASS-supported loan in 2018. As we will show, this was successful for two crops (rice and maize), for coffee and cashew, the end of the harvest season was mostly before the date of the survey, but had not completely finished. This means that we may not have captured all of the earnings of those crops. The timing of the survey however was a given and could not be changed.

The latter group (control) was similar to the former group, and therefore also gained access to a PASS supported loan, without having used that loan yet. This means they were supported with their business plan, were accepted by the financial institution, but they have not yet gone through a complete crop cycle. Questions pertaining to the previous crop cycle also refer to the crop season in 2018. As the number of farmers with a guaranteed loan not yet used in the past season was limited, we added to this set of farmers by selection farmers randomly from within the groups to which they belonged. These farmers may have a higher wealth and collateral availability level than the former control farmers.

The estimated size of Survey Type I based on a yield effect for rice of 30% (based on relatively low present yield levels of 1800 kg/ ha), and standard assumptions for alpha and power (5% and 80% respectively) is 350 in the case of rice (for both treatment and control). Due to over-researched populations in one of the survey areas (Morogoro), this number was not reached (we did 330 interviews), but in view of the high level of significance in the analysis on the major dependent variables, we feel that the purpose of the survey was reached.

Survey type II

The preference of Danida and the Danish Embassy in Dar es Salaam as expressed in the Skype call was to not focus on only two value chains, but to have a wider range of value chains, as PASS is also focusing on such a wider range. Presently, cereals, horticultural crops, oil crops, livestock (among which bee keeping and poultry), and tree crops such as cashew and coffee are included, at the level of both production and processing. To allow for a statement on the impact of PASS on all or most of these value chains, ideally the survey described above would include all these products. This is not possible as the number of producers is not sufficiently large to allow for a statistically significant result in the analysis of each product.

Instead, the Evaluation Team agreed to design a second type of survey, which focused on a range of products, and asks the producers about the changes effectuated by the involvement with PASS through a reconstructed baseline-end line questionnaire. For a number of important products (cashew, coffee, maize and rice), the Evaluation Team used the same survey form, focusing on the differences in productivity, production, wellbeing and food security between the previous season (2018) and the preceding season (2017). This approach leads to risks including a seasonal/annual bias, which the Evaluation Team corrected by comparing the results to the Survey type I results.

This also meant that the sample size of the farmers focusing on these various products was limited. It was acknowledged by Danida and the Danish Embassy team that statistically significant results cannot be expected because of this, but the variety of methods, now including both Survey types, as well as the desk research, interviews with key informants, interviews with selected small and medium-sized enterprise interviews and desk research, will yield a rich database from which relevant findings can be derived.

The choice of products/ value chains was partly determined by the number of farmers who are engaged with PASS producing a certain crop. The minimum number of farmers was initially set at 20-25, and thus the whole survey at about 425. We collected more survey interviews in each case (above 50, see table 1). This was achieved by reducing the length of the survey as much as possible and thus increasing the number

done per day, and combining the maize and rice survey in one of the regions (Mbeya), in view of the larger numbers of farmers for both crops in that regions, and in view of logistics.

Description of the data sample

In line with the inception report and the additional decisions made in the first few days of the fieldwork (and communicated and agreed upon by DANIDA and Danish Embassy), we have collected data on the following crops: rice, cashew, coffee and maize. In the case of rice, a deep dive was made, which means that we collected data on farmers connected to PASS as well as on farmers not connected to PASS, described in chapter 2. Chapter 3 discusses the four crops and focuses on farmers connected with PASS for all four crops (disregarding the non-connected rice farmers) for 2018 and 2017.

The following numbers of interviews were done (table 1).

Table 1. Number of interviews done per crop/ region.

Crop	Rice	Cashew	Coffee	Maize
Region	Morogoro Mbeya	Mtwara	Ruvuma	Mbeya
Numbers interviewed	330	52	59	58
PASS/ non-PASS	180/ 150	52	59	58

Rice farmers, PASS and non-PASS

Respondent and household data

The requirement for the survey was to ask the person most knowledgeable on the issues discussed: land use, cultivation, sales and employment. In most cases, this was the male farmer who was considered the head of the household. In most other cases it was the female head of the household. Ages generally differed slightly but significantly.¹

Respondent sex	PASS farmer	no PASS farmer	pvalue	sig
Male	74%	75%	0.96	

¹ In any experiment or observation that involves drawing a sample from a population, there is always the possibility that an observed effect would have occurred due to sampling error alone. But if the p-value of an observed effect is less than the significance level, an investigator may conclude that the effect reflects the characteristics of the whole population (Wikipedia). Here, the p-value is derived from a Chi-squared test. ***, **, * indicate significance levels of 1%, 5% and 10% respectively. A level of 5% is generally taken as the minimum.

Female	26%	25%		
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Respondent's relationship to household head	PASS farmer	no PASS farmer	pvalue	sig
Head	65%	73%	0.13	
Husband/wife	31%	25%		
Others	4%	2%		

Respondent age	PASS farmer	no PASS farmer	pvalue	sig
mean	46,79	41,21	0.02	**

Ages difference is quite small but significant: PASS farmers are generally slightly older than non-PASS farmers.

Respondent marital status	PASS farmer	no PASS farmer	pvalue	sig
Single, never married	4%	6%	0.13	
Divorced	4%	2%		
Separated	1%	5%		
Widowed	7%	5%		
Cohabiting	7%	8%		
Married, civil marriage	14%	9%		
Married, customary-religious	59%	63%		
Married, polygamous	4%	2%		

Education and literacy levels of PASS farmers are generally also higher, which together with the higher ages is usually rare. In this case, PASS farmers are older and better educated.

Respondent education	PASS farmer	no PASS farmer	pvalue	sig
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No education	5%	4%	0.97	
Some elementary/primary school	8%	8%		
Completed elementary/primary school	61%	66%		
Some secondary	7%	6%		
Completed secondary	13%	10%		
Some university	1%	1%		
Completed university	2%	3%		
Technical-vocational training	3%	3%		
Other	0%	0%		

Respondent literacy	PASS farmer	no PASS farmer	pvalue	sig
Cannot read nor write	0%	33%	0.06	*
Can read	0%	0%		
Can write	0%	0%		
Can read and write	100%	67%		

Household size	PASS farmer	no PASS farmer	pvalue	sig
Mean size	6.1	5.1	0.0	***
Number of members < 18 years	2.9	2.4	0.0	**
Number of members between 18 and 65	3.1	2.7	0.2	
Number of members > 65	0.2	0.1	0.8	

Household size is as expected from other surveys in similar rural areas elsewhere in Africa, and point at a transition towards smaller families throughout. Relatively high levels of dependency are prevalent, indicating we may expect household labour to be infrequent. PASS households are slightly but significantly larger which can be expected with slightly older families. The age difference is not sufficient to expect a household cycle effect (better-off farmers are usually the older households in the population due to the build-up of wealth over time).

Agricultural productivity and production

Land

Land ownership will be discussed again when we focus on wealth and wellbeing. Related to crop production and productivity, land holdings are crucial to farmers as a resource to which they should have easy access.

Total land used to cultivate last season (2018)	PASS farmer	no PASS farmer	pvalue	sig
Mean land used for cultivation in acres	8.9	6.7	0.03	**
Total land owned	5.1	3.1	0.01	***
Total land rented, leased, borrowed, etc	3.8	3.6		

PASS farmers have a noticeably larger area of land in use, and of that area, they own the largest share. Both categories of farmers rent or borrow equally sized additional land.

Labour and employment

Most farmers combine household labour on the farm with hiring farm labour for peak hours. The latter employs the unemployed and reintegrates poor members of the community in the farming system.

Labour use last season (2018) for main crop	PASS farmer	no PASS farmer	pvalue	sig
Household or communal labour	52%	59%	0.20	
Hired labour	94%	87%	0.03	**

The direction of the relationship between PASS support and commercial labour is positive; PASS farmers are more likely to have hired labour and less likely to have used household labour. This supports the hypothesis that the loans lead to a higher propensity to hire external farm hands. The percentage of households that uses household labour is actually quite low: usually we find higher levels. This relates to the small household sizes, with high dependency ratios, where labour may be scarce.

Use of household or communal labour (2018)	PASS farmer	no PASS farmer	pvalue	sig
land preparation	5.4	8.9	0.21	
planting	9.4	9.3	0.96	
fertilizer application	1.3	1.2	0.82	
weeding	10.5	10.9	0.86	

spraying and top dressing	0.8	1.0	0.57	
harvesting	7.4	5.1	0.40	
Total	34.8	36.3		

Average use of household labour for those who use this in the farm did not differ very much between PASS and non-PASS farmers, and not significantly either. In fact, the differences are almost negligible, if anything, we would have expected a slightly lower use of family labour among PASS farmers under the assumption that they would have better access to mechanised farming tools, with the benefit of their loans. This is not the case, and this could alternatively be related to the similar size in household size and dependency ratio.

Hired labour (2018)	PASS farmer	no PASS farmer	pvalue	sig
land preparation	11.45	10.20	0.82	
planting	31.71	17.95	0.03	**
fertilizer application	1.76	1.75	0.99	
weeding	27.80	18.45	0.13	
spraying and top dressing	1.70	1.78	0.82	
harvesting	10.17	11.42	0.67	
Total	84.58	61.57		

Hired labour makes up a larger part of the labour input in all farms, with PASS farmers using more hired labour than non-PASS farmers. PASS farmers' hired labour input is more than twice the number of household labour. Especially planting and weeding take up more labour, probably related to the larger share of irrigated rice production in PASS farmers' farms, and the fact that their farms are larger.

Tractor use and ownership is quite an issue in the area. The following tables shows that most farmers use tractors for their farm operations. This must have reduced their use of manual labour quite considerably, as the use of a tractor for a day can replace a team of three or four manual labourers. Interestingly, there are very few tractors owned by these same farmers: they all rent these tractors from the large farmers who have them in possession for their own farm. These use them for their own farm first, and rent them out to their neighbours after.

Tractor use last season (2018) for main crop	PASS farmer	no PASS farmer	pvalue	sig
mean	94%	92%	0.38	

Number of tractors owned	0.03	0.02	0.54	
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Cost of labour per day differs between PASS and non-PASS farmers in a significant way. The difference is marked, with non-PASS farmers paying more.

Daily pay for labourer (2018)	PASS farmer	no PASS farmer	pvalue	sig
mean	13,365.69	15,829.37	0.01	***

A quick calculation shows that for the farmers in the survey, the total sum spent on (and earned by) labour is in the order of 1.1 M TZshs, or about 400 euro, per PASS farmer, and about 0.9 M TZshs per non-PASS farmer, which is indeed a considerable sum, as well as a significant difference.

Other costs for the farmers are related to the use of inputs. These are one of the most important reasons why farmers take loans from banks. The following tables shows that these amounts are high also.

Expenditures on input	PASS farmer	Non-PASS farmer	pvalue	sig
2018	629,561	481,743	0.21	
2017	556,482	455,947	0.38	

Total amounts spent are quite a bit lower than on labour in both cases, but still consist of about 250 euro per PASS farmer and slightly less for non-PASS farmers. Also the data show an increase in the use of inputs in the two past years, which we assumed would be the case for PASS farmers, but may indicate a higher need for inputs due to contextual reasons, such as pests and the weather in the past season.

Crops

Cropping patterns are the first step in the analysis, and the following table shows the pattern.

Crops produced last season (2018)	PASS farmer	Non-PASS farmer	pvalue	sig
Beans	2%	0%	0.07	*
Cabbages	0%	0%		
Carrots	0%	0%		
Cassava	1%	0%	0.36	
Cashew	0%	0%		
Chick pea	0%	0%		
Coffee	0%	0%		
Cotton	0%	0%		
Cow pea	0%	0%		
Groundnuts/peanuts	14%	8%	0.07	*
Kale	0%	0%		
Maize	81%	59%	0.00	***
Millet	0%	0%		
Onions	0%	0%		
Potato	0%	0%		
Rice dryland	21%	43%	0.00	***
Rice irrigated	78%	49%	0.00	***
Rice Both	7%	11%	0.27	
Spinach and other vegetables	0%	1%	0.12	
Sorghum	0%	0%		
Soy	0%	0%		
Sunflower	12%	7%	0.09	*
Sweet potato	0%	1%	0.27	
Tomatoes	1%	1%	0.90	

Crops produced last season (2018)	PASS farmer	Non-PASS farmer	pvalue	sig
Watermelon	1%	0%	0.36	
Other	1%	1%	0.85	

PASS farmers who took a loan for rice have significantly more often irrigated their rice. They also less often mix dryland and irrigated rice cultivation in their cropping patterns (they specialise more), and otherwise focus on cash crops more (sunflower and groundnuts, all significant. To compensate for the increased commercialisation and market dependency perhaps, they also more often have included maize in their cropping pattern, which is the main food crop. In all, the cropping pattern seems to be more diverse as that of the non-PASS farmers.

Timing of the start of the cropping season is important, as early planting usually implies higher yields, provided the rainfall is good enough in the start of the season. Since a significantly larger share of PASS farmers has irrigated rice land, one would expect an earlier planting season, and higher yields, and thus higher sales. This is in fact what we see in the next table: 80 % of the PASS farmers finishes planting in December, while for non-PASS farmers this is 56%, a significant difference. The harvest season is also shorter and earlier, though not significantly.

Start of the season - month	PASS farmer	Non-PASS farmer	pvalue	sig
January	9%	20%	0.00	***
February	8%	20%		
March	1%	1%		
April	0%	1%		
May	1%	0%		
June	0%	1%		
July	0%	1%		
August	0%	0%		
September	0%	1%		
October	1%	1%		
November	52%	21%		
December	28%	35%		

End of the season - month	PASS farmer	Non-PASS farmer	pvalue	sig
January	0%	0%	0.14	
February	1%	0%		
March	1%	0%		
April	1%	1%		
May	17%	11%		
June	16%	15%		
July	39%	29%		
August	13%	22%		
September	12%	20%		
October	1%	1%		
November	0%	1%		
December	1%	1%		

One of the most important tables of course is the following, which indicates the difference in production and productivity (in kg).

	PASS farmer	Non-PASS farmer	pvalue	sig
Main crop production in previous season (2017)	11485	7516	0.02	**
Main crop production in last season (2018)	10726	7320	0.02	**
Main crop production in average season	12393	8508	0.02	**
Main crop production in bad season	7551	5372	0.04	**
Main crop production in good season	16630	11101	0.01	**

Productivity per acre	1933	1562	0.00	***
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The results are very clear, consistent and significant: PASS farmers produce more rice, and their productivity is higher, as was expected after the above analysis on timing of the crop. Productivity is substantially higher, by 20%, which is considerable though slightly lower than expected before the study. We added the data on 2017 and on average bad and good years to show the consistent pattern. Both years (2017 and 2018) were slightly below average, due to the erratic start of the season, and the low temperatures during part of it.

Crop sales

Marketing behaviour and prices received does not differ between PASS and non-PASS farmers. The main location at which they sell, and the prices and time between harvest and sale is almost similar and not significantly different. The long period between harvest and sale is quite interesting: the narrative is usually that farmers sell immediately after harvest and have to accept low prices therefore. This is not the case here. Additionally, these weeks have to be added to the crop cycle (see next chapter on crops).

Main sale location (2018)	PASS farmer	Non-PASS farmer	pvalue	sig
Local market	45%	43%	0.48	
District market	1%	1%		
Traders / brokers	49%	46%		
Neighbours/ other farmers in the area	2%	5%		
Direct to a company	0%	0%		
Other	4%	5%		
	PASS farmer	Non-PASS farmer	pvalue	sig
Common price received for main crop sale at main location (2018)	767	783	0.69	
Common price received for main crop sale (2017)	899	879	0.72	
Duration between harvest and sale (weeks)	8.4	9.2	0.26	

Total earnings and profit can now be computed, which shows that non-PASS farmers earn two-thirds of what PASS farmers earn.

Bank accounts	PASS farmer	Non-PASS farmer
total earnings	8,230,556	5,734,902

(in Euro)	3,166	2,206
total profit	6,470,460	4,278,559
in euro (2600)	2,489	1,646
Total compared to PASS farmers	100%	66%

Financial services

Bank account ownership is higher among PASS farmers by a considerable margin. However, that does not mean that savings are also done through the bank.

Bank accounts	PASS farmer	Non-PASS farmer	pvalue	sig
Bank account ownership in household	59%	43%	0.00	***
Respondent bank account ownership	81%	54%	0.00	***
Saving through an account in 2018	41%	46%	0.32	

The source of savings services differs quite substantially and significantly. PASS farmers more often go to banks for this service, non-PASS farmers also go to MFIs and SACCOs or credit unions. Mobile money is used by many as a temporary deposit of money.

	PASS farmer	Non-PASS farmer	pvalue	sig
Mobile money	10%	9%	0.85	
Village money lender	0%	0%		
SACCO / Credit Union	1%	6%	0.15	
Microfinance institution / NGO	0%	13%	0.00	***
Bank	89%	71%	0.01	***
Trader	1%	0%	0.33	
Private company	0%	0%		
Church	0%	0%		
Government programme	0%	0%		

None	0%	0%		
Other	4%	3%	0.70	

Savings frequency is much more seasonal for PASS farmers than for non-PASS farmers, indicating adjusted financial cycles related possibly to the cropping season through loan services and better earnings, or more cash cropping compared to non-PASS farmers.

Savings frequency	PASS farmer	Non-PASS farmer	pvalue	sig
Daily	4%	3%	0.17	
Weekly	6%	1%		
Every 14 days	4%	4%		
Monthly	15%	16%		
Quarterly	16%	13%		
Every six months	1%	4%		
seasonal	40%	27%		
Yearly	0%	7%		
Other	13%	22%		

Insurance can add to the risk reduction that goes with taking part in financial activities: a very high percentage of both PASS and non-PASS farmers had some form of health insurance. PASS farmers had this and a loan insurance very much more often and were significantly better insured. This is quite a remarkable finding, as insurance in other rural areas studied has not penetrated to this degree.

	PASS farmer	Non-PASS farmer	pvalue	sig
Crop insurance	3%	3%	1.00	
Health insurance	42%	33%	0.09	*
Life insurance	1%	2%	0.23	
Loan insurance	17%	7%	0.01	***

loans

In relation to loan taking, PASS farmers are very much more active and significantly more often go to banks for this, as was expected. Non-PASS farmers get loans from their friends, village money lenders and SACCOs and credit unions and MFIs. This means that there is a need for loans, but there are barriers to going to a bank, and they have to resort to more expensive financial services. These farmers are the future clients of PASS.

	PASS farmer	Non-PASS farmer	pvalue	sig
Borrowed money for main crop in 2018	68%	32%	0.00	***
Of these:				
Mobile money	0%	0%		
Family	0%	0%		
Friends	16%	35%	0.00	***
Village money lender	7%	19%	0.03	**
SACCO / Credit Union	12%	17%	0.46	
Microfinance institution / NGO	2%	15%	0.00	***
Bank	73%	15%	0.00	***
Trader	1%	2%	0.49	
Other private company	1%	0%	0.53	
Church	0%	0%		
Government programme	0%	0%		
Other	0%	0%		

Loan sizes are also significantly higher in the case of PASS farmers, against lower costs. The service of PASS is additional to the present situation and leads to higher loans and investments.

	PASS farmer	Non-PASS farmer	pvalue	sig

Loan size	3,251,262	1,267,143	0.01	***
Loan interest rate %	21.7	26.5	0.29	

	PASS farmer	Non-PASS farmer	pvalue	sig
purchase inputs	82%	71%	0.11	
buy/lease more land	41%	35%	0.51	
hire labour	61%	63%	0.90	
buy/hire farm equipment	41%	27%	0.09	*
Transport costs	31%	23%	0.29	
Storage	20%	10%	0.15	
other	13%	8%	0.39	

PASS farmers use their loans for the purchase of all inputs including land, but not necessarily labour, at least from the loan. We do know that higher levels of hired labour are used by PASS farmers, but the loans are almost exclusively for the purchase of inputs, and thus hired labour is invested in additionally. This leverage situation increases the impact of the loan beyond the direct purchase of inputs.

Non-financial services: business plan, was appreciated as helping with the planning of the farm activities by all who had obtained help, and generally experienced a high increase in production as a consequence.

	PASS farmer	Non-PASS farmer	pvalue	sig
Help with business plan	24%	5%	0.00	***
Help with business plan useful in planning farm activities	23%	5%	0.00	***
Loan effect on agricultural production	PASS farmer	Non-PASS farmer	pvalue	sig
Slight increase	10%	57%	0.01	**
Moderate increase	31%	0%		
Important increase	55%	43%		
Doubled or more	5%	0%		

Satisfaction with the loan process and the bank was generally less. Not surprisingly, this related to the long time the process took, in some cases making farmers receive the loan when the agricultural season had already started.

Satisfaction with loan process	PASS farmer	Non- PASS farmer	pvalue	sig
Very satisfied	1%	8%	0.11	
Satisfied	33%	31%		
Not satisfied	58%	52%		
Very unsatisfied	7%	10%		
Satisfaction with organisation which provided the loan	PASS farmer	Non-PASS farmer	pvalue	sig
Very good	3%	10%	0.26	
Good	35%	25%		
Fair	30%	32%		
Poor	27%	28%		
Very poor	5%	5%		

Wellbeing

PASS farmers feel better off and have a higher level of wellbeing, small but significant.

Current life satisfaction level	PASS farmer	Non-PASS farmer	pvalue	sig
Very unsatisfied	7%	4%	0.35	
Unsatisfied	39%	32%		
Neither unsatisfied nor satisfied	29%	31%		
Satisfied	24%	32%		
Very satisfied	1%	1%		

Household current wellbeing compared to neighbours	PASS farmer	Non-PASS farmer	pvalue	sig
Less well-off	33%	38%	0.08	*
About the same	41%	46%		
Better off	26%	16%		
Household current wellbeing compared to friends	PASS farmer	Non-PASS farmer	pvalue	sig
Less well-off	28%	36%	0.01	**
About the same	49%	53%		
Better off	23%	11%		

Food security

PASS farmers have a higher level of food security than non-PASS farmers

Food security in past year	PASS farmer	Non-PASS farmer	pvalue	sig
Often or always less than needs	2%	6%	0.04	**
Sometimes less than needs	12%	15%		
Just covers needs	22%	30%		
More than needs	64%	49%		

Comparing rice, cashew, coffee and maize farmers over time

In this part of the report, we want to compare farmers producing the various crops over sectors and over time. The time period is necessarily short, as the answers were based on recall for the year 2017, assumed to be the year previous to the season for which a loan was obtained (2018). Unfortunately, there were insufficient numbers of farmers in the Navision database to which this applied, and therefore the Evaluation Team had to add farmers who had obtained a loan in earlier years. This will make the sample less diverse over years than we expected initially.

However, the goal of comparing crops as requested in the Skype call referred to earlier was achieved.

A different set of data is presented in this report, though the database on the various crops contains the same information as presented for PASS related rice farmers. We will also refer to the data on rice, and only present data that are significantly different from those of the rice farmers, while stating in every instance that this is the case when they are similar.

Respondent and household data

The person responsible for the crops discussed is more often the male farmer in the household. We now see that for the food crops (though they also feature as cash crop) the women were often responsible.

Respondent sex	Rice	Cashew	Coffee	Maize	pvalue	sig
Male	74%	90%	92%	62%	0.00	***
Female	26%	10%	8%	38%		

Ages and marital status of the respondent was quite similar between crops and similar to the rice farmers. The same applies for household size, which differ very little between crops. Education levels were also similar, with the exception of coffee farmers who were generally less educated than the other farmers interviewed.

Productivity and production

Land

Land area used and in possession differed considerably and significantly. Also, rice and maize farmers seem to borrow and lease more land as part of their land holding than coffee and cashew farmers. A large area of the land was dedicated to the main crop discussed, except for coffee.

Total area last season (2018)	Rice	Cashew	Coffee	Maize	pvalue	sig
Total land used to cultivate	8.9	11.7	4.4	6.0	0.00	***
Total land owned	5.1	9.5	4.2	3.2	0.00	***
Total land rented, leased, borrowed, etc	3.8	2.2	0.3	2.8		

Land used for main crop (2018)	Rice	Cashew	Coffee	Maize	pvalue	sig
Total land used	6.5	9.9	2.0	4.3	0.00	***
Land owned in total land used for main crop	2.1	8.5	1.7	2.1	0.00	***

When people expanded their production and crop land, the following answers were given on the question how that came about.

Reason for land expansion, 2017-2018	Rice	Cashew	Coffee	Maize	pvalue	sig
Better availability of inputs I need	34%	57%	43%	44%	0.69	
Lower price/increased affordability	12%	57%	29%	22%	0.05	**
Better quality seed available	24%	0%	14%	11%	0.42	
Better environmental conditions	39%	57%	29%	33%	0.72	
Improved training/knowledge to grow	7%	0%	14%	22%	0.43	
Better prices	10%	0%	0%	0%	0.51	
Easier to sell / more buyers	7%	0%	0%	0%	0.64	
Loan made it possible to expand my production	44%	0%	43%	44%	0.17	
Other crops have become less profit	7%	0%	0%	0%	0.64	
I have more land	5%	0%	14%	0%	0.54	
Other	15%	29%	0%	11%	0.50	

Answers related to loan provision and improved availability of inputs feature prominently. We conclude that this is a result of the increased availability of loans through the guarantee provided by PASS.

Labour

We find that the case of rice discussed above differs from the other crops in the application of household and communal labour: for the other crops, farmers apply a lot of their own labour, despite the fact that their households are not significantly larger.

Labour use for main crop (2018)	Rice	Cashew	Coffee	Maize	pvalue	sig
Household or communal labour	52%	75%	97%	78%	0.00	***
Hired labour use	94%	94%	8%	71%	0.00	***
Labour use for main crop (2017)	Rice	Cashew	Coffee	Maize	pvalue	sig
Household or communal labour	52%	75%	95%	84%	0.00	***
Hired labour use	90%	88%	8%	71%	0.00	***

We also see that there has been an increase of labour, in particular hired labour for rice and cashew, and a decline in household labour in maize. All differences between the crops are significant.

Compared to rice, the other crops are more labour intensive, though the land area under cashew is slightly larger. The differences between the crops are all significant. Weeding for cashew and harvesting for coffee are labour intensive activities.

Household or communal labour	Rice	Cashew	Coffee	Maize	pvalue	sig
land preparation	5.4	3.0	15.7	8.4	0.01	***
planting	9.4	4.3	3.9	7.1	0.01	***
fertilizer application	1.3	0.8	2.7	4.9	0.00	***
weeding	10.5	27.5	13.2	11.3	0.00	***
spraying and top dressing	0.8	2.2	2.5	3.2	0.00	***
harvesting	7.4	25.7	40.5	12.9	0.00	***
Total	34.8	63.5	78.5	47.8		

Hired labour use for main crop is also considerable in some crops.

	Rice	Cashew	Coffee	Maize	pvalue	sig
land preparation	11.4	5.7	36.2	7.2	0.56	
planting	31.7	4.1	2.8	11.0	0.01	***
fertilizer application	1.8	1.4	0.8	2.9	0.13	

weeding	27.8	43.0	5.6	14.0	0.09	*
spraying and top dressing	1.7	2.3	0.4	2.0	0.33	
harvesting	10.2	43.0	27.6	16.0	0.00	***
total	84.6	99.6	73.4	53.2		

Cashew and coffee need substantial numbers of labour days, both household and hired. Both are cash crops.

Tractor use appears to be a crop-related input: only rice shows a considerable rate of tractor use, up in the case of rice and cashew compared to the previous season.

	Rice	Cashew	Coffee	Maize	pvalue	sig
Tractor use last season (2018) for main crop	94%	19%	0%	31%	0.00	***
2017	89%	12%	2%	34%	0.00	***

Cost of labour per day differs very much. The following table shows that this may differ by a factor of 300%. Mostly, this has to do with how heavy a burden the job is and the local job market. Prices have gone up in most crops by a margin. The differences are significant.

	Rice	Cashew	Coffee	Maize	pvalue	sig
Daily pay for labourer (2018)	13365,69	11914,96	6800	6815,789	0.00	***
Daily pay for labourer (2017)	13066,47	11955,56	4402	5179,487	0.00	***

Total amounts in local currency for labour are highest for rice and cashew, lowest for coffee and maize. They range between 1./ 1.2 M TZshs for rice and cashew, to 0.5/ 0.35 M TZshs for coffee and maize.

Other inputs also differ considerably per crop, with the lowest amount in coffee and the highest in cashew. As labour costs were high for rice and cashew also, these crops are very high input crops. The differences per year are significant. There does not seem to be a pattern in the trend per crop however over the two years.

Expenditures	Rice	Cashew	Coffee	Maize	pvalue	sig
Expenditures on input (2018)	629,561	673,829	191,205	417,112	0.00	***

Expenditures on input (2017)	556,482	1,069,181	168,027	543,579	0.02	**
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We add here a table to summarise the inputs farmers express they used: the total is above 100% as multiple answers were possible. Use of inputs seems to have grown slightly in the period between 2017 and 2018, and is very variable and different between crops.

2018	Rice	Cashew	Coffee	Maize	pvalue	sig
Planting fertilizer	51%	4%	20%	79%	0.00	***
Top dressing	80%	21%	76%	78%	0.00	***
Manure	3%	10%	81%	21%	0.00	***
Pesticide/fungicide/herbicide	66%	90%	88%	34%	0.00	***
2017						
Planting fertilizer	46%	0%	22%	79%	0.00	***
Top dressing	79%	21%	66%	83%	0.00	***
Manure	2%	8%	81%	19%	0.00	***
Pesticide/fungicide/herbicide	62%	96%	83%	34%	0.00	***

Crops

Cropping patterns are fairly typical: cash cropping is always accompanied by food cropping (cassava and sorghum for cashew, in the dry areas, Maize in the case of coffee, as coffee and maize are both very suitable for highland areas. Rice, mostly a cash crop but also consumed locally, is part of a very diverse cropping pattern, with maize and other food crops, and groundnuts and sunflower, cash crops again. Maize is accompanied by beans (always a steady combination) and sunflower for cash needs. One wonders whether maize was the reason for the loan in the first place.

Crops produced last season (2018)	Rice	Cashew	Coffee	Maize	pvalue	sig
Bananas	0%	4%	7%	0%	0.00	***
Beans	2%	2%	41%	19%	0.00	***
Cabbages	0%	0%	0%	0%		
Carrots	0%	0%	0%	0%		
Cassava	1%	38%	29%	2%	0.00	***

Cashew	0%	100%	0%	0%	0.00	***
Chick pea	0%	0%	0%	0%		
Coffee	0%	0%	100%	2%	0.00	***
Cotton	0%	0%	0%	0%		
Cow pea	0%	6%	0%	0%	0.00	***
Groundnuts/peanuts	14%	8%	0%	2%	0.00	***
Kale	0%	0%	0%	0%		
Maize	81%	52%	98%	100%	0.00	***
Millet	0%	6%	2%	0%	0.01	***
Onions	0%	0%	0%	0%		
Potato	0%	0%	0%	0%		
Rice dryland	21%	4%	2%	0%	0.00	***
Rice irrigated	78%	0%	0%	0%	0.00	***
Rice Both	7%	0%	0%	0%	0.01	***
Spinach and other vegetables	0%	0%	0%	0%		
Sorghum	0%	21%	0%	0%	0.00	***
Soy	0%	0%	0%	0%		
Sunflower	12%	0%	3%	60%	0.00	***
Sweet potato	0%	0%	0%	0%		
Tomatoes	1%	2%	0%	0%	0.51	
Watermelon	1%	0%	0%	0%	0.82	
Other	1%	10%	0%	10%	0.00	***

Again. Cropping seasons are important for the farmer (in view of the timing of the rain) and for PASS and the banks, in terms of timeliness of the loan process before the start of the season.

Start of the season - month	Rice	Cashew	Coffee	Maize	pvalue	sig
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January	9%	2%	5%	0%	0.00	***
February	8%	0%	0%	3%		
March	1%	31%	0%	0%		
April	0%	31%	2%	0%		
May	1%	0%	2%	0%		
June	0%	12%	29%	3%		
July	0%	0%	2%	0%		
August	0%	2%	0%	0%		
September	0%	0%	2%	0%		
October	1%	4%	12%	0%		
November	52%	4%	15%	62%		
December	28%	15%	32%	31%		
End of the season - month	Rice	Cashew	Coffee	Maize	pvalue	sig
January	0%	0%	10%	0%	0.00	***
February	1%	0%	0%	0%		
March	1%	0%	2%	12%		
April	1%	2%	2%	2%		
May	17%	4%	10%	9%		
June	16%	0%	20%	36%		
July	39%	8%	14%	36%		
August	13%	17%	2%	3%		
September	12%	21%	3%	2%		
October	1%	6%	14%	0%		
November	0%	23%	24%	0%		
December	1%	19%	0%	0%		

A balanced portfolio with all these crops would allow a spread of peak staff needs. This may not be the case as each branch of PASS is located in a region with a crop fairly typical for that region, see above. For PASS as a whole the peaks may flatten out, for the branches they are very real.

Again, an important table is the following one, with production and productivity and yields.

	Rice	Cashew	Coffee	Maize	pvalue	sig
Main crop production in last season (2018)	10,726	2,166	615	3,130	0.00	***
Main crop production in previous season (2017)	11,485	922	847	3,622	0.00	***
Main crop production in average season	12,393	1,892	877	4,544	0.00	***
Main crop production in bad season	7,551	943	392	2,172	0.00	***
Main crop production in good season	16,630	3,221	1,436	6,114	0.00	***
Productivity per acre	1,933	119	510	1,094	0.00	***

Here it becomes clear that the season in the one crop may be quite different in character from the other crops. Cashew was a very successful crop the past season (2018), while coffee did very badly.

Crop sales

Main sale location (2018)	Rice	Cashew	Coffee	Maize	pvalue	sig
Local market	45%	40%	42%	34%	0.00	***
District market	1%	0%	0%	4%		
Traders / brokers	49%	0%	0%	54%		
Neighbours/ other farmers in the area	2%	0%	0%	0%		
Direct to a company	0%	8%	13%	6%		
Other	4%	53%	44%	2%		
	Rice	Cashew	Coffee	Maize	pvalue	sig
Common price received at main location	767	2,232	2,817	395	0.01	**

Common price received for main crop sale	899	3,345	2,006	500	0.00	***
Duration between harvest and sale (weeks)	8	3	2	9	0.00	***

Cashew and coffee are sold via the local cooperative (the 'other' in the table), otherwise the local market and the trader are the main points of sale for most crops. For the food crops, the period between harvest and sale is rather long as was noticed in the case of rice.

Total earnings and profits can now be calculated.

	Rice	Cashew	Coffee	Maize
total earnings	8,230,556	4,833,428	1,730,830	1,236,680
in euro (2600)	3,166	1,859	666	476
total profit	6,470,459	2,972,919	1,040,504	457,301
in euro (2600)	2,489	1,143	400	176

Rice is the most lucrative crop for the farmer, the best choice when it can be grown. Not surprisingly, maize has the lowest profit per farm, a result we find in other studies too (Zaal, F. Bymolt, R., Tyszler, M. (2014)). Cashew did well due to the high yields, though the prices in 2018 were below those of 2017, when the harvest was very low.

Financial services and loans

We find very high levels of bank account prevalence in the four cropping areas.

Bank accounts	Rice	Cashew	Coffee	Maize	pvalue	sig
Bank account ownership in household	59%	81%	66%	38%	0.00	***
Respondent bank account ownership	81%	88%	85%	52%	0.00	***
Saving through an account in 2018	41%	25%	49%	33%	0.05	**

Savings services differ significantly when it concerns the formal institutions, as in the case with the rice farmers above. For cashew, the MFI Vision fund appears as a prominent source of savings services. Otherwise the banks feature as the main source of this service.

Savings services	Rice	Cashew	Coffee	Maize	pvalue	sig
Mobile money	10%	0%	3%	16%	0.31	

Village money lender	0%	0%	0%	0%		
SACCO / Credit Union	1%	0%	10%	16%	0.03	**
Microfinance institution / NGO	0%	23%	0%	5%	0.00	***
Bank	89%	85%	86%	58%	0.01	**
Trader	1%	0%	0%	0%	0.84	
Private company	0%	0%	0%	5%	0.11	
Church	0%	0%	0%	0%		
Government programme	0%	0%	0%	0%		
none	0%	0%	0%	0%		
Other	4%	0%	3%	11%	0.51	

Frequencies of savings differ per crop. Seasonal savings are important for rice and cashew.

Savings frequency	Rice	Cashew	Coffee	Maize	pvalue	sig
Daily	4%	0%	0%	0%	0.06	*
Weekly	6%	0%	0%	5%		
Every 14 days	4%	0%	4%	0%		
Monthly	15%	25%	4%	16%		
Quarterly	16%	25%	11%	26%		
Every six months	1%	0%	0%	5%		
seasonal	40%	17%	44%	11%		
Yearly	0%	8%	0%	0%		
Other	13%	25%	37%	37%		

Again, high levels of insurance are found especially for health insurance. Farmers in other cropping systems than rice are generally less highly insured.

	Rice	Cashew	Coffee	Maize	pvalue	sig
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Crop insurance	3%	4%	2%	0%	0.49	
Health insurance	42%	33%	14%	21%	0.00	***
Life insurance	1%	4%	2%	0%	0.19	
Loan insurance	17%	6%	3%	2%	0.00	***

Loans

Again, banks feature prominently when loans are discussed. High levels of loan taking take place in all crops except maize, which again is not uncommon. Otherwise SACCOs are important, especially in coffee.

Borrowed money for main crop in 2018	Rice	Cashew	Coffee	Maize	pvalue	sig
	68%	81%	88%	40%	0.00	***
of these:						
	Rice	Cashew	Coffee	Maize	pvalue	sig
Mobile money	0%	0%	0%	0%		
Family	0%	0%	0%	0%		
Friends	16%	0%	0%	4%	0.00	***
Village money lender	7%	0%	13%	0%	0.04	**
SACCO / Credit Union	12%	0%	40%	26%	0.00	***
Microfinance institution / NGO	2%	0%	2%	22%	0.00	***
Bank	73%	100%	44%	61%	0.00	***
Trader	1%	0%	0%	0%	0.81	
Other private company	1%	0%	0%	13%	0.00	***
Church	0%	0%	0%	0%		
Government programme	0%	0%	0%	0%		
Other	0%	0%	6%	0%	0.01	**

It now appears that loan sizes in rice are among the higher loans amounts. Second comes cashew, but the other crops are less likely to have large loans, in particular maize. This is understandable when the low profits in maize are considered.

	Rice	Cashew	Coffee	Maize	pvalue	sig
Loan size	3,251,262	2,675,000	241,231	617,139	0.00	***
Loan interest rate	22	18	21	21	0.42	

The purpose of the loan was also asked. The purchase of inputs is the most important use of the loan, the hiring of labour is the second. This supports the thesis that the loans have a productivity increasing effect, but also increase employment opportunities through creating labour.

	Rice	Cashew	Coffee	Maize	pvalue	sig
purchase inputs	82%	90%	94%	87%	0.14	
buy/lease more land	41%	24%	6%	13%	0.00	***
hire labour	61%	71%	6%	30%	0.00	***
buy/hire farm equipment	41%	14%	2%	22%	0.00	***
Transport costs	31%	26%	8%	13%	0.00	***
Storage	20%	12%	0%	0%	0.00	***
other	13%	24%	10%	35%	0.02	**

The non-financial services were important for many farmers in cash crops: for maize this was less of an issue as fewer farmers seem to have had this service, or were aware of it. Generally, the effect of the loan and the business plan was appreciated highly. When the effect was negative as it was in a few cases, the reason was the late receiving of the loan due to long drawn out processes.

	Rice	Cashew	Coffee	Maize	pvalue	sig
Help with business plan	24%	27%	41%	14%	0.01	***
business plan useful in planning farm activities	23%	25%	41%	14%	0.01	***
Sufficient collateral for the loan	23%	27%	34%	14%	0.07	*

The bank helped to resolve collateral	1%	0%	7%	0%	0.00	***
Loan effect on agricultural production	Rice	Cashew	Coffee	Maize	pvalue	sig
Slight increase	10%	57%	17%	14%	0.15	
Moderate increase	31%	14%	38%	14%		
Important increase	55%	29%	46%	71%		
Doubled or more	5%	0%	0%	0%		

Satisfaction with loan process was affected by late provision of the loan. Receiving a loan too late makes it useless to the farmer. Satisfaction was highest in coffee, lowest in cashew.

Satisfaction with loan process	Rice	Cashew	Coffee	Maize	pvalue	sig
Very satisfied	1%	0%	17%	0%	0.00	***
Satisfied	33%	30%	76%	52%		
Not satisfied	58%	66%	7%	44%		
Very unsatisfied	7%	5%	0%	4%		
Satisfaction with organisation which provided the loan	Rice	Cashew	Coffee	Maize	pvalue	sig
Very good	3%	0%	17%	0%	0.00	***
Good	35%	36%	69%	26%		
Fair	30%	20%	10%	59%		
Poor	27%	36%	4%	15%		
Very poor	5%	7%	0%	0%		

Wellbeing

Wellbeing was not very dissimilar to that of the rice farmers discussed earlier. Again, wellbeing among friends is more similar than between neighbours.

Current life satisfaction level	Rice	Cashew	Coffee	Maize	pvalue	sig
Very unsatisfied	7%	13%	5%	9%	0.01	**
Unsatisfied	39%	44%	19%	28%		
Neither unsatisfied nor satisfied	29%	27%	27%	36%		
Satisfied	24%	15%	47%	26%		
Very satisfied	1%	0%	2%	2%		
Wellbeing compared to neighbours	Rice	Cashew	Coffee	Maize	pvalue	sig
Less well-off	33%	40%	15%	28%	0.01	**
About the same	41%	50%	59%	41%		
Better off	26%	10%	25%	31%		
Wellbeing compared to friends'	Rice	Cashew	Coffee	Maize	pvalue	sig
Less well-off	28%	38%	24%	31%	0.39	
About the same	49%	52%	56%	48%		
Better off	23%	10%	20%	21%		

Food security

Rice and maize farmers seem to have a high food security, cashew farmers the lowest.

Food security in past year	Rice	Cashew	Coffee	Maize	pvalue	sig
Often or always less than needs	2%	6%	0%	2%	0.00	***
Sometimes less than needs	12%	23%	7%	5%		
Just covers needs	22%	58%	44%	34%		
More than needs	64%	13%	49%	59%		