Independent Office of Evaluation

IFAD
Investing in rural people

Republic of Kenya
Smallholder Horticulture Marketing Programme

IMPACT EVALUATION

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Impact Evaluation

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Photos of activities supported by the Smallholder Horticulture Marketing Programme

Front cover: Kibugu Horticulture Market, Embu County, constructed by the Smallholder Horticulture Marketing Programme.

Back cover: Infrastructure supported by the programme in Bureti Sub-County. Bridges and roads constructed and rehabilitated under the programme contributed to enhanced incomes and food security through improved access to markets and traders (left). Beneficiaries in Bungoma County. With the money they have made producing bananas they have been able to send their children to school and build a new house (right).

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Preface

This report presents the findings of the impact evaluation of the Smallholder Agriculture Marketing Programme in Kenya, undertaken by the Independent Office of Evaluation of IFAD. The programme was implemented between 2007 and 2014 and its main objectives were to increase incomes and reduce poverty among poor rural households in medium- to high-potential farming areas for whom horticulture was a source of livelihood and to increase the health and welfare of Kenyans by improving the quality and increasing the quantity of horticultural produce consumed within the country. The programme used a value chain approach to achieve these objectives.

This impact evaluation used a quasi-experimental approach and combined econometric and qualitative techniques to attribute the impact on beneficiaries of the IFAD-supported programme. To comprehensively assess impact on food consumption and diets, the evaluation used two measures of food security – the Household Food Insecurity Assessment Score and the Household Dietary Diversity Score.

The evaluation found that the value chain approach of the programme rightfully targeted the building blocks of the chain. However, the implementation of this approach produced mixed results. On the one hand the links between producers input stockists improved, as did production. However, interventions for creating market linkages with traders were less successful. Negative behaviour dynamics among producer groups played a role in the programme's lack of intended success with group-selling. Importantly, investment in physical market structures which consumed a large share of the programme funds have not borne fruit as expected.

The results of the impact evaluation showed statistically significant changes in the incomes and food security of beneficiaries as compared to non-beneficiaries. These changes were driven by productivity increases in some horticulture crops such as bananas, as a result of the training and planting material that the programme provided, but to some extent they were also due to the rehabilitation of rural roads and bridges. The food security situation of beneficiaries was found to be better than that of non-beneficiaries.

Moving forward, the evaluation recommends that IFAD-supported programmes adopt a better integrated and sequenced approach to value chains without delineating geographic boundaries. Further, when fostering relationships among value chain actors – input suppliers, producers and traders – IFAD needs to provide sustained support if a favourable behavioural shift among the actors towards strengthened relationships is to take shape.

I am hopeful that the results of this impact evaluation, derived from the use of a sound methodology, will add evidence and knowledge to what works and what does not in programmes targeting pro-poor agricultural value chains.

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Acknowledgements

This impact evaluation report was prepared by Hansdeep Khaira, Evaluation Officer in the Independent Office of Evaluation of IFAD (IOE), under the supervision of Johanna Pennarz, IOE Lead Evaluation Officer, and the overall guidance of Fabrizio Felloni, IOE Deputy Director. Shijie Yang, IOE Research Analyst, provided sound technical support at several stages of the evaluation. Shaun Ryan, IOE Evaluation Assistant, provided administrative support throughout the evaluation.

Matteo Borzoni, IOE agriculture and rural development consultant, brought his vast knowledge and experience to bear on this impact evaluation, and provided critical inputs to the report.

IOE used the services of the Geoeng Systems Ltd, a research and data collection company based in Kenya, for support in designing the impact survey, and in collecting and analysing data.

IOE takes this opportunity to express appreciation to the Government of Kenya, IFAD Management and IFAD's East and Southern Africa Division. IOE would like to acknowledge the invaluable support provided by IFAD's Country Office in Kenya. In particular, thanks go to Hani Elsadani, the former Country Director for Kenya, for his insightful inputs. IOE also thanks Jameston Mwololo Mbwika, acting Country Programme Officer and Catherine Nduati, Country Programme Assistant, for their support to the IOE missions. Acknowledgements also go to Emma Mburu, IFAD Desk Officer at the National Treasury and Susan Moywaywa IFAD Desk Officer at the Ministry of Agriculture, Livestock, Fisheries and Irrigation for their support. Appreciation also goes to the staff of the Smallholder Horticulture Marketing Programme (ShoMaP), and in particular to Simon Muchigiri, the Monitoring and Evaluation Officer of SHoMaP, for sharing his knowledge of the programme and providing constant support to the IOE team during the mission.

Contents

Currency equivalent, weights and measures

Currency equivalent

Currency Unit	=	Kenyan shilling (KSh)
US$1.00	=	KSh 67.32 (2007)
		KSh 87.92 (2014)

Weights and measures

1 kilogram	=	1000 g
1 000 kg	=	2.204 lb.
1 kilometre (km)	=	0.62 mile
1 metre	=	1.09 yards
1 square metre	=	10.76 square feet
1 acre	=	0.405 hectare
1 hectare (ha)	=	2.47 acres

Abbreviations and acronyms

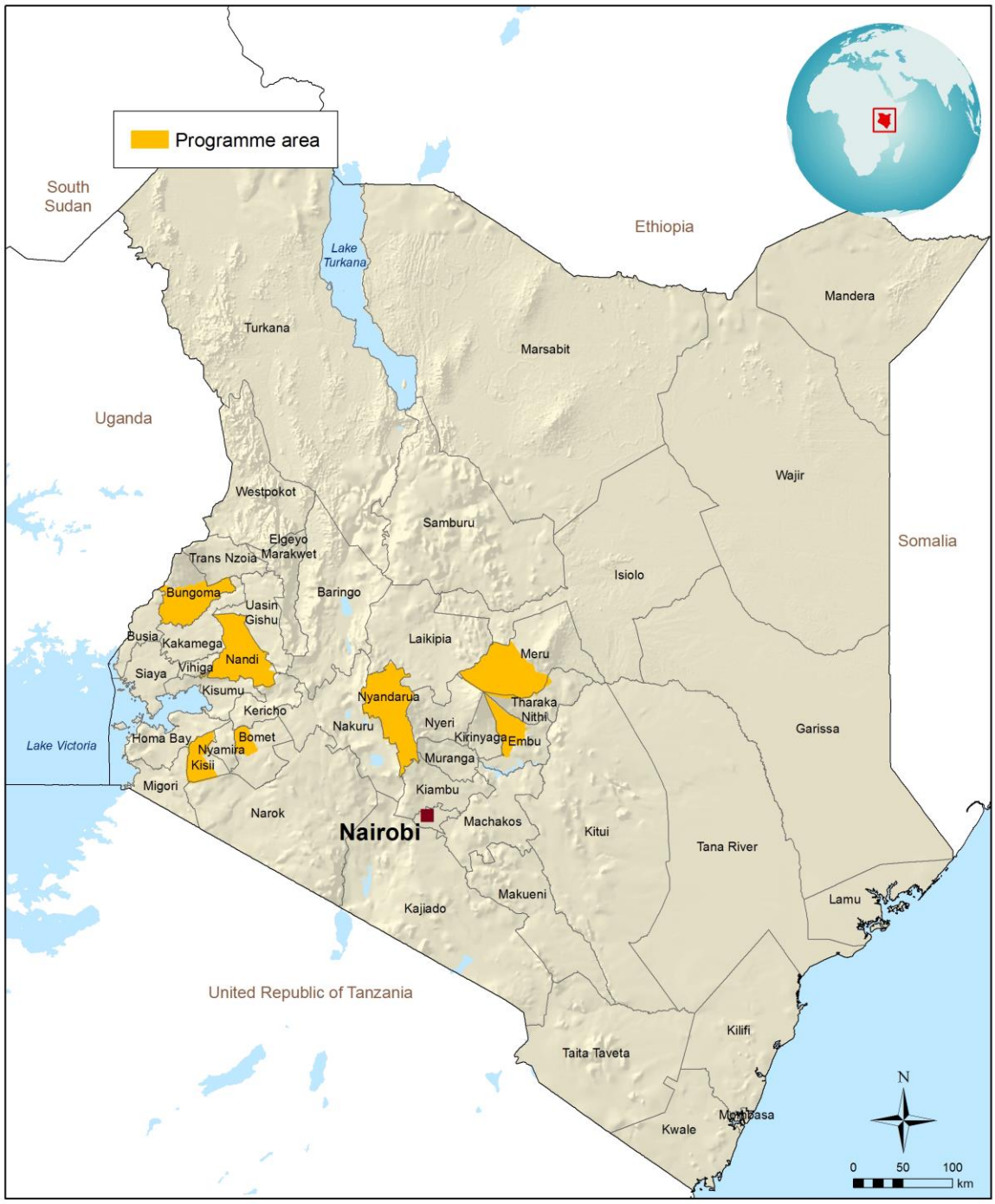
AGRA	Alliance for a Green Revolution in Africa
ASCU	Agricultural Sector Coordination Unit
ATT	average treatment on the treated
AWPB	annual work plan and budget
COSOP	country strategic opportunities programme
DAO	district agricultural officer
EA	enumeration area
FGD	focus group discussion
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Assessment Scale
GDP	gross domestic product
IOE	Independent Office of Evaluation of IFAD
KePHIS	Kenya Plant Health Inspectorate Service
KII	key informant interview
KNBS	Kenya National Bureau of Statistics
M&E	monitoring and evaluation
MoALFI	Ministry of Agriculture, Livestock, Fisheries and Irrigation
MoU	memorandum of understanding
MTR	mid-term review
PCA	principal component analysis
PCR	programme completion report
PMU	programme management unit
PSC	Programme Steering Committee
RIMS	Results and Impact Management System
SHoMaP	Smallholder Horticulture Marketing Programme
SMS	short message service
VCA	value chain analysis

Map of the programme area

Kenya

Smallholder Horticulture Marketing Programme

Impact Evaluation



The designations employed and the presentation of the material in this map do not imply the expression of any opinion whatsoever on the part of IFAD concerning the delimitation of the frontiers or boundaries, or the authorities thereof.

Map compiled by IFAD | 26-11-2018

The Heequeendo community-based organization in Bungoma East Sub-County received business training from ShoMaP. The group processes bananas and runs a small restaurant and shop. In addition, they make hat and other garments from banana fiber.

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Executive summary

A. Background

1. In line with the decision of the IFAD Executive Board, in 2017/2018 the Independent Office of Evaluation of IFAD (IOE) carried out an impact evaluation of the IFAD-supported Smallholder Horticulture Marketing Programme (SHoMaP) in Kenya. The overall rationale and terms of reference for this impact evaluation are set out in the approach paper.[1]

B. The programme

2. The overall goal of SHoMaP was to reduce poverty among poor rural households by increasing incomes and reducing unemployment and underemployment in medium- and high-potential farming areas where horticultural production was an important source of livelihood. This was to be achieved by easing the input and produce marketing constraints faced by smallholder farm households that produced horticultural crops for the domestic market. The two programme development goals were to: (i) increase incomes and reduce poverty among poor rural households in medium- to high-potential farming areas for which horticulture was a source of livelihood; and (ii) increase the health and welfare of Kenyans by improving the quality and increasing the quantity of horticultural produce consumed within the country.

3. **Target group.** The President's Report states that the programme would directly reach some 12,000 smallholder farm households, or 60,000 individuals. Direct target beneficiaries included smallholder horticultural farmers producing primarily for the domestic market, input suppliers (stockists), produce traders, transporters and processors. An additional 85,000 households would benefit indirectly from the programme through increased mobility and new employment opportunities along the value chains. Geographic targeting was used to select sub-counties based on their poverty profile, horticulture production and the presence of other relevant initiatives for possible synergies. At the design stage it was expected that 36 per cent of beneficiaries would be women.

4. **Programme components.** SHoMaP was implemented through three main components: component A: domestic market systems analysis; component B: institutional strengthening; and component C: investment in domestic horticultural value chains, plus a fourth component on programme management and coordination. Under component A, the programme was to carry out a number of studies including two nationwide studies, one on upstream input supply systems and the other on downstream horticultural wholesale and retail marketing, and 14 district-based value chain analysis (VCA) studies. Component B comprised: (i) training for existing formal and informal farmers' groups involved in horticulture, input stockists, traders, brokers, market managers and ministry staff; (ii) support to farmers and traders on market information by mobile phone short-text messaging and radio; (iii) support to the development of an improved horticultural sub-sector policy and legislation framework. Component C comprised: (i) pilot initiatives aimed at supporting groups of beneficiaries through competitive grants; (ii) spot improvement of rural roads to provide accessibility to markets; and (iii) development or improvement of downstream market infrastructure.

5. **Programme costs and financing.** The programme cost at completion was funded as follows: IFAD loan of US$23.03 million (71.6 per cent of total budget), IFAD grant of US$0.50 million (1.6 per cent), Government of Kenya counterpart funds of US$7.23 million (22.5 per cent) and the beneficiaries' contribution of US$1.39 million (4.3 per cent).

[1] https://www.ifad.org/en/web/ioe/evaluation/asset/40307169

6. **Time frame.** The SHoMaP was approved by the IFAD Executive Board on 18 April 2007 and the loan was signed on 10 July 2007. It was scheduled to start in June 2007, complete in December 2013 and close on 30 June 2014. However, the programme was granted a one-year no-cost extension and the actual completion and closing dates were 31 December 2014 and 30 June 2015, respectively.

7. **Implementation arrangements.** The programme was implemented by the Ministry of Agriculture, Livestock and Fisheries. The Programme Management Unit (PMU) was tasked with facilitating programme implementation. In each participating district or sub-county, the agricultural office established annual workplans and budgets and coordinated the implementation of SHoMaP in its jurisdiction. In addition, district or sub-county stakeholder fora were entrusted with the analysis of horticultural marketing potential and constraints and with the vetting of incoming proposals for market structures.

C. Evaluation objectives, methodology and process

8. **Objectives.** The overall goal of the impact evaluation for SHoMaP was to assess how the programme performed and identify the reasons underlying its performance, and in doing so provide relevant information for the design and implementation of future IFAD-supported projects and programmes. The main objectives of the evaluation were to: (i) establish to what extent the programme interventions had an economic effect on beneficiary households, and whether the effects could be attributed to the programme's interventions; (ii) identify what factors were responsible for the performance – both successful and unsuccessful – of the programme; and (iii) provide useful evidence to be used as a critical input for the Kenya country strategy and programme evaluation.

9. **Methodology and process.** The programme was evaluated using the criteria provided in the second edition of the IOE Evaluation Manual (2015). These included the four impact domains under the rural poverty impact criterion: (i) household income and assets; (ii) human and social capital and empowerment; (iii) food security and agricultural productivity; and (iv) institutions and policies. In addition, the following criteria were used to evaluate performance: relevance, effectiveness, efficiency, sustainability of benefits, gender equality and women's empowerment, innovation and scaling up, environment and natural resources management, adaptation to climate change, overall programme achievement, and the performance of partners. The criteria were rated on a scale from 1 to 6, with 6 representing the highest and 1 the lowest score.

10. The theory of change of the programme was the point of departure for this impact evaluation (see annex IV). The impact evaluation used a quasi-experimental design in order to attribute, or not, the observed effects to the programme's interventions. Identification of impact was achieved through a counterfactual: the use of a control or a comparison group.

11. The impact evaluation used a mix of quantitative and qualitative methods. The detailed methodology and a discussion of results and lessons learned are presented in annex VI. The core instrument for the evaluation was the household survey, which was used to collect primary quantitative data. The survey was administered to 1,522 households, with 825 interviews in control households and 697 in treatment households. The questionnaire was designed and administered to both treated and control groups using computer-assisted personal interviews. The quantitative part of the evaluation was complemented by a set of qualitative methods that provided an understanding of the causal mechanisms by which the intervention either achieved or failed to achieve its goals. Key informant interviews (KIIs) and focus group discussions (FGD) were used as instruments for gathering qualitative information. The KIIs elicited individual perspectives from input stockists and traders/transporters. A total of 48 KIIs were conducted, distributed equally across all the 14 districts. They reflect all categories of beneficiaries and

the most important key informants. Further, 17 FGDs elicited perspectives from retailers who sell their produce from markets constructed by SHoMaP, members of pilot initiatives and commercial villages, and from management committees (bridges and markets).

12. The impact evaluation relied on a propensity score matching method to estimate the impact of the programme's activities on the households' economic well-being. Selected characteristics (covariates) that could have influenced the probability of a beneficiary being treated by the programme were used in a standard *probit* model to calculate propensity scores. The nearest neighbour matching procedure (with replacement) was used to calculate the scores. The covariates were balanced between the treatment and control groups after weighting by the propensity score. The quality of matching between the beneficiary and control groups was assessed using the standardized bias approach, which compared the bias before and after matching. The quality of matching helped to establish that the distribution of variables was balanced in both the treatment and the control group, i.e. that there was good matching between these two groups.

13. The impact evaluation used "with and without" comparison analysis for estimating programme effects. This involved comparing the values of outcome variables at the same post-programme point in time – 2017 in this case – for both treatment and control groups.

14. Given the importance of national food security for the Government of Kenya, the impact evaluation used a multidimensional approach to assess the effects of the programme on the food security of the beneficiaries. Two indicators – the Household Food Insecurity Assessment Scale (HFIAS) and the Household Dietary Diversity Score (HDDS) – were used to assess a household's access to food dimension and a household's quality of diet dimension, respectively. The HFIAS assesses the households' perception of food security and its response to it, and the HDDS assesses the nutritional quality aspect or the micronutrient adequacy of the respondents' diet.

D. Main evaluation findings

15. **Rural poverty impact**. The impact evaluation considers SHoMaP's impact on the economic situation of its beneficiaries as modestly positive. The evaluation assessed the economic benefits accruing to a household through three measures: agricultural income, food expenditure and asset ownership index. Empirical evidence showed positive differences in agricultural incomes for beneficiaries as compared to the comparison group and these were statistically significant. Similarly, the beneficiaries reported greater expenditure on food, but the results were not statistically significant and hence it cannot be said with a certain level of statistical confidence that there is a strong likelihood of this indeed having occurred. Results related to farm assets showed that SHoMaP beneficiaries had greater assets relative to non-beneficiaries. However, the results are not statistically significant. In terms of heterogeneous programme effects, SHoMaP-supported female-headed households recorded higher incomes than female-headed households in the comparison group. However, in comparison to male-headed households, the programme did not lead to higher or equal incomes in female-headed households.

16. The evaluation used two measures to assess changes in the food security situation of beneficiaries: the HFIAS and the HDDS. The aim was to approach the issue of food security from a more comprehensive perspective that looked at respondents' perceptions of food security and their responses to it, and the nutritional quality of the food consumed by then. The results showed that SHoMaP beneficiaries had greater access to food and consumed a larger variety of food items as compared to the control group (statistically significant differences of -0.43 and 0.24 for HDIAS and HDDS, respectively).

17. Crop yields were greater in beneficiary households for bananas and Irish potatoes and the results were statistically significant. For sweet potatoes, yields in control households were greater but the results were not statistically significant. Results also showed that gross margin per acre for SHoMaP households was greater than the control group beneficiaries for all four crops. From a statistical perspective though, results were significant for bananas and sweet potatoes only. These results are important because in 12 of the 14 sub-counties in which the programme intervened, banana was one of the value chains selected by the programme, thereby underlining its important role.

18. In terms of social capital, quantitative analysis conducted by this evaluation showed that members belonging to households that participated in SHoMaP's activities were more likely to form groups than non-SHoMaP households. However, an important caveat here is that the majority of the former belonged to producer groups as opposed to marketing groups. This aspect was also highlighted in FGDs; while farmers did come together to form producer groups (in order to learn farming practices from each other), when it came to marketing in a group, most shied away from it due to issues of trust and leadership among members. For instance, group members did not trust the fact that the few members designated to sell on the group's behalf would be transparent about the actual price received or that they would pay the others on time.

19. SHoMaP conducted training for input stockists on bookkeeping, farm input dynamics and use of new products, and safe use of products; it also supported farmers in improving the quality of outputs and quality and nature of inputs and helped them improve their sales. However, interviews conducted by the evaluation revealed that the training time was short and was based on the assumption that beneficiaries had basic knowledge of these aspects to start with, which was not always true. The evaluation did not quantitatively assess the impact on beneficiaries of market structures and pilot initiatives; however, the results of observations, FGDs and KIIs reveal that these two interventions did not perform as expected. Roughly only half of the market structures were functioning well at the time of this evaluation; the same was the case with pilot initiatives. The evaluation rates the rural poverty impact criterion as *moderately satisfactory* (4).

20. **Relevance.** SHoMaP's development objectives were consistent with the 2030 Kenya Vision, the Ministry of Agriculture, Livestock and Fisheries Strategic Plan 2013-2017, the three strategic objectives of the Strategic Plan of the Horticultural Crops Development Authority 2009 and Kenya's Agricultural Sector Development Strategy (2009-2020) with regard to increased productivity, commercialization and competitiveness of agricultural commodities. SHoMaP's objectives and activities were also compliant with IFAD's Strategic Framework and with the relevant 2007 country strategic opportunities programme. The focus on commercialization of horticultural produce for local markets was relevant since throughout the medium- and high-potential areas of Kenya, the percentage of households that grow horticultural crops ranges from 80-100 per cent and less than 2 per cent of farmers produce directly for export. Most of the programme activities were determined based on a participatory and demand-driven approach (e.g. for income-generating pilot initiatives, design of markets and improvements in bridges and roads).

21. However, a number of issues, both exogenous and endogenous, challenged the relevance of the programme's design and approach. Changes in the country's constitutional context affected the relevance of the chosen partners to implement the rural market infrastructure component. With the promulgation of the new constitution in 2010, a devolved system of governance was adopted which led to issues such as lack of funds for and empowerment of the market management committees by the counties. Further, VCA studies were conducted on the basis of districts even though most of the selected commodities are also traded outside the targeted programme districts, and this meant that an integrated value chain

approach could not be adopted. Finally, the programme design did not take into account the capacity required for implementing an ambitious programme that spanned 14 districts, undertook a host of diverse activities (i.e. covering both "soft" (capacity building) and "hard" (infrastructure) interventions), and targeted beneficiaries with heterogeneous needs. The relevance of the programme is assessed as *moderately satisfactory* (4).

22. **Effectiveness.** The programme achieved most of its targets. In terms of specific objectives, access to markets was the main one in terms of funds allocated by the programme. In this regard, spot improvements (roads and bridges) were successful, bringing improved access to markets and traders. However, where more than 60 per cent of the programme funds were spent – i.e. on building or improving markets – the outcomes were less than satisfactory. Only half the markets were in complete use at the time of this evaluation. The aim to improve efficiency of input and output markets was a mixed success. Training to input stockists was useful in increasing their knowledge (which they passed on to the farmers) and their sense of conducting business. However, there was no economic impact of this on the farmers in terms of the stockists having passed on the efficiency savings to farmers through reduced input prices.

23. Commercial villages, i.e. commodity-based groups in villages, showed mixed success in accessing markets. The price information systems planned at programme appraisal had either not been developed (text messaging), were not maintained after the programme ended (billboards) or showed little evidence of use. The objective to raise value-added production was also a mixed success. Some pilot initiatives such as greenhouses for tomatoes displayed evidence of functioning well; however, at the time of the evaluation mission, half of the pilot initiatives were not producing income for farmers either because they never started or because they collapsed. Importantly, the programme was mainly unsuccessful in downstream activities related to creating a value proposition for farmers by facilitating group selling. Thus, on one hand, the great majority of planned outputs were delivered, but on the other, they did not culminate into outcomes to the desired extent. The evaluation rates effectiveness as *moderately unsatisfactory* (3).

24. **Efficiency.** The programme came into effect in a relatively short time after loan approval. There was a lag of only seven months between IFAD Board approval and the actual commencement of the programme, and this was lower than both the IFAD average of 12.3 months and the regional IFAD average of 10.2 months. Disbursements were slow initially, but at the time of programme completion almost 98 per cent of IFAD funds had been disbursed. Overall programme costs, however, exceeded their planned amounts by some 21 per cent. The high overall level of expenditure was a result of the Government's contribution, which exceeded the original design target by about 446 per cent of the total amount foreseen at design. These additional resources went mainly towards civil works to cover the variations in the cost of market structures caused by issues of cost overruns or unapproved additional works. Management costs too exceeded their estimate at appraisal by some 37 per cent. This was because activities such as market analysis, support for monitoring and evaluation (M&E) systems and evaluation of marketing infrastructure designs had to be outsourced since the PMU did not have the requisite capacity to undertake these in-house as originally planned.

25. The programme did not undertake a final cost-benefit analysis in a value chain promotion programme with more than 70 per cent of funds allocated to infrastructure-related activities. As per the analysis of this evaluation, in the case of certain investments such as roads and bridges, there were clear benefits that justified their costs; in the case of market structures, the benefits did not justify the costs of their construction, at least not until all the market structures are fully functioning. Considering the above factors, the impact evaluation rates the efficiency of the programme as *moderately unsatisfactory* (3).

26. **Sustainability of benefits.** The evaluation notes mixed success on the sustainability of commercial village activities and pilot initiatives. The spot improvements can be expected to endure longer given the formation of beneficiary-based committees and funding from the county governments. The sustainability of market structures, where the lion's share of the programme funds were invested, is delicately poised. Roadblocks remain, notably injection of capital by county governments to complete all works and the preparedness of counties and market management committees to ensure smooth functioning of the markets. It is possible that these roadblocks are due to the teething problems associated with devolution, and that the markets will function as expected. The evaluation rates sustainability as *moderately satisfactory* (4).

27. **Innovation.** SHoMaP was designed with a number of innovations to promote best practices and to ensure effective implementation. The evaluation finds this noteworthy. On the other hand, of these innovations, some: (i) were not implemented at all (two nationwide studies); (ii) were not produced in the intended quality (VCA studies); and (iii) gave mixed results (commercial villages and pilot initiatives). This evaluation rates innovation as *moderately unsatisfactory* (3).

28. **Scaling up.** Of the numerous activities carried out by SHoMaP, there are instances of one activity – i.e. value chain development – that was scaled up. In Bungoma county, for instance, the county government had set aside funding to promote value addition in the banana and tomato value chains. In Nyandarua, the county had adopted the value chain approach and had come up with a strategy for promoting the potato and carrot value chains. More specifically, the Nyandarua county government had posted officers in charge of value chain development and market access to ensure the success of its value chain support initiatives. In Kericho county, the SHoMaP VCA approach influenced the development of the County Horticulture Development Programme. The county government allocated 160 million Kenyan shillings to the promotion of irrigated horticulture, development of the pineapple value chain and support for development of cottage industries in the horticulture sub-sector. The evaluation rates scaling up as moderately successful (4).

29. **Gender equality and women's empowerment.** The programme elicited an equal participation of women and men. Similarly, most targets set for women were achieved. The programme's M&E system collected sex-disaggregated data. Further, SHoMaP had a positive impact on women: beneficiary households had more women involved in household decision-making than control group households. The incomes of women-headed beneficiary households were found to be greater than in the control group by the quantitative analysis. On the other hand, the lack of a full-time gender specialist was a missed opportunity, especially when half the programme's beneficiaries were women. The evaluation rates gender equality and women's empowerment as *satisfactory* (5).

30. **Environment and natural resources management.** A considerable number of activities undertaken by the programme were to protect and restore the environment and natural resources. Training helped increase the community's understanding of how to manage environmental risks. The compulsory use of environmental assessment and the implementation of mitigation measures ensured that market structures with negative environmental impact were not financed, and that activities were implemented in an environmentally acceptable manner. The programme introduced several environmentally friendly features and items of equipment with regard to the market structures. Provisions were made for disposal of waste generated in the markets. The necessary improvement of the long-term fertility of smallholder lands and other sustainable agricultural practices, such as diversifying crop rotations, are likely to reduce land degradation and pressure on less fertile lands. However, there is a chance that the likely use of spurious fertilizers to augment production and the fact that some of the activities meant to

protect against environmental degradation, such as waste disposal, are not carried out, could negate or hinder some of the outcomes with regard to the environment. The evaluation rates environment and natural resources management as *satisfactory* (5).

31. **Adaptation to climate change.** The programme did not have an explicit strategy related to climate change although at the time of SHoMaP's implementation climate change had been recognized by IFAD as an important issue affecting smallholder livelihoods. However, some of the pilot initiative proposals were related to adaptation to climate change. For instance, 16 out of the 80 initiatives were for greenhouse farming (including the Nakewa youth group initiative in Bungoma East that used rainwater harvesting for greenhouse farming). The use of greenhouse farming was intended to provide a controlled environment for crop growth regardless of weather conditions. Further, some proposals were for drip irrigation for production (for example, the Miruriiri Growers Self-Help Group in Imenti South). The evaluation rates adaptation to climate change as *moderately satisfactory* (4).

32. **Performance of partners: Government**. The relatively large scale of the programme, the extent of collaboration required among collaborating agencies, and the issues associated with staff, including turnover, left the PMU exposed on several fronts. The PMU did not help its case by delaying the establishment of an M&E system. However, the Government showed its commitment by providing extra funds to complete the market structures and by accelerating implementation after the midterm review. M&E was a weak point, but the attention to knowledge management was noteworthy. Admittedly, the devolution process that occurred midway in the programme's life cycle affected the implementation plans, especially for market structures. The national Government, for its part, developed and signed memorandums of understanding with the county governments to ensure that they complete the implementation plans and upkeep the markets. The evaluation rates government performance as *moderately satisfactory* (4).

33. **Performance of partners: IFAD.** The programme was directly supervised by IFAD, and its supervision and implementation support was deemed adequate by the programme staff interviewed by the evaluation team. IFAD fielded 11 supervision and support missions during the seven years of the programme, which were of use to the programme implementers. Further, IFAD's timely guidance and coordination facilitated the achievement of 96 per cent cumulative disbursement of the IFAD loan and 100 per cent of the grant. Since the programme faced difficulties in completing the infrastructure activities, especially for the markets, IFAD provided the programme with a one-year no-cost extension to complete the market infrastructure projects. Annual audits were carried out in accordance with the required international audit standards, and reports were accepted by IFAD.

34. On the other hand, IFAD could have done more about the lack of an M&E system apart from solely raising the issue in the supervision reports, especially given the corporate emphasis on measuring results. There was some disconnect between the sheer scale of the programme (geographic spread and number of activities) and the capacity on the ground to implement it. IFAD could have been more proactive in assessing this gap. Some of the proposals that were approved for the pilot initiatives did not have the basis for long-term sustainability and should not have been approved. The undertaking of the two nationwide studies and completion of the VCA assessment studies on time should have been more vigorously pursued by IFAD. The evaluation rates IFAD's performance as *moderately satisfactory* (4).

E. Conclusions

35. The impact on horticulture producers' incomes and food security was primarily realized through the production node of the value chains. The focus of the training provided by the programme was primarily on selling in groups and marketing

(creating marketing linkages). Some training was provided on agronomic practices. However, training given by the programme to commercial village groups impacted more on agronomic practices at the cost of marketing knowledge. The greater incomes in the treatment group compared to the control group were a result of greater gross margins for the former, driven mainly by differences in yields in some of the programme-promoted horticultural commodities such as bananas and Irish potatoes.

36. Value chain development under the programme rightfully targeted several building blocks, but an integrated approach was lacking. The programme targeted several activities associated with a value chain: market analysis; improvement of input markets; increased capacities of farmers to engage with value chains; formalized sustainable trade linkages; and investments in infrastructure. However, issues in a commodity value chain were to be addressed using districts as the basis, as opposed to using a holistic approach that could transcend administrative boundaries. Even the district-based value chain studies – which were to be the core tool for the design of interventions for pilot initiatives and commodity producer groups – were conducted late, while several activities that would have followed from this analysis, such as selection of groups, were conducted beforehand. Further, the market analysis through two nationwide studies that was to be the starting point for the value chain activities was not undertaken at all.

37. Negative relationship dynamics led to the limited success of the programme with regard to marketing groups. Lack of trust among group members was the common denominator in explaining the less-than-desired outcomes of commercial villages. Issues of lack of accountability, and poor governance and management, acted as barriers to successful group-working. The delayed start of the programme with respect to its core activities meant that there was no adequate time to remedy the situation by providing additional support to groups.

38. The effects of the devolution process were most visible for the market infrastructure aspect. There was a lack of common understanding among the various stakeholders regarding the responsibility, ownership and management framework of market facilities after the hand-over of the market structures to the county governments. While the memoranda of understanding between national government, horticulture market committees and county governments were useful, they did not provide adequate legal backing, especially considering that the committees were not legal entities.

39. The success of pilot initiatives was mostly evident in those that were production-oriented. Almost two-thirds of the initiatives were for value addition and agro-processing (such as banana-based products), and most of them did not perform as expected. On the other hand, initiatives that were production-oriented (such as greenhouses) performed far better. Most initiatives that the evaluation team saw were under-capitalized, poorly managed and had no clear business growth and linkage strategy. Also, the small grant size received by groups meant that many initiatives were unsustainable and eventually ceased to operate.

40. The programme produced mixed outcomes in terms of improving power relations along the value chains. In some cases, such as construction of roads, the programme interventions benefited both farmers and traders. Thus, for instance, roads made access to production areas easier for traders and at the same time producers obtained better prices. In other cases, such as commercial villages, the programme's aim to shift the balance of power in trade relations in favour of smallholder growers was not as effective as desired because not all commercial villages were able to enhance their capacity to produce in bulk, and access to market information was not effective. Further, while the programme attempted to link commercial villages to commodity-specific apex farmers' organizations, it stopped short of fostering market linkages for the apex organizations.

F. Recommendations

41. **Recommendation 1: In value chain-related interventions, adopt an integrated approach and a proper sequencing of activities.** The successful development of a value chain requires both an integrated design and a proper sequencing of its building blocks or activities. The former entails considering the chain in its entirety, not restricted by internal geographic boundaries, and placing emphasis on upstream, production and downstream activities. Further, an integrated approach also requires proper sequencing of value chain interventions. Given the limited duration of IFAD-supported projects, when detailed design of activities is to occur after programme start-up, then meticulous planning and strict timelines become even more important for realizing the intended results.

42. **Recommendation 2: When strengthening relationships among value chain actors, allocate sufficient time and support for capacity development and behavioural shifts to take shape.** Relationships exist between different groups of actors (e.g. producer and trader) and within the same group of actors (e.g. farmer to farmer). Enhancing and helping coordinate stronger relationships can potentially achieve a number of benefits to make the value chains work more effectively. However, programmes need to factor-in sufficient time and constant support for attitudinal shifts among actors to take effect, especially in contexts where trust among marketing group members can take longer to build. In this regard, training programmes should accord top priority to sensitization and training on group approaches and dynamics.

43. **Recommendation 3: Target individual entrepreneurs or smaller enterprises for agro-processing while positioning farmers as suppliers of raw materials.** The quantitative and qualitative results of this evaluation clearly underline three facts: (i) working in groups did not succeed as desired; (ii) the pilot initiatives for value addition did not work as expected; and (iii) increases in incomes were mainly from increased production of commodities in primary form. Thus, focusing on a few, individual entrepreneurs or micro, small and medium enterprises and providing them with support for both upstream and downstream activities would have more impact, since farmer groups may lack the necessary capital and entrepreneurial attitude to make small agro-processing enterprises sustainable. This is supported by the results of the evaluation, which demonstrated that production of primary horticultural products was a profitable activity for farmers.

44. **Recommendation 4: For infrastructure-related interventions, establish mechanisms for collaboration among stakeholders as part of the programme exit strategy.** Long-term sustainability of social infrastructure such as markets requires effective mechanisms that establish clear rules of engagement among stakeholders and help imbibe ownership. The point of departure for establishing such mechanisms should be a negotiation of the respective roles and responsibilities of the stakeholders, an area where IFAD programmes can play an important role in facilitating agreement. The collaboration should also encompass governance, including a dispute settlement mechanism and risk mitigation measures, and a clear and transparent revenue-sharing mechanism. For mechanisms to be appropriately enforced, it is important that they be institutionalized through a legal framework.

IFAD Management's response[1]

1. Management welcomes the findings of the Smallholder Horticultural Marketing Programme (SHoMaP) Impact Evaluation conducted by the Independent Office of Evaluation (IOE). Management is pleased to note that the impact evaluation is in line with the programme completion report in assessing the overall performance of the programme as *moderately satisfactory*. The impact evaluation recognizes that the programme operated during the early stages of implementation of the new constitution of Kenya. This resulted in substantial changes to the country context, such as the devolution of the activities of the Ministry of Agriculture, Livestock and Fisheries to new county governments.

2. Management concurs with the impact evaluation's assessment that the programme's performance in terms of gender equality and women's empowerment was satisfactory. Management welcomes the finding that the targets for women's participation were achieved and that beneficiary women-headed households registered higher incomes than women-headed households in control groups.

3. Management agrees with the impact evaluation's recommendations and will ensure that these are acted upon during the implementation of the ongoing IFAD-supported projects and programmes in Kenya as well as in the design of future projects and programmes. In this regard, Management would like to acknowledge the following:

Recommendation 1: In value chain-related interventions, adopt an integrated approach and a proper sequencing of activities.

Agreed. Management agrees that value chain studies and activities should encompass the entire value chain, rather than being restricted to district boundaries and with little focus on upstream activities. The design had envisaged two nationwide studies to complement the district-based value chain studies, and the undertaking of these studies should have been more vigorously pursued by IFAD. An integrated approach is being adopted in on-going value chain programmes in Kenya, such as the Smallholder Dairy Commercialization Programme, which works with a wide range of upstream and downstream actors in the dairy value chain. Rather than focusing on administrative boundaries, this programme intervenes in the so-called dairy commercialization areas, broad geographical areas selected on the basis of a series of indicators for milk production, marketing and consumption, as well as poverty.

Recommendation 2: When strengthening relationships among value chain actors, allocate sufficient time and support for capacity development and behavioural shifts to take shape

Agreed. Management agrees that to achieve effective linkages along the value chains, patience is required in order to build sustainable alliances both horizontally (between farmers) and vertically (between farmers and traders). It is appreciated that farmers' lack of trust towards traders often leads them to be reluctant to engage in trading arrangements. It is also appreciated that group cohesion is important to build good working relationships within farmer groups. IFAD's on-going projects in Kenya are making concerted efforts to ensure that priority is given to the reinforcement of farmer group capacities and social capital, especially when these groups engage in joint business activities.

Recommendation 3: Target individual entrepreneurs or small enterprises for agro-processing while positioning farmers as suppliers of raw materials

[1] The Programme Management Department sent the final Management's response to the Independent Office of Evaluation of IFAD on 1 October 2018.

Agreed. Management shares the concerns expressed by the evaluation regarding the difficulties encountered by SHoMaP when promoting farmer groups' involvement in value addition activities. We also take note of the finding that increases in incomes were mainly from farm production activities. Indeed, value addition in the form of actual processing is a skill that is not common or a priority to most smallholder farmers in Kenya. Management also takes note of the recommendation to work with a small number of individual entrepreneurs or small to medium enterprises to advance value addition activities. However, in line with recommendation 2, Management also notes that trainings on group approaches and dynamics, as well as on business skills, can strengthen farmer groups' capacities to run small agro-processing enterprises. Thus, Management would prefer not to exclude the possibility of working with farmer groups in value addition activities where there is an expressed interest and adequate capacity.

Recommendation 4: For infrastructure-related interventions, establish mechanisms for collaboration among stakeholders as part of the programme exit strategy

Agreed. Management agrees with evaluation's observations. As pointed out by the evaluation, the programme was implemented in a period of transition from a central to a devolved system of governance. Unfortunately, implementation of the market infrastructure activities was slowed down by this transition. This is one of the factors that contributed to the failure to complete the infrastructure works and to the lack of clear ownership arrangements for the market structures. However, it is important to note that some of the structures are already being rehabilitated, and that money has been allocated by the county governments for their completion and operationalization.

4. Management thanks IOE for the fruitful process and will ensure that lessons learned from this exercise are internalized to further improve the performance of IFAD-funded projects and programmes in Kenya and elsewhere.

The Pyhort self-help group in Nyandarua North County built a potato storage shed with support from the programme. Nine potato farmers in the area collect and store their potatoes here during peak harvest time and sell in bulk three months later, to make a profit.

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Republic of Kenya
Smallholder Horticulture Marketing Programme
Impact Evaluation

I. Background, evaluation objectives, process and methodology

1. **Background.** In line with the IFAD Evaluation Policy and as decided by the Executive Board, the Independent Office of Evaluation of IFAD (IOE) undertakes one impact evaluation every year. Given their scope, the impact evaluations rely on extensive data collection and robust data analysis methods in order to gather attributable evidence on the effects of a project on its beneficiaries. In 2017-2018, the office undertook its fifth impact evaluation. The programme selected for the impact evaluation is the Smallholder Horticulture Marketing Programme (SHoMaP) in Kenya. The programme was selected using a comprehensive selectivity framework.[1]

2. **Objectives.** The overall goal of the impact evaluation for SHoMaP was to assess how the programme performed, and articulate the reasons for its performance, and in doing so provide relevant information for the design and implementation of future IFAD-supported projects and programmes. The main objectives of the evaluation were to:

   i) measure, and in doing so, establish if the programme interventions had an economic effect on beneficiary households, and whether the effects can be attributed to the programme's interventions;

   ii) identify which factors were responsible for the performance – both successful and unsuccessful – of the programme; and

   iii) provide useful evidence for and to be used as a critical input towards the Kenya country strategy and programme evaluation.

3. **Process.** The process for undertaking the impact evaluation was an elaborate process, as outlined below.

   i) A *preliminary assessment* of the programme that involved making a data inventory and evaluating the methodology of the impact assessment conducted by the programme was undertaken (see annex VI). This was followed by a *desk review* of programme documentation at IFAD headquarters and discussions with the programme's ex-Country Programme Officer in Rome. A scoping mission was then undertaken to Kenya. This entailed meeting with IFAD's Country Programme Manager for Kenya, concerned IFAD staff in Nairobi, and staff of the Programme Management Unit (PMU).

   ii) A competitive *bidding process* was launched to select a company to undertake the quantitative and qualitative data collection, and consequently, a Kenya-based organization was selected. The company undertook a household survey and conducted focus group discussions (FGDs) and key informant interviews (KIIs), and the data collected were analysed in collaboration with the IOE team. The main mission was undertaken by the IOE lead evaluator along with the IOE consultant to finalize the sampling design and the questionnaire for the household survey and FGDs, to meet

[1] Based largely on the selectivity framework, IOE undertakes impact evaluations of projects: (i) within three years of their completion date; (ii) that are not selected for impact evaluation by IFAD Management; (iii) that will also be included as part of the project portfolio analysis in forthcoming country strategy and programme evaluations, to enhance the latter's evidence base; (iv) that have innovative development approaches (e.g. institutional, social, technological) that merit deeper analysis and documentation; and (v) that offer enhanced opportunities for learning, on what works and what does not in promoting sustainable and inclusive rural transformation.

with programme officials and programme staff, and to travel to selected areas[2] to meet beneficiaries and hold meetings with local officials.

iii) Based on the results obtained from the impact evaluation and findings of the main mission, the preliminary findings were shared with the Government at a presentation in Nairobi, and feedback was gathered. Based on this, the first draft of the impact evaluation was prepared and internally peer-reviewed by IOE, subsequent to which the first draft was shared with IFAD's Programme Management Department and with the Government. A learning workshop will be held in Nairobi to discuss the evaluation's main findings and recommendations with key stakeholders and IFAD staff.

4. **Methodology.** The principal aim of this evaluation was to assess the impact of the programme on its beneficiaries. Following guidelines of the IOE Evaluation Manual Second Edition (2015), impact was evaluated using the four impact domains under the rural poverty impact criterion: (i) household income and assets; (ii) human and social capital and empowerment; (iii) food security and agricultural productivity; and (iv) institutions and policies. In addition, the other criteria evaluated included: relevance, effectiveness, efficiency and sustainability of benefits, gender equality and women's empowerment, innovation and scaling up, environment and natural resources management, adaptation to climate change, overall project achievement, and performance of partners (IFAD and Government). In line with the Evaluation Manual, the above criteria were rated on a scale from 1 to 6, with 6 representing the highest and 1 the lowest score.

5. The **theory of change** was the point of departure for this impact evaluation (displayed in annex IV). It demonstrates the causal pathway from outputs to outcomes (short and medium to long term) and finally to impact. While the theory of change is also an extended expression of the logframe (see annex V for logframe), the one presented in the annex is reconstructed. In other words, it takes into account some of the main changes that occurred during programme implementation, especially with regards to activities and outputs. To this extent, it differs from the logframe that was developed at the appraisal stage and which was not modified to reflect the changes as they occurred.

6. The theory of change is cast in a value chain format, which was essentially the underlying premise of the programme. Thus, it shows both vertical and horizontal linkages; the former indicate forward and backward linkages between upstream and downstream actors resulting from programme interventions, and the latter indicate how activities and outputs related to the same actor result in outcomes (for that actor). As depicted by the figure in the annex, the interventions lead to common medium- to long-term outcomes such as increased value of production and improved food security. The impact or the goal of the programme is an increase in the incomes. One more objective of the intervention logic is to present the assumptions that underpin the transition along the causal path (shown by way of shaded boxes). The causal pathway illustrated in the theory was used to inform the reasons underlying the results of the impact evaluation (in the section on Rural Poverty Impact) later in this document.

7. The detailed methodology undertaken for this impact evaluation is presented in annex VI. The impact assessment used a **quasi-experimental** design to attribute programme results to its interventions. The identification of impact was achieved through a counterfactual/control group, i.e. what would have happened to the treatment group in the absence of the treatment. The key evaluation question was: *how does the easing of inefficiencies in inputs and in produce marketing constraints increase incomes in medium- and high-potential farming areas where horticulture is an important source of livelihood?* The specific sub-questions allowed the development of indicators for measuring impacts at household, community and

[2] The IOE mission travelled to Eldoret, Embu, Kericho, Kiisi, Kisumu, Meru, Nakuru and Nyandurua.

institutional levels and relevant study hypothesis. The indicators were to assess both intended and unintended benefits.

8. The impact evaluation used a **mix of quantitative and qualitative methods** in order to utilize the strengths and overcome the shortcomings of each method. The two methods were carried out contemporaneously for reasons of cost and time efficiency. The core instrument for the evaluation was the household survey, which was used to collect primary quantitative data. The survey was administered to 1,522 households, with 825 interviews in control households and 697 in treatment households. A household questionnaire was designed and administered to both treated and control groups using Computer Assisted Personal Interviews. The questionnaire gathered data on demographics, education, health and variables of interest for the impact evaluation such as agricultural income, gross margin, household dietary diversity, yields, household food insecurity index, food consumption expenditure, frequency of group membership and asset index.

9. The quantitative part of the evaluation was complemented by a set of qualitative methods which provided an understanding of the causal mechanisms by which the intervention either achieved or failed to achieve its goals. KIIs and FGDs were used as instruments for gathering qualitative information. The KIIs elicited individual perspectives from input stockists and traders /transporters. A total of 48 KIIs were collected, distributed across all the 14 districts. They represented all categories of beneficiaries and most important key informants. A total of 17 FGDs elicited perspectives from retailers who sell their produce in markets constructed by SHoMaP, members of pilot initiatives and commercial villages, and from management committees (bridges and markets). Table 1 displays the sub-questions and the tools used in this evaluation. Details of KIIs and FGDs are reported in table 2.

Table 1
Evaluation tools used for the impact evaluation

Sub-questions	*Quantitative tools*	*Purpose*
What was the impact of SHoMaP on incomes, agricultural productivity, assets and food security of beneficiary households?	Structured impact survey	Administered to all the sampled households for the collection of primary quantitative data.
- To what extent were commercial villages and pilot initiatives successful and why? - To what extent did SHoMAP cause changes in the social and economic conditions of women?		
- Which were the main perceptions of hot-spot improvements?	Focus Group Discussions	Conducted separately for women and men by project component and sub-component to triangulate with quantitative information.
- To what extent did the different categories of beneficiaries participate in the programme's implementation? - To what extent were pilot initiatives successful and why?		
- What is the current state of use of market infrastructure and what	Key Informant Interviews	Conducted with different project partners to identify project successes and failures and with beneficiaries to triangulate with quantitative information.

are the main reasons for this? - To what extent did SHoMaP cause changes in the distribution of agricultural inputs?		
What is the current state of market infrastructures and hot spot improvements?	Observations	Conducted by the IOE team to assess the status of market infrastructures and of hot-spot improvements.

Table 2
Details of KIIs and FGDs

Categories of KII	*Number*
PMU	3
Beneficiaries - stockists	10
Beneficiaries -committee members	3
Beneficiaries - representatives of pilot initiatives	2
Beneficiaries - transporters	4
Beneficiaries - traders	5
Service providers	2
Ministry of Agriculture, Livestock, Fisheries and Irrigation at county level	15
County government	3
Categories of FGs	
Pilot initiatives	4
Commercial villages	5
Market management committees	2
Bridge committees	1
Retailers	4
Women	1

Source: field interviews by evaluation team.

10. The **sample size** was calculated using the following parameter values: alpha=0.05, beta=0.2, a Minimum Detectable Effect of 0.20 for income variable (assumption based on the programme endline survey), an intra-cluster correlation value of 0.1 and adjusting for possible non-response (5 per cent). A sample size of **1,522 households** was obtained, with 697 in the treated group and 825 in the control group. The oversampling of the control group was in order to find the best quality matches possible for the treated group and to confront the issue of the control group sampling units dropping out due to lack of adequate matching.

11. The **sampling strategy** involved creating the sampling frame. The Kenya National Bureau of Statistics (KNBS), using the Kenya Population and Housing Census Survey database, developed the enumeration areas (EAs) for the sampling frame for this study. The selection of the EAs was done using the probability proportional to size using the total number of households in each EA as the measure of size (an EA could have between 50 and 150 households). Thus, larger EAs had a greater probability of being selected. From each selected EA, a uniform sample of 13

households was selected systematically, with a random start.[3] The systematic random sampling method was adopted as it enables the distribution of the sample across the EA evenly and yields good estimates for the population parameters. The households were selected after the listing process was completed in each EA.

12. Similarly, the EAs for the sampling frame for the treated villages were selected from the national sample frame. Consequently, the treated villages were selected on the basis of the listing from IFAD. From a listing of all the villages that benefited from the SHoMaP, commercial producer groups were systematically selected with a random start based on interval of five. The number of households to be interviewed in each village was then proportionately determined using the population of treated households in that village. The selection of villages for the control group was determined by the agro-ecological zones in which the treated households belong. Only villages in high- and medium-potential zones (these were the same characteristics that were also used to select the intervention areas) and those that grew similar crops as the treated groups were selected. The control villages did not benefit from any of the SHoMaP interventions. Households were selected from the Census sampling frame managed by the KNBS. Based on the total number of non-treated households, the number of households interviewed for each selected village was proportionate to the number of treated households selected in final sample within the same district.

13. **Quantitative data analysis methods.** The impact evaluation relied on the propensity score matching method to estimate the impact of the programme's activities on the households' economic well-being. Selected characteristics (covariates) that could have influenced the probability of a beneficiary being treated by the programme were used in a standard *probit* model to calculate propensity scores. The nearest neighbour matching procedure (with replacement) was used to calculate the scores. The covariates were balanced between the treatment and control groups after weighting by the propensity score. The quality of matching between the beneficiary and control groups was assessed using the standardized bias approach, which compared the bias before and after matching. The quality of matching helped to establish that the distribution of variables was balanced in both the treatment and control groups, i.e. that there was good matching between these two groups.

14. The impact evaluation made use of "with and without" comparison analysis for estimating programme effects. The former involved comparing the values of outcome variables at the same post-programme time point, i.e. 2017 in this case, for both treatment and control groups.

15. The impact evaluation used a multi-dimensional approach to assess the effects of the programme on the food security of the beneficiaries. Two indicators – the Household Food Insecurity Assessment Scale (HFIAS) and the Household Dietary Diversity Score (HDDS) – were used to assess the household's access to food dimension and the household's quality of diet dimension, respectively. The HFIAS assesses the households' perception of food security and its response to it, and the HDDS assesses the nutritional quality aspect or the micronutrient adequacy of the respondents' diet.

16. **Limitations.** The direct target beneficiaries of the programme included smallholder horticultural farmers primarily producing for the domestic market, produce traders, input suppliers (stockists), produce transporters and horticultural processors; indirect target beneficiaries included horticultural consumers, and rural underemployed and unemployed men and women.

[3] Designs with probability proportional to size have the characteristic of having the same sample size from each selected cluster. This can have important practical benefits in survey planning, implementation, and supervision, since it means a roughly equal workload in each cluster.

17. The impact evaluation questionnaire was administered only to the beneficiaries of training support (farmers) and hot-spot improvements (roads and bridges); beneficiaries of pilot initiatives and market structures (traders) and consumers were not included. Smallholders were supposed to benefit from almost all interventions: training on best agricultural practices and group selling; rehabilitation of roads (via better prices and market connectivity) market structures (via the traders, who sold in these markets, passing on better prices to them); and training of stockists (via improved use of inputs). The farmers also formed the majority of the beneficiaries. Hence, the quantitative survey was posed to this group of beneficiaries. Other beneficiaries such as input stockists, traders and transporters were included through the qualitative method, i.e. FGDs. Therefore, to an extent, the average (quantitative) effects do not take into the account the positive or negative effects emanating from the pilot initiatives and the market structures, and to that extent, the effects may be over- or under-stated. Further, the indirect effects of the programme through employment generation were not evaluated.

18. The attempt at recreating baseline values through recall did not succeed because the quality of recall values was found to be unreliable. Hence, the plan to use difference-in-difference approach was dropped and programme effects were instead calculated using the "with and without" approach. Since good matching of treatment and control groups' characteristics was achieved, the approach can be considered as yielding reliable results, although it is possible that some bias due to unobservable differences between the treatment and the control groups could remain.

19. Although matching in various forms is widely used, the technique also has some limitations. The most obvious is that the pairing of households with and without programme can only be done based on observable characteristics. While multivariate matching minimizes bias on observables, it cannot control for unobserved confounding covariates.

A. Context

20. Kenya has made significant political, structural and economic reforms that have largely driven sustained economic growth, social development and political gains over the past decade. However, its key development challenges still include poverty, inequality, climate change and the vulnerability of the economy to internal and external shocks. Kenya's recent political reform stemmed from the passage of a new constitution in 2010 that introduced a bicameral legislative house, devolved county government, a constitutionally tenured judiciary and electoral body. Devolution ushered in a new political and economic governance system.

21. According to the latest data available, Kenya's population stands at 48.46 million, growing at the rate of 2.8 per cent per annum. The poverty headcount ratio at national poverty lines (per cent of population) is 36 per cent.[4] While economic activity faltered following the 2008 global economic recession, growth resumed in the last three years, reaching 5.8 per cent in 2016 and placing Kenya as one of the fastest growing economies in sub-Saharan Africa. The economic expansion has been boosted by a stable macroeconomic environment, low oil prices, a rebound in tourism, strong remittance inflows and a government-led infrastructure development initiative. Looking ahead, short-term gross domestic product (GDP) growth is expected to decelerate because of ongoing drought, weak credit growth, security concerns and the pick-up in oil prices. Medium-term GDP growth is expected to rebound (dependent on completion of ongoing infrastructure projects, resolution of slow credit growth, strengthening of the global economy and tourism).[5]

[4] World Development Indicators. Accessed in May 2018.
[5] World Bank, http://www.worldbank.org/en/country/kenya

22. In addition to aligning economic development through the country's development agenda to the long-term development plan, Vision 2030, the President of Kenya in December 2017 outlined the "Big Four" development priority areas for his final term as President. The Big Four will prioritize manufacturing, universal healthcare, affordable housing and food security.

23. Kenya has the potential to be one of Africa's success stories from its growing youthful population, a dynamic private sector, a highly skilled workforce, improved infrastructure, a new constitution, and its pivotal role in East Africa. Addressing the challenges of poverty, inequality, governance, the skills gap between market requirements and the education curriculum, climate change, low investment and low firm productivity to achieve rapid, sustained growth rates that will transform lives of ordinary citizens, will be the major goals for Kenya.

24. **Agricultural and rural development sector context.** In Kenya, agricultural production accounts for one third of the country's GDP, with recent annual growth pegged at 4 per cent, and it is the primary source of livelihood for the majority of rural households. Agriculture employs 38 per cent of the total labour force and 73 per cent of the rural population. Agriculture supplies the manufacturing sector with about 75 per cent of industrial raw materials and generates tax revenue and foreign exchange that supports other economic activities. Over the last few decades, horticulture has emerged as one of the leading sub-sectors in the agriculture sector in terms of foreign exchange earnings, food security, employment creation and poverty alleviation.

25. In addition to some stable crops, the majority of rural households located in arable areas grow fruits and vegetables for home consumption, and the sale of small seasonal surpluses is a major source of income for many. About 4 per cent of the horticultural production is exported. A significant portion of fruits and vegetables are produced and consumed by members of the rural households themselves. Farm households with a surplus may sell to deficit households, "over the fence" to neighbours or to other households within walking distance. Farm families may transport produce to a roadside sales point or a local retail market where they sell it themselves. Alternatively, farmers may sell to small local traders who transport the produce and in turn sell it along the road or in a retail market to travellers and local consumers. The most common forms of fresh produce retailing in rural areas are roadside vending and sale in open-air market areas. In larger villages and rural centres, there may be a permanent market facility operated by the county council, with stalls specifically for the sale of produce.

26. Production for the domestic market is particularly important for low-income farmers, most of whom lack the resources and organizational capability necessary to produce for export. However, the domestic horticulture sub-sector value chains in Kenya face a number of challenges. Some of these challenges are complex and require a systematic approach to address them. The main challenges include lack of commercialization, low production and productivity and weak market linkages. Lack of infrastructure and limited support services (e.g. financial services, extension services, insurance services) further constrain the sector growth.

27. Insofar as input markets are concerned, since liberalization of the seed market, fake seed, uncertified seed, underweight packages and false packaging have increasingly affected the industry. Overall intensity of fertilizer use is estimated at around 30 kg/ha, well above the average for sub-Saharan Africa but low compared to other parts of the world. The retail price of fertilizer in Kenya continues to be high, partly due to high costs incurred in domestic distribution, and more intensive use of fertilizers will require a more cost-effective distribution system. For a long time, the Government has encouraged the use of pesticides as a panacea to pest problems, which has resulted in increasing use of chemical pesticides.

28. **Programme objectives.** The overall goal of SHoMaP was to reduce poverty among poor rural households by increasing incomes and reducing unemployment and underemployment in medium- and high-potential farming areas where horticultural production was an important source of livelihood, through easing input and produce marketing constraints faced by small-scale farm households that produced horticultural crops for the domestic market. Towards this end, the two programme development goals were to: (i) increase incomes and reduce poverty among poor rural households in medium- to high-potential farming areas for which horticulture was a source of livelihood; and (ii) increase the health and welfare of Kenyans by improving the quality and increasing the quantity of horticultural produce consumed within the country.

29. The programme sought to address inefficiencies and constraints in input supply and horticultural marketing in target areas with the ultimate aims of: (i) reducing farm unit cost of inputs among smallholder horticultural farmers; (ii) improving the quality of inputs and services provided by input suppliers (stockists) to smallholder horticultural farmers; (iii) raising the quality of horticultural produce traded in the domestic market; and (iv) increasing and stabilizing farm-gate prices for smallholder horticultural producers.

30. **Programme components.** SHoMaP was implemented through four components:

    Component A: Domestic market systems analysis

    Component B: Institutional strengthening

    Component C: Investment in domestic horticultural value chains

    Component D: programme management and coordination

31. *Component A: Domestic market systems analysis*. The objective of this component was to identify constraints faced by smallholder horticultural farmers in the acquisition of inputs and marketing of horticultural produce. In order to inform programme interventions, the programme was expected to carry out a set of **studies** during the start-up phase. These included: (i) selection of three priority horticultural commodities to be targeted in each of the 14 programme districts; (ii) two nation-wide studies (on upstream inputs supply systems and on downstream horticultural produce wholesale and retail marketing); (iii) 14 district-based value chain analysis (VCA) studies (one in each of the programme districts); and (iv) a district-wide stockists mapping study.

32. *Component B: Institutional strengthening.* The main objective of this component was to support demand-driven capacity-strengthening needs of both service providers and farmers. The component was comprised of **training, provision of market information and policy support**, to be achieved through the following five sub-components: (i) support to existing formal and informal farmer groups involved in horticultural through training focusing on improving group cohesion and planning and managing group-based marketing activities and investments; (ii) training of horticultural input stockists, traders, brokers and market managers to increase their efficiency and, in the case of traders, improve the quality of the produce that they supply to domestic consumers; (iii) "on-the-job training" of Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALFI) staff in marketing and business management; (iv) support to evolving systems that provide market information to farmers and traders by mobile phone short message service (SMS) and by radio; and (v) support to the development of an improved horticultural sub-sector policy and legislation framework.

33. *Component C: Investment in domestic horticulture value chains*. This component aimed to support cost-effective investments and innovative initiatives to break constraints facing the domestic horticulture value chain, add value to produce, reduce marketing costs, and enhance efficiency and equity with which marketing chains moved commodities from farms to markets. The programme pursued these

aims under the following three sub-components: (i) **pilot initiatives** which aimed to support innovative pilot investments for groups of beneficiaries through competitive grants. These were related to agricultural production (such as greenhouses, seed-bulking, warehousing, water-harvesting for irrigation), value addition (banana-ripening) and agro-processing (juice-making, banana and potato crisp-making). Where found economically feasible, such innovative pilot investments could then be replicated using loan funding obtained by groups from microfinance institutions, savings and credit cooperatives or through community-based financing arrangements; (ii) **spot improvement of rural access roads** to provide accessibility and open up marketing functions in horticultural production clusters in the target districts; and (iii) **development or improvement of downstream physical market infrastructure** aimed at providing appropriate and demand-driven marketing facilities, as well as to promote effective, efficient and transparent business practices in the domestic horticulture value chain.

34. *Component D: Programme management and coordination*. The programme's management and organizational arrangements were designed to make use of the potential for partnerships between the public sector, the private sector and civil society organizations, both in programme implementation and in the marketing mechanisms which the programme would support. A Programme Steering Committee was established at the national level to provide guidance with the aim of ensuring that activities undertaken were in line with national policies, strategies and procedures. The PMU was responsible for coordinating programme activities and facilitating the implementation of programme interventions using existing district (sub-county) planning, management, and coordination and supervision structures in place.

35. **Programme area**. As per programme design, the target areas comprised eight horticultural producing districts (Kisii and Gucha in Nyanza Province; Bureti and Nandi South in Rift Valley Province; Bungoma in Western Province; Nyandarua in Central Province; and Embu and Meru Central in Eastern Province). By the time the programme started, the eight original target districts had further been subdivided into 14 districts which were maintained as the administrative units of the programme. The 14 districts were: Bungoma North, East, South and West in Bungoma County; Nandi South in Nandi County; Bureti district in Bomet County; Kisii and Gucha districts in Kisii County; Nyandarua North and South districts in Nyandarua County; Embu district in Embu County; and Meru Central, Imenti South and North districts in Meru County. These districts were further subdivided, resulting in a total of 32 administrative districts which were, nevertheless, within the original target geographical coverage of the programme.

36. **Target beneficiaries**. The President's Report states that the programme would directly reach some 12,000 smallholder farm households, or 60,000 individuals, mostly members of 600 supported producer and marketing groups. Direct target beneficiaries of the programme included smallholder horticultural farmers producing primarily for the domestic market, input suppliers (stockists), produce traders, transporters and processors. An additional 85,000 households would benefit indirectly from the programme through increased mobility and new employment opportunities along the value chains. Geographic targeting came down to the selection of sub-counties, which was based on their poverty profile, horticulture production, and the presence of other relevant initiatives for possible synergies. Social targeting was applied by ways of membership to the supported producer and marketing groups. At the design stage, it was expected that 36 per cent of beneficiaries would be women.

37. **Target commodities**. The programme focused on three horticultural commodities in each target district which were selected through a participatory process involving relevant stakeholders. Selected commodities comprised bananas in 12 districts; tomato in 9 districts; Irish potatoes in 4 districts; onions in 4 districts; mango in

3 districts; passionfruit in 3 districts; cabbage in 2 districts; local/traditional vegetables in 2 districts; garden peas in 2 districts; and pineapple in 1 district.

38. **Programme costs and financing.** The programme budget at appraisal was US$26.59 million, with contributions as follows: IFAD loan of US$ 23.43 million (88.1 per cent of the total programme costs) and a grant of US$ 0.50 million (1.9 per cent of the total programme costs), Government of Kenya counterpart funds of US$ 1.62 million (6.1 per cent of total programme budget) and beneficiaries contribution of US$ 1.04 million (3.9 per cent of total programme budget). At completion, the composition as per disbursements was as follows: IFAD loan of US$ 23.03 (71.6 per cent of total budget), IFAD grant of US$ 0.50 million (1.6 per cent), Government of Kenya counterpart funds of US$ 7.23 million (22.5 per cent of total programme budget) and beneficiaries' contribution of US$ 1.39 million (4.3 per cent of total programme budget).

B. Programme design and implementation arrangements

39. **Timeframe.** The SHoMaP initiative was formulated in 2006, approved by the IFAD Executive Board on 18 April 2007 and the programme loan signed between the Government of Kenya and IFAD on 10 July 2007 (Loan No. 720-KE, Grant No. 951-KE). It was to be a seven-year programme which was scheduled to start in June 2007, complete in December 2013 and close on 30 June 2014. The loan was declared effective on 23 November 2007 but the programme did not actually start until April 2008 when most of the programme implementation team members were on board. Further, owing to the delays in completion of market infrastructure, the programme was granted a one-year no-cost extension. The actual completion and closing dates were 31 December 2014 and 30 June 2015, respectively.

40. **Changes during the programme's life.** Three changes occurred during the programme's implementation. One, at appraisal it was planned that nationwide upstream input supply and downstream produce marketing studies would be conducted prior to carrying out district-based value chains studies. However, eventually the two nationwide studies were not undertaken. Two, due to delays in completion of market structures, a one-year no-cost extension was requested by the programme authorities and was granted by IFAD. Three, there was a reallocation of funds among the components, with funds being moved from components A and B to components C (mainly market structures) and D (programme management).

41. **Implementation arrangements.** The programme was implemented by the MoALFI. A PMU was set up in Nakuru, which was centrally located among the seven distinct programme territories. The PMU was tasked with the facilitation of programme implementation and with the capacity-building of district staff who held direct implementation, monitoring and evaluation functions. In each participating district or sub-county, the agricultural office established annual work plans and budgets and coordinated the implementation of SHoMaP in its jurisdiction.

42. In addition, district or sub-county stakeholder fora were entrusted with the analysis of horticultural marketing potentials and constraints and with the vetting of incoming proposals for market structures. District (sub-county) smallholder horticultural sub-committees were formed from the already existing district stakeholder forum in each programme district. These sub-committees were convened by the district (cub-county) agriculture officer (DAO). The roles of these sub-committees were to discuss marketing issues related to horticultural produce grown in the districts and provide guidance to the programme, vet proposals from the community for subsequent support by the programme, and monitor Programme implementation.

43. **Programme implementation progress.** The programme was slow to start with. The mid-term review (MTR) (April 2012) noted several targets that had been under-achieved up to the mid-point in the programme life cycle. For example,

there was a delay in the preparation and completion of the 14 district-focused VCAs. These studies were supposed to be completed within six months of programme start-up but the first six reports were completed in 2011, while the other eight reports were completed in 2012. Further, until MTR, only five out of the 50 proposals approved for market structures were under construction (but not completed). Markets were the reason why programme completion was extended by one year.

44. Similarly, by MTR, the programme had reached 215 marketing groups by way of establishment and training, which was only 36 per cent of the programme target population of 600 farmer and/or trader groups. There was a stark lag in terms of targets achieved for meetings by the end of half the life span of the programme: 17 per cent for district horticulture stakeholder meetings, 26 per cent for district stakeholder fora meetings, 23 per cent for divisional stakeholder fora meetings and 8 per cent for divisional horticulture sub-committee meetings.

45. **Programme monitoring and evaluation (M&E).** The M&E system was put in place four years after programme effectiveness. In the meantime, M&E information was collected through various mechanisms including through community-based monitoring; divisional and district agricultural staff (in the form of asset register, training register, contract register, infrastructure register, groups register), and physical outputs in general. However, this was done without a proper M&E systems guide. Further, high turnover of divisional and district staff required frequent re-training efforts.

46. The original programme included 30 indicators between output and goal levels. These were increased to close to 50 at MTR in 2012. SHoMaP did not have a comprehensive and well-integrated programme performance monitoring and evaluation results systems or M&E framework with clear and practical linkages between activities, planned outputs, outcomes and impact. Further, according to the programme MTR, indicators in the logframe were poorly defined. Thus, while the three outputs under programme purposes and the five indicators were to a large extent specific and to some extent measurable and realistic, they were neither attributable nor time-bound. At the same time, neither the outputs nor the indicators under the development goals were realistic, attributable or time-bound. About 30 per cent and 50 per cent of the total number of indicators in components C and D, respectively, were not time-bound. These aspects were eventually added after programme mid-term.

II. Main evaluation findings

A. Project performance and rural poverty impact

Relevance

47. IOE defines relevance as the extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, institutional priorities and partner and donor policies. It also entails an assessment of programme design and coherence in achieving its objectives.

48. **Relevance of objectives.** SHoMaP's objectives were to increase the output of and the net margins earned by poor smallholders from horticultural production, to increase employment opportunities arising from an expanded capacity of horticultural smallholders to produce for the market, and to reduce the cost to domestic consumers and increase the quality of horticulture products. The focus on commercialization of horticultural produce for local markets was relevant since throughout the medium- and high-potential areas in Kenya the percentage of households that grow horticultural crops ranges from 80-100 per cent and less than 2 per cent of farmers produce directly for export. The focus on increased productivity and addressing inefficiencies and constraints in input supply and horticultural marketing rightfully formed the basis for fostering domestic market-oriented production.

49. **Alignment with national policies.** SHoMaP's development objectives were consistent with the 2030 Kenya Vision. One of the key five strategies for the agriculture sector in the Vision is the inclusion of market access through value addition in the processing, packaging and branding of the bulk of agricultural products; another is the increase in productivity through provision of widely accessible inputs and services to farmers and pastoralists.[6] Similarly, SHoMaP objectives were fully consistent with Kenya's Agricultural Sector Development Strategy (2009-2020), whose strategic mission for the agriculture sector is an "innovative, commercially-oriented, competitive and modern agricultural sector" and its "strategic thrust: increased productivity, commercialization and competitiveness of agricultural commodities".[7]

50. The programme objectives were also in line with three overall objectives of the MoALFI Strategic Plan 2013-2017: (i) create an enabling environment for agricultural development; (ii) increase productivity and output in the agriculture sector; and (iii) improve market access and trade.[8] Finally, SHoMaP's objectives were coherent with three strategic objectives of the Strategic Plan of the Horticultural Crop Development Authority 2009: (i) "to facilitate the implementation of the National Horticultural Policy and the enactment of a legal framework to facilitate continued growth, development and sustainability of the horticultural sub-sector; (ii) to facilitate and coordinate the implementation of comprehensive development marketing strategies at the national and county levels for the horticultural subsector; and (iii) to build adequate capacity to provide quality, efficiency and effective services to the sub-sector at national and county levels".[9]

51. **Coherence with other donor projects.** The programme was coherent with other projects funded by Japan International Cooperation Agency (JICA), UN Women and the United States Agency for International Development. More specifically, JICA provided training to stakeholder committees to maintain the roads improved by SHoMaP in Gucha. UN Women funded the establishment of greenhouses for ten women groups, while SHoMaP assisted UN Women in vetting the greenhouse proposals and in training the beneficiaries of the UN Women-funded greenhouses.

[6] Government of Kenya (2007) Kenya Vision 2030: A Globally Competitive and Prosperous Kenya.
[7] Government of Kenya (2009) Agricultural Sector Development Strategy: 2009-2020.
[8] Ministry of Agriculture, Livestock and Fisheries. Strategic Plan 2013-2017.
[9] Horticultural Crops Development Authority. Strategic Plan 2009-2013.

SHoMaP, with the United States Agency for International Development, also contributed to funding the National Horticulture Marketing Information System, which is a platform that intends to provide all value chain players with access to reliable horticultural data (including prices).

52. **Relevance to the country strategic opportunities programme and IFAD strategies.** SHoMaP's objectives and activities were also fully compliant with IFAD's Corporate Strategic Framework and with the relevant 2007 country strategic opportunities programme (COSOP). More specifically, the SHoMaP capacity-building activities for the MoALFI staff, stockists and traders was relevant to the COSOP strategic objective 1: improving the delivery of services to the rural poor by strengthening the capacity of the public and private sectors and civil society organizations. The infrastructure component of SHoMaP and the supported pilot initiates were in line with the COSOP strategic objective 2: increasing incomes of the rural poor through improved access to and utilization of appropriate technologies, markets and community-owned productive and social infrastructure. Within component B of the programme, SHoMaP envisaged to improve access to financial services by providing a US$2.5 million credit guarantee, which was in line with the COSOP strategic objective 3: increasing opportunities for the rural poor through improved access to rural financial services.[10]

53. **Relevance of approach.** Focusing on value addition and domestic markets was considered to be very relevant to the needs of the poor by the programme staff and by interviewed beneficiaries. This is because domestic consumption accounts for the bulk of national production but has received far less policy analysis and support from the Government and development partners than the horticultural market for export. Also, unlike the horticultural export market, production for domestic consumption is dominated by low-income farmers. Adding value was deemed very relevant in order to facilitate diversification of incomes and to avoid the production of raw material products with few market outlets and low potential for income generation. The programme used a participatory approach in several of its activities. It helped form local committees at divisional and district levels such as the horticulture committees, market management committees and road management committees, to involve locals in the design and implementation of its activities.

54. Crucial changes in the country context affected the relevance of the approach. With the promulgation of the new constitution in 2010, a devolved system of governance was adopted (the devolution came into force in 2013). With the new constitutional structure, the responsibility to manage rural market infrastructure was moved from the MoALFI (at national level) to counties' Departments of Trade. Memoranda of understanding (MoUs) were signed between national government and county governments. The understanding was that while the overall management of the markets lay vested with the county governments, they could appoint a body or committee to delegate some functions. This was to be achieved through market management committees, established under the programme, which would consist of horticulture producers, traders and input stockists. According to a wide range of respondents interviewed by the evaluation (including programme staff, MoALFI staff at local level and county staff of the Department of Trade), there were issues of lack of empowerment of the market management

[10] SHoMaP also promoted and supported the linkage of value chain players with financial institutions, for the purpose of facilitating marketing and producer groups to access loans, credit facilities and financial literacy information. Through a guarantee risk-sharing fund, Government of Kenya, the Alliance for a Green Revolution in Africa (AGRA) and Equity Bank had entered into a framework partnership guarantee agreement. The terms of this credit guarantee agreement were that a fund of US$5 million shared equally between SHoMaP and AGRA would be deposited into an interest-bearing account opened at Equity Bank in the names of "AGRA-Government of Kenya loss-sharing fund". This was done, and IFAD transferred the sum of US$2.5 million to Equity Bank. However, since no losses were incurred by Equity Bank (i.e. there were no defaults by the borrowers), the amount of US$2.5 million was not used and was reinstated to IFAD. Therefore, no assessment of the credit guarantee aspect was undertaken by this evaluation.

committees. Counties did not delegate power to the committees and equip them with funds needed to manage the day-to-day affairs of the market.

55. **Relevance of design.** The logframe in the appraisal document included assumptions and supporting pre-conditions necessary to achieve the programme objectives. Those assumptions that were related to the political context and the market (stability of the political and economic conditions, and MoALFI and subsidiary institutions maintaining support for market-led development in the sub-sector) proved to be correct; however, some assumptions were unrealistic – for instance, the case of assumed reduction in the selling price of agricultural inputs as a result of trainings for stockists and of improved marketing systems.

56. The definition of a great part of the programme activities was based on a participatory and demand-driven approach (this was the case of income-generating pilot initiatives, design of markets and implementation of hot-spot improvements like bridges and roads), which requires good implementation-readiness. However, interviews with MoAFLI and PMU staff revealed that consultations with local stakeholders, although considered important, were also the origin of delays.

57. The selection of the value chains to be supported was to be done on the basis of the results of VCA studies conducted at district level. However, there were a number of issues with these studies. Given that most commodities are traded both within and outside target programme districts, the requirement that VCAs be district-focused in the Programme Appraisal report was an ill-informed strategy and was a weakness attributable to programme design. The wrong geographical focus of the VCA studies was also confirmed by PMU staff during the impact evaluation. Additionally, there was considerable delay in the preparation of these value chain reports, which reduced their usefulness in the identification of specific interventions. The programme design did not take into account the capacity required for implementing a programme that spanned 14 districts, undertook a host of activities that were diverse (i.e. covering both "soft" and "hard" interventions), and targeted beneficiaries with heterogeneous needs.

58. To summarize relevance, the programme was rightly premised on the needs of the rural poor smallholders engaged in horticultural production in Kenya and was also relevant to the national policy and agricultural strategy. It was coherent with other donor projects and initiatives in Kenya. However, a number of issues, both exogenous and endogenous, challenged the relevance of the design. Changes in the context affected the relevance of the chosen partners to implement the rural market infrastructure component. Some of the design assumptions were questionable and the delay and the subsequent failure to use the envisaged VCA studies was an important deviation from the envisaged appraisal approach. The relevance of the programme is assessed as *moderately satisfactory* (4).

Effectiveness

59. In assessing effectiveness, this evaluation aims to determine the extent to which the programme's objectives were achieved. This is in line with the definition of effectiveness provided by the IOE Evaluation Manual, which states that it is "the extent to which the development intervention's objectives were achieved or are likely to be achieved, taking into account their relative importance". First, however, the evaluation provides an assessment of the effectiveness of the programme's outreach and targeted approach.

60. It is important to highlight that the findings in this section were determined based on the triangulation of several data and information sources that go beyond the careful review of programme documents, data collected using the indicators in the Results and Impact Management System (RIMS) and M&E data. These include quantitative and qualitative primary data collected by IOE during this impact evaluation, site visits and inspections of various programme activities, and

interviews with key informants including government officials, programme beneficiaries, and members of institutions.

61. **Delivery of outputs and outreach.** SHoMaP reached 152,304 people (21,311 households) compared to appraisal target of 60,000 people (12,000 households); of these, 77,293 were females and 75,011 were males. These beneficiaries had been mainly reached through 704 groups compared to the appraisal target of 600. The difference between the number of groups at appraisal and the actual was due to the formation of beneficiary committees such as horticulture committees, market management committees, etc. in the number of groups. However, a beneficiary could have been part of more than one group; therefore, the total beneficiary outreach number mentioned above had an element of over-estimation.

62. Overall, the programme delivered a majority of planned outputs under component B (Institutional Strengthening), while for component A (Domestic Market System Analysis) and C (Investment in Domestic Horticultural Value Chain) the delivery of outputs was not complete. For component A, a VCA study was delivered for each target district. The VCA studies were supposed to be completed during the first six months of programme implementation. However, the programme completion report (PCR) noted that six VCA studies were completed in 2011 and the remaining eight studies were completed in 2012. The programme also intended to conduct two nationwide studies: an upstream input supply system study and a downstream produce wholesale and retail marketing study. Neither study was eventually conducted.

63. Under component B, the programme's plan was to develop a system of price information through SMS and radio broadcasts. The programme also planned to install billboards with price information in 15 markets. The billboards were erected during the programme implementation but these were not in operation soon after the programme start (and neither at the time of the IOE mission), while the SMS and radio message system was not implemented. SHoMaP also contributed funds to the National Horticulture Management Information System, which includes price information for horticultural produces. Under component B, the programme contributed to the drafting of the National Horticultural Policy. Some other achievements under the component B are shown in table 3. It is noteworthy that the majority of targets were achieved, and even over-achieved.

Table 3
Selected outputs under component B

Activity	*Target*	*Achieved*
Formation of farmer/producer groups	600	704
Trainings for: input stockists	1 400	1 044
farmer groups	500	530
produce traders	950	1 091
transporters	550	585
marketing agents	400	577
agri-processors	920	752
government staff	2 000	2 522

Source: i) data compiled at the time of IOE mission from programme M&E and KII; ii) The unit of measurement for the outputs is *number of persons*, except for the first and third outputs, which are *number of groups*.

64. **Targeting.** As reported in the Programme Appraisal Document, the districts where the programme was implemented were selected using a ranking procedure based on a weighted set of indicators relating to poverty, horticultural production and the presence of a long-term (12 years at the time of the programme formulation) World Bank-supported project, named Kenya Agricultural Productivity

Project. The highest weights were related to poverty (the extent of poverty had a 45 per cent weight and the depth of poverty had a 15 per cent weight).

65. In order to empirically evaluate the programme's targeting approach, a *probit* model was used which derives from the analysis of primary data in the impact survey. The analysis offers an indication of the effectiveness of the targeting approach by matching the treatment and comparison groups on a set of salient characteristics that influence the participation of households in the programme using the propensity score method.

66. The *probit* results show that the most important factors that determined whether a household participated in the programme or not were: age of the household head, household size, primary education, whether a household cultivated horticultural crops, and whether the crop cultivated was promoted by SHoMaP (table 4).

67. In addition, households that practiced freehold and leasehold land tenure systems and those growing fruit crops were more likely to participate, while households growing staple crops were less likely to participate in SHoMaP. These were significantly and positively associated with participation in the programme. Specifically, the propensity score index can be interpreted as follows: the propensity score index was positively influenced by age of the household head, and was statistically significant. Thus, an additional member in the household increases the propensity score index (i.e. the benefits of participation as perceived by the household). These results also allowed the evaluation to define common support.[11]

68. The results indicate that households that were cultivating horticulture crops, and further, those that were cultivating crops promoted by SHoMaP, participated in the programme as beneficiaries. This supports the targeting strategy of SHoMaP, which was to work with existing horticulture producers of selected value chains. The fact that beneficiaries were likely to have had primary education was important for the programme's activities, especially those directed at training beneficiaries on technical and management skills (e.g. bookkeeping) which presupposed a certain level of literacy among participants. However, being a female-headed household did not increase the likelihood of a household participating in the programme. This demonstrates that no specific targeting was directed towards including female-headed households in the programme.[12]

[11] In order for the matching to be valid, it is essential to compare “observed values” for participants and non-participants with the same range of characteristics. Observations in the comparison group with a propensity score lower than the lowest observed value in the treatment group are discarded. Similarly, observations in the treatment group with a propensity score higher than the highest observed value in the comparison group are discarded. What remains is known as “the region of common support”.

[12] No mention of a strategy, approach or activities for targeting female-headed households is made in the project documents reviewed by the IOE team.

Table 4
***Probit* estimates for participating in SHoMaP**

Variable	*Coefficient*
Age of household head	0.0101* (0.00463)
Female-headed household	0.112 (0.0876)
Average age of household members	0.00895 (0.00493)
Household size	0.0620** (0.0211)
Average age of adults in household (18 and above)	0.000604 (0.00509)
Primary education	0.313*** (0.0815)
Land used for agricultural purposes	-0.00141 (0.0181)
Land tenure system of the land owned	0.181* (0.0786)
Land owned at baseline	0.00104 (0.0136)
Total livestock owned in 2007	0.00188 (0.00114)
Horticultural crops	0.289***(0.0759)
Staple food crops	-0.207* (0.0862)
Permanent cash crops	0 (.)
Fruit crops	0.261** (0.0973)
Tuber food crops	-0.0867 (0.0840)
Annual cash crops	0 (.)
Crop was promoted	0.410*** (0.103)
Constant	-1.929*** (0.220)
Sample size	1,522
Pseudo R-squared	0.102
Log likelihood	-942.5

*** significant at 1%; ** significant at 5%; *significant at 10%; standard errors in parenthesis.
Source: IOE impact evaluation team.

69. **Effectiveness in meeting the development objectives**. The development objectives had three main foci: horticultural productivity, input system and marketing system. The following section analyses the effectiveness in meeting the development objectives for each of these three areas individually.

70. **Objective 1. Improving physical access of rural households to markets.** The construction and improvement of *market structures* was the most important intervention of the programme in terms of financial allocation, amounting to 61 per cent of the programme budget. SHoMaP had 40 construction contracts in 38 markets.[13] The status of the 38 markets was assessed by the IOE team by visiting markets and interviewing county government officers. Results are reported in Figure 1. On the basis of the information collected on each market, the IOE team developed four categories of market status, and assigned the markets to these:

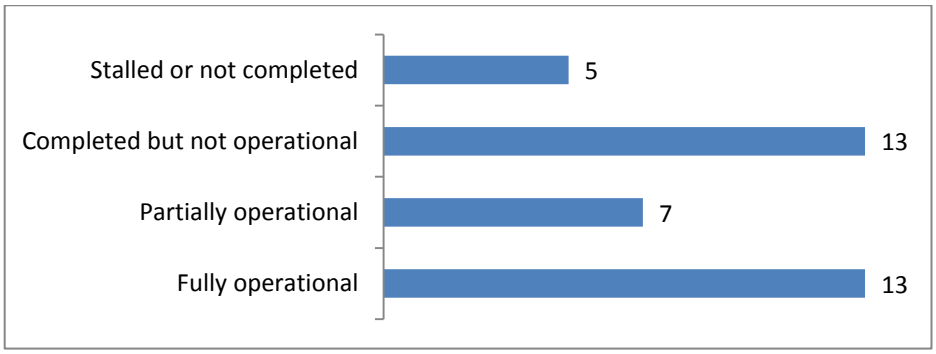
(a) Fully operational: main market areas (e.g. retailers and wholesalers' areas in markets where both are built) are used for at least two days per week.
(b) Partially operational: only a part of the market is currently used, while a substantial part is not used (e.g. the retailers or the wholesalers' part), or the whole market is used less than two days per week.

[13] Two markets had four contracts: (i) Miruriiri (in Meuru), which had a market development contract and a perimeter construction wall contract; and (ii) Nkubu (in Meru), which had a market development contract and market shades contract.

(c) Completed but not operational: the construction of the market was completed but the market is not used.
(d) Stalled or not completed: the construction of the market stalled, the construction is not complete, and the market is not used.

71. The figure shows that 13 of the 38 markets (or 34 per cent of the total) built by the programme are fully operational; the majority are either partially operational or not in use.

Figure 1
Status of market structures (numbers)



Source: compiled from programme M&E data and KIIs.

72. Common characteristics of the markets that are fully operational are: the markets were built on areas where previously there was an open-air market, or where the contract consisted of improvement of already existing structures including construction of roofs and hard floors and installation of basic facilities such as toilets, piped water, and waste disposal systems.

73. Regarding the stalled or non-operational markets, there were three main reasons for this state. One, *lack of vendors in the market*. Some vendors refused to move to the newly constructed markets and continued to sell on the street or at bus stops because the buyers travelling on the street found it convenient to buy from such locations. Consequently, the market was abandoned as all vendors moved closer together on the main thoroughfares. A lack of compliance-enforcement on the part of county governments meant that this situation continued unabated. In at least two markets, the evaluation team found the roads leading to the market had been left unpaved, making it difficult for the produce to move to the market. In some other cases, the market was constructed at a distance that traders considered far from the main road and hence was not used. One reason for this is that both the site and the size of land allocated for the development of market facilities were dictated by the availability of land within the county council and may not necessarily have been ideal for the intended purpose.

74. Two, *unfinished market structures*. In some cases, electricity and water connections had not been established and some other minor works remained to be completed. Mainly due to issues with the contractors, work in such markets was very shoddy (structures were falling apart); one market structure was not completed because the Ministry Tender Committee's approval had not been provided.

75. Third, the *constitutional reforms* caused misunderstanding about responsibilities on market completion. For instance, in interviews with the MoALFI it was revealed to the IOE team that the MoUs on the transfer of the market structures signed between the county and national governments had specified that all responsibility lay in the hands of the former, including completing any unfinished works. However, officials of two counties visited by the team were unaware of this arrangement, showing communication issues. Further, the aim of the programme was to ensure that traders and other market users through the market management committees would share responsibilities for development,

management and maintenance of market infrastructure and services with the county governments. In some cases, though, these committees had been side-lined after the handing-over of markets to local authorities through lack of funds and authority needed to run the day-to-day operations. There was a lack of clear and common understanding among the various stakeholders regarding ownership and the management framework of market facilities after completion.

76. Although the programme made efforts to develop a vetting criterion for proposals to ensure ownership by the community and the horticulture committee by using a participatory approach, and to ensure that public resources were utilized prudently, the MTR found little evidence of the market facilities having undergone any rigorous economic and financial feasibility assessment. This could have been based on, among other parameters, existing and/or projected produce turnover, development and maintenance costs, and existing as well as projected market prices.

77. *Spot improvement of rural access roads and paths to provide accessibility*. The programme opened 547 km of roads and paths through spot improvement against a target of 230 km, an achievement of 238 per cent. FGDs with stakeholder committees for spot improvements reported good benefits from this type of intervention. More specifically, traders had started to buy agricultural produce like banana or mango as a result of the newly constructed bridges. Participants in FGDs reported that before the bridges were constructed, a great part of their banana and mango production was unsold because of lack of market outlet, while currently, new buyers were coming. In addition, farmers could now fetch better prices since the prices offered by traders were higher than the prices they could fetch in the local market. In addition, as a result of the improvement of road conditions, participants of FGDs reported that traders no longer applied a price reduction for transport. Thus, prices received for some vegetables (banana, potato, cabbage and tomato) and milk by some of the interviewed beneficiaries had increased in general after the spot improvement, with some beneficiaries reporting increases of up to two and four times.[14] Beneficiaries also reported that the walking distance for children going to school had been reduced thanks to the bridges.

78. **Objective 2. Improving efficiency of agricultural input and produce markets.** This was to be achieved through: (i) training to existing formal and informal farmer groups on group cohesion and planning and managing group-based marketing activities; (ii) training of horticultural input stockists, traders and brokers to increase their efficiency and, in the case of traders, improve the quality of the produce that they supply to domestic consumers; (iii) training of MoALFI staff in marketing and business management; and (iv) support to evolving systems that provide market information to farmers and traders by mobile phone STM and by radio.

79. The programme provided trainings to stockists on product handling and storage, pests and pesticides, products certified by the Kenya Plant Health Inspectorate Service (KePHIS), recordkeeping, business planning and management, and safe use of products. Four stockists interviewed by the evaluation team reported increase in sales since 2008. This might be due to the fact that SHoMaP field staff advised farmers to buy agricultural inputs from stockists trained by the programme. They all reported satisfaction regarding quality of trainings. In addition, the interviewed stockists reported to regularly advise farmers on how to apply the products they sell and which product to apply to deal with a given problem.

80. None of the interviewed stockists reported offering reduction in sales price to farmers. However, one stockist reported a reduction in his mark-up price, due to increased competition. Some of the shop-owners interviewed reported that their

[14] The evaluation could not confirm the information pertaining to price increases by two to four times.

employees attended the trainings but the owners did not. As a consequence, knowledge learned during training was not retained; the issue of staff turnover was quite prevalent in the stockists' shops visited by the evaluation team.

81. The Commercial Villages model was a market-led commercialization process through which horticulture groups in villages were commercialized and trained to increase participation along value chains through training on agribusiness, group dynamics and leadership skills. The aim was to enable members to bulk high volumes of produce and attract more lucrative markets and prices because they could engage in bulk selling or contractual farming.

82. FGDs with farmers and commercial villages revealed poor evidence of the use of group sales and the market-scouting method taught during trainings. It was noted by the evaluation team that the trained farmer groups were grappling with various governance issues marked by poor attendance of meetings, time management, rumour-mongering among members, conflict among members, lack of transparency and accountability, and poor leadership. These often led to mismanagement and disintegration of the groups, and as a result, the marketing groups did not perform as expected, and many beneficiaries continued selling individually to the market intermediaries Thus, adoption of training for group marketing was below expectations.

83. Training was also provided to local agricultural extension staff on the value chain approach to sector development, agribusiness management and marketing. Most respondents interviewed indicated that they were able to carry out their work with greater understanding and confidence. However, turnover of staff who were trained was an issue, wherein knowledge gained was not necessarily used.

84. The importance of market information for both the efficiency of horticultural marketing and the fairness with which marketing systems operate was recognized by the programme. Almost all VCA studies conducted by the programme pointed to lack of market information as one of the key constraints identified by farmers. As a result, billboards with price information of agricultural commodities were erected in 15 rural markets. In addition, the programme contributed funds to an online price information system called the National Farmers Information Service. However, the evaluation team found no evidence of the use of the National Farmers Information Service in the FGDs, and the price of the billboards erected by the programme had not been updated after SHoMaP's end. As mentioned, the SMS and radio message system for prices was not developed. The programme was not fully successful in undertaking the activity related to market information.

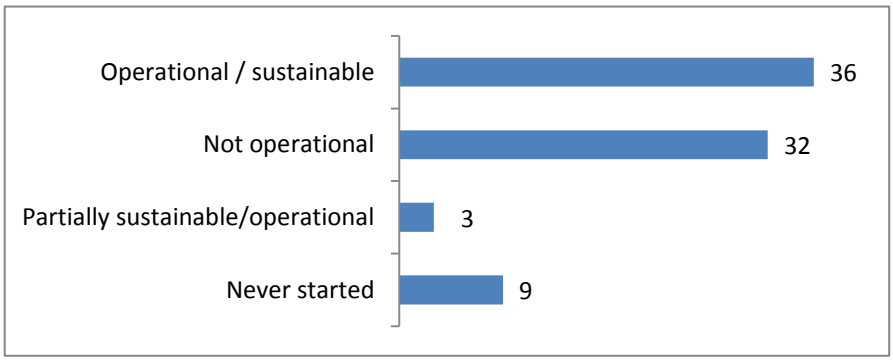
85. **Objective 3. Raising value added between the point of harvest and the consumer.** As part of this objective, the programme supported pilot initiatives that demonstrated innovative marketing approaches and or adoption of technology that had the potential to improve the agribusiness initiatives by beneficiaries. Through interviews with sub-county agricultural officers and previous MoALFI officers at ward level, the IOE team reconstructed the current state of the 80 pilot initiatives. Results are reported in figure 2. Pilot initiatives are classified by IOE into four main categories:

    (a) Operational/sustainable: the funded pilot initiative is still operational or is not but has been replicated by the group members individually.[15]
    (b) Not operational: the funded pilot initiatives is no longer operational.
    (c) Partially sustainable/operational: the group only uses part of the equipment that was funded or conducts only part of the planned operations.
    (d) Never started: the group was funded but planned operations never started.

[15] SHoMaP intended to promote replication as an objective of pilot initiatives.

86. The figure shows that 36 of the 80 pilot initiatives (or 45 per cent of the total) are currently fully operational, while the remaining 44 are either not operational or partially operational.

Figure 2
Status of pilot initiatives (numbers)



Source: Compiled from programme M&E data and KIIs.

87. By analysing answers from KIIs, a list of common characteristics of the successful and unsuccessful pilot initiative groups was prepared by the evaluation and is presented in table 5.

Table 5
Common characteristics of pilot initiative groups

Successful	*Never started/not operational/not sustainable*
i. motivated group leaders	i. negative group dynamics resulting in lack of trust among members
ii. low-level technology in transformation (e.g. banana-hardening, banana solar dryers, banana-ripening chambers, water harvesting)	ii. technicalities in the installation and operation of the equipment (e.g. equipment bought for a 3-phase electricity, while only the 2-phase electricity was available)
iii. market scouting (a technique learned during SHoMaP trainings)	iii. poor quality of proposals approved (e.g. establishment of greenhouses with no access to water or of equipment requiring electricity with no access to electricity)
iv. market linkages developed with buyers	iv. no market outlet for products
v. access to credit for working capital from banks	v. rejection of food standard certification by Kenya Bureau of Standards
vi. certification on food quality from the Kenya Bureau of Standards	vi. mismanagement of funds by group members
	vii. increase in price of raw materials for processed foods
	viii. lack of group enthusiasm (group lacking young members)
	ix. pests affecting production of the produce to be transformed (tomato and passion fruit)

Source: compiled by IOE impact evaluation team; KIIs.

88. To summarize the analysis with regards to programme effectiveness, access to markets was the most important objective in terms of funds allocated by the programme. In this regard, spot improvements (roads and bridges) were successful, with access to markets and traders improved. However, where more than 60 per cent of the programme funds were spent (i.e. on building or improving markets), the outcomes were disappointing. Only half the markets were in complete use at the time of this evaluation, although it could be argued that the

"teething" problems associated with the devolution played an important role in the issues associated with the markets.

89. On the other hand, the aim to improve efficiency of input and output markets was a mixed success. Training to stockists was useful in increasing their knowledge (which they passed on to the farmers) and their sense of conducting business. However, there was no economic impact of this on the farmers in terms of the stockists having passed on the efficiency savings to farmers through reduced input prices. Commercial villages showed mixed success in accessing markets. The price information systems planned at programme appraisal had not been developed (text messaging), were not maintained after the programme ended (billboards) or showed little evidence of use. The objective to raise value-added production was also a mixed success. Some pilot initiatives such as greenhouses for tomatoes displayed evidence of functioning well, but at the time of the evaluation mission, half of the pilot initiatives were not producing income for farmers either because they never started or because they collapsed.

90. Importantly, the programme was mainly unsuccessful in downstream activities related to creating value proposition for farmers by facilitating group selling. Thus, although the great majority of planned outputs were delivered, the evidence collected by the evaluation suggests that this did not culminate into outcomes to the desired effect. The evaluation rates effectiveness as *moderately unsatisfactory* (3).

Efficiency

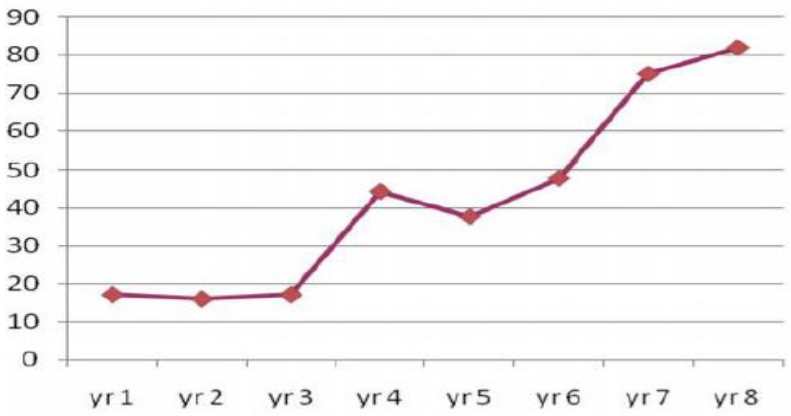
91. **Expenditures.** The assessment of efficiency examines how economically resources and inputs are converted into results. There was a seven-month effectiveness lag between IFAD Board approval and the actual commencement of the programme. This was lower than the IFAD average of 12.3 months and of the regional IFAD average of 10.2 months.[16] On the other hand, while the IFAD loan was eventually disbursed to the tune of 98 per cent,[17] the programme started slowly; only 28 per cent of IFAD funds had been disbursed by MTR, thus delaying the immediate benefits to the beneficiaries. Given that the disbursement by the time of the MTR was largely the initial advance and some non-core investment costs, SHoMaP's core investments took place in the post-MTR period. By the time the implementation capacity was at its peak, the programme was due for closure.

92. The principal factors affecting management in SHoMaP were the conceptual challenges on value chains necessitating outsourcing, understaffing, weak contract management, and long distances for supervision. The MTR noted that SHoMaP's value chain approach put considerable managerial and coordination strain on the PMU and its co-implementers, many of whom were not familiar with this subject. Further, owing to the delays in completion of market infrastructure projects, the programme was granted a one-year no-cost extension. To compound matters, the PMU experienced high staff turnover during programme implementation, which also slowed the implementation.

93. When viewing disbursements from the standpoint of the absorption of the annual work and plan budget (AWPB), it is observed that up until year six of the programme, this percentage was below 50. Figure 3 demonstrates the annual absorption rates of the AWPB.

[16] For a meaningful comparison, only those IFAD investment projects that were approved in 2007 (the same year of approval as SHoMaP) were considered in the analysis.
[17] The PCR argues that loan disbursement could have attained the 100 per cent mark if the defect liability period of contractors amounting to SDR 0.27 had occurred within the loan closure period.

Figure 3
Annual absorption rates of AWPB (per cent)



Source: Programme M&E data.

94. The above pre- and post-MTR percentages relate to only the IFAD funding. When the beneficiary and GoK counterpart funds are included in the analysis, cumulative expenditure was 121 per cent of the total cost envisaged at design (table 6). The high overall level of expenditure was a result of the government contribution that exceeded the original design target by an equivalent of US$5.6 million, reaching US$7.2 million by June 2015 or about 446 per cent of the total amount foreseen at design. The GoK's additional resources went mainly towards civil works under component C (market structures). This was done to cover the variations in the cost of market structures caused by issues of cost overruns or unapproved additional works such as in the cases of markets at Matisi, Murungaru and Oleriondo.[18] In addition, there were other contributions that were not quantified, such as land for market infrastructure that was provided by the county governments.

Table 6
Disbursement by sources of financing (US$ million)

Financier	*Allocated at appraisal*	*Disbursed*	*Disbursed /allocated (ratio)*
IFAD loan	23.43	23.03	0.98
IFAD grant	0.50	0.50	1.00
Government	1.62	7.23	4.46
Beneficiaries	1.04	1.39	1.34
Total	26.59	32.15	1.21

Source: IFAD GRIPS/Oracle BI

95. There was a reallocation of funds among components during implementation which was markedly different from the one envisaged at appraisal. Table 7 shows that funds from components A and B were reallocated to components C and D. These increases were quite substantial from the costs planned at appraisal – 30 per cent increase for component C and more than one-third increase in allocation for programme management. The reasons given for the increases for component C included increased costs of inputs for market construction. In the case of component A, one reason for lower actual costs was because of the two nationwide studies on upstream and downstream activities that were not carried out. Similarly, in the case of component B, the lower actual costs were derived from trainings whose costs were lower than anticipated at the time of programme design.

96. In terms of the higher management costs, the MTR had noted that SHoMaP's value chain approach put considerable managerial and coordination strain on PMU and its

[18] Supervision mission report 2014, page 5.

co-implementers, many of whom were not familiar with this subject. IFAD hence recommended that the PMU strategically undertake competitive outsourcing of services to tackle the matter, especially regarding market analysis, support for M&E systems, and evaluation of marketing infrastructure designs.[19]

Table 7
Expenditure by component (in percentage)

Component	*Actual over appraisal (%)*	*Proportion of actual (%)*
A. Domestic market system analysis	26.07	0.74
B. Institutional strengthening	47.21	7.46
C. Investment in support of domestic value chains	130.56	72.60
D. Programme management	137.45	19.2
Total	113.35	100

Source: IFAD GRIPS/Oracle BI

97. **Cost per beneficiary.** The President's Report states that in addition to the 12,000 households (60,000 individuals, assuming five members per household) as direct beneficiaries, there would be 85,000 households of indirect beneficiaries, thereby making a total of 97,000. Based on the programme's M&E records, the PCR states that the programme managed to directly reach 152,304 people, out of whom 77,293 were female and 75,011 were male. This, when compared to appraisal target of 60,000 people gives a 254 per cent achievement. These beneficiaries were reached through 704 groups, compared to the appraisal target of 600. The higher outreach number results in the actual cost per beneficiary (US$ 211) being lower than the cost per beneficiary at the time of the programme design (US 443). However, as mentioned earlier in this document, although the increase in total outreach number was related to additional groups being formed (mainly committees), most of these additional groups or committees had the same beneficiaries who were part of the horticulture groups trained by the programme. Thus, the outreach number is saddled with issues of double-counting of beneficiary numbers and hence the cost per beneficiary figure presented here should be interpreted with extreme caution.

98. **Economic internal rate of return**. To demonstrate the programme's potential to yield high returns, farm models and crop budgets for the key horticultural crops grown by poor smallholders in the programme area were simulated at programme formulation to show that interventions at farm level were financially viable and made good business sense, and would therefore be likely to be adopted by farmers. The economic internal rate of return at design worked out at 22 per cent. Unfortunately, this was not validated or recalculated at completion. In a value chain promotion programme, this is a missed opportunity. There is no reason provided for this omission. However, as per the analysis of this evaluation, in case of certain investments such as roads and bridges, there were clear benefits that justified their costs (e.g. positive impacts on incomes, as derived from the qualitative information collected by this evaluation). On the other hand, in the case of market structures, the benefits have not justified the costs of their construction at least unless all the market structures are fully functioning.

99. To summarize the analysis presented above, the programme came into effect after the loan approval in a relatively short time. However, the absence of a final cost-benefit analysis is a flaw in a value chain promotion programme, with more than

[19] SHoMaP MTR. Paras. 86-87.

70 per cent of funds allocated to infrastructure-related activities. The over-shooting of counterpart funding (government), the extension required to complete the programme and the overall higher total actual programme costs are factors that adversely affected the efficiency of operations. The fact that almost half of the market structures were not working at the time of programme closure has negative implications in the cost-versus-benefit analysis. Considering the above factors, the impact evaluation rates the efficiency of the programme as *moderately unsatisfactory* (3).

Rural poverty impact

100. IOE defines impact as the changes that have occurred – as perceived at the time of evaluation – in the lives of rural people (whether positive or negative, direct or indirect, intended or unintended) as a result of IFAD-funded interventions. In order to measure the changes and improvements in the quality of life of the population in the programme areas, the evaluation carried out a quantitative and qualitative assessment focusing on the four impact domains described in the IOE evaluation manual, as appropriate to the present programme: (i) household income and assets; (ii) food security and agricultural productivity; (iii) human and social capital and empowerment; and (iv) institutions and policies.

101. The results presented in this section show changes in variables of interest after implementation of the SHoMaP using "average treatment effects on the treated" (ATT), i.e. average changes in values for programme participants only.[20] The variables of interest include: agricultural income, gross margin, household dietary diversity, yields, household food insecurity access scale, food consumption expenditure, frequency of group membership and asset index. As mentioned in the section on methodology earlier, the evaluation uses a "with and without" comparison. This approach compares the outcomes of the two groups – participants and non-participants – at the same post-programme time point (2017, in this case), and the results pertain to the matched observations only.

Household income and assets

102. The evaluation in this section assessed the flow of economic benefits accruing to a household through three measures: agricultural income, food consumption expenditure and asset ownership index.

103. *Agricultural income.* Agricultural income here is an economic measure that takes into account incomes from livestock and every crop that the household cultivated during the year.[21] Table 8 presents the results related to agricultural income per year per household. The results show that incomes for beneficiaries relative to non-beneficiaries were greater (by Ksh 14,917), and the results are statistically significant.

Table 8
Agricultural income effects (in local currency) (annual income per household)

Variable		*All crops*
Agricultural income	ATT	14 917.55**
	standard error	(6 490.41)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

104. In terms of heterogeneous programme effects, quantitative analysis was conducted on income differentials between male- and female-headed households. The results show that SHoMaP-supported female-headed households recorded higher incomes

[20] ATT is the average gain from the programme for programme participants and is denoted as: $E[Y1 - Y0| P = 1] = E[\Delta| P = 1]$ where: $Y0$ = value of Y if person is *not* treated; $Y1$ = value of Y if person *is* treated; P = 1: Individual *was* treated.

[21] Agricultural income was calculated as income from sale of crops and livestock minus input costs (fertilizers, pesticides and seeds) and cost of hiring labour.

than female-headed households in control groups (up to 50 per cent more). However, in comparison to male-headed households, the programme did not lead to higher or equal incomes of female-headed households. Incomes of female-headed households were at least 30 per cent lower than incomes of their male counterparts. However, the above results with regards to female-headed households were not found to be statistically significant.

105. *Food consumption expenditure*. This is the value of income a household spends on food. This includes both money spent on purchased food and the value of consumption of own production (the price for consumption of own production was assumed to be the same as the price of actual purchases). The respondents were asked to report the expenditure on food in the last seven days preceding the survey. The results show that on average, food expenditure for SHoMaP beneficiary households was greater by Ksh 116.20 relative to control group households, although the results are not statistically significant.

Table 9
Food consumption expenditure effects (local currency)

Variable		*Effects*
Food consumption	ATT	116.24
	standard error	(119.00)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

106. *Asset index*. An alternative measure of measuring economic effects is the asset index. In this case, the aim is to collect data on several household assets and combine this information into a proxy indicator such as the wealth index, which is created using principal component analysis (PCA). Asset ownership gives an indication of the longer-term economic status of a household and is less dependent on short-term economic changes compared with other wealth or poverty measures.

107. Thus, in order to assess whether the programme had an impact on a household's physical assets, a PCA was carried out to create an asset index.[22] The first component was used as the wealth index, as it accounts for the largest proportion of the variance. The first component of the calculated asset index is also the component that is most highly correlated with the sum of assets purchased after programme start (after 2007). The first component was then extracted, and regression analysis was used to test whether the programme had an impact on household assets. The questionnaires asked what the households owned, based on an extensive list of assets. A greater number of assets can increase the predictability of the model,[23] and this principle was followed in the questionnaire.

108. The questionnaire included both farm (including livestock) and non-farm assets and questions were related to both whether a household owned an asset and the numbers of each asset. The first principal component was positively correlated with the sum of items owned by households. Hence, an increase in this indicator suggests greater assets.

109. Results related to farm assets show that SHoMaP beneficiaries had greater assets relative to non-beneficiaries. However, the results are not statistically significant and hence it cannot be said with a certain level of statistical confidence that there is a strong likelihood of this having occurred.

[22] PCA is a "data reduction" procedure. It involves replacing *many* correlated variables with a set of *principal* uncorrelated "principal components" which can explain much of the variance and represent unobserved characteristics of the population. The objectives of a PCA are to: (i) discover or reduce the dimensionality of the data set; and ii) to identify new meaningful underlying variables. The first principal component explains the largest proportion of the total variance and it is used as the wealth index to represent the household's wealth.
[23] VAM, WFP.

Table 10
Asset index score for farm assets

Variable		*Score*
Asset index	ATT	0.02
	standard error	(0.11)

Food security and agricultural productivity

110. The assessment of food security and agricultural productivity entails the assessment of changes in food security related to access to food, as well as changes in agricultural productivity, which are measured in terms of yields. The values for these outcomes of interest are presented in this section.

111. **Food security.** The evaluation used two measures to assess changes in the food security situation of beneficiaries emanating from the programme's interventions – HFIAS and HDDS. The aim was to approach the issue of food security from a more comprehensive perspective that looked at both the perceptions of respondents to food security, and their responses to it, and the nutritional quality of the food consumed by them. A brief description of the two measures and the results obtained from the use of their methodology are presented under.

112. *Household Food Insecurity Access Scale*. The HFIAS is based on the concept that the experience of food insecurity causes predictable reactions and responses that can be quantified through a survey on a scale.[24] The original questionnaire developed by Coates consists of nine occurrence questions that represent a generally increasing level of severity of food insecurity (access) over a past period (30 days), and nine "frequency of occurrence" questions that are asked as a follow-up to each occurrence question to determine how often the condition occurred. These questions are formulated under three domains: anxiety and uncertainty about the household food supply; insufficient quality; and insufficient food intake and its physical consequences. The higher the score, the greater is the severity of food insecurity. Each of the nine questions is scored between 0 and 3, with 3 being the highest frequency of occurrence (often). The score for each is then added together. This evaluation readapted the HFIAS developed by Coates to reflect the local context. Thus, eight of the nine questions were retained. As a consequence, the HFIAS used in this evaluation can range from 0 to 24, indicating the degree of insecure food access.

113. The results displayed in table 11 demonstrate that food insecurity of beneficiary households was only marginally lower than that of non-beneficiary households in the surveyed areas. There are two plausible explanations for this: one, since the surveyed areas, especially the high-potential areas, witness two harvest periods, access to food may not be an issue; and two, there is a social desirability bias against hunger in that respondents are less likely to report on issues related to hunger. Comparing the two groups shows that beneficiary households attained lower scores than control households, and these results were statistically significant at the 5 per cent level. In other words, it is likely that SHoMaP beneficiaries had slightly greater access to food.

Table 11
Average treatment effects related to access to food

Variable		*Score*
HFIAS	ATT	-0.43**
	standard error	(0.18)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

[24] Coates, *et al*. FANTA.

114. *Household Dietary Diversity Score.* The HDDS represents a measure of household access to a variety of foods and also shows whether the household can achieve sufficient nutritional intake. To measure the HDDS, the evaluation team used the data collected through the household questionnaire using a list of food items consumed by the household, and grouped the items in the 16 categories of food that underlie the HDDS developed by the Food and Agriculture Organization of the United Nations. The questions were recoded into a 12-point scale as suggested by the methodology. The results of analysis estimate that the HDDS was 0.24 points higher on a 12- point scale in beneficiary households and the effect was statistically significant at the 5 per cent level (table 12).

Table 12
Average treatment effects for HDDS

Variable		*Score*
HDDS	ATT	0.24**
	standard error	(0.10)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

115. **Agricultural yields.** SHoMaP expected agricultural productivity to increase through training on better crop practices and use of better-quality farm inputs (fertilizers, pesticides and improved seeds). This evaluation used two measures of agricultural productivity: gross margin and yields. Gross margin per acre refers to total income from crops less the variable cost per acre of land under cultivation. Gross margin is different from agricultural income in that it is calculated at the level of land as opposed to agricultural income, which is calculated at the level of a household. Yield is calculated as total production per acre (in kg).

116. Results are presented for four selected crops that were promoted by SHoMaP: banana, sweet potato, Irish potato and cabbage.[25] Results show that gross margin per acre for SHoMaP households was greater than the control group beneficiaries for all four crops. From a statistical perspective though, results were significant for banana and sweet potato only. These results are important because in 12 of the 14 sub-counties in which the programme intervened, banana was one of the value chains selected by the programme, thereby underlining its important role.

Table 13
Average effects related to gross margin (in local currency)

Variable		*Banana*	*Sweet potato*	*Irish potato*	*Cabbage*
Gross margin per acre	ATT	34 576.32***	15 441.25*	10 474.10	14 313.83
	standard error	(8 578.02)	(8 965.53)	(8 749.21)	(19 070.89)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

117. In terms of individual crop yields, results are presented for the four same crops promoted by SHoMaP as above. Table 14 shows that yields were greater in beneficiary households for banana and Irish potato and the results are statistically significant. For sweet potato, yields in control households were greater but the results are not statistically significant.

Table 14
Average effects for yields (kg/acre) of individual crops

	Banana	*Sweet potato*	*Irish potato*	*Cabbage*
ATT	4 040.39**	-315.94	2 220.93**	1 411.68
standard error	(1 969.96)	(230.57)	(1 058.71)	(8 590.84)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

[25] Although the impact evaluation questionnaire included all crops promoted by SHoMaP, only these four crops were retained for analysis due to low number of observations for others.

118. **Causal pathway for the economic impact on beneficiaries**. The programme's intervention logic was that beneficiary farmers would increase their incomes and food security through enhanced pro-poor linkages to value chains brought about through increased productivity, higher prices, better market connectivity and improved linkages with upstream and downstream value chain actors. Specifically, increased incomes would be affected through the following: (i) increased productivity engendered through training received from the programme on better agricultural practices; (ii) input stockists providing more and better quality farm inputs; (iii) input stockists passing on discounts to farmers as cost benefits attained through streamlined business processes; (iv) reduced transportation costs for suppliers/buyers of farm produce, higher prices for produce and increased marketing of produce due to spot improvements (roads and bridges); (v) better terms of sales due to improved bargaining power of farmers (operating as groups) with traders; (vi) market structures contributing to better prices for traders (e.g. less spoilage, more customers) which would be passed on to farmers; and (vii) better prices for farmers due to enhanced access to market information.

119. With regards to increased productivity, as demonstrated earlier, the quantitative analysis showed increased yields for beneficiaries producing SHoMaP-promoted products. FGDs revealed that this was most likely a result of training on better agricultural practices received by beneficiaries of SHoMaP, including use of better variety of seeds or planting materials, soil preparation, use of certified fertilizers, crop rotation and improved small-scale irrigation. FGDs held with beneficiaries where banana cultivation was promoted reported an increase in productivity which was due to the introduction of varieties produced through tissue culture, for example. The new variety has a lower production cycle (18 months) than traditional bananas (24 months), it is less prone to pest attack, and, what is considered more important by farmers, it can be stored for about two weeks after harvest (while traditional varieties are more perishable).

120. With regard to input stockists providing farmers with better inputs, the training provided to input stockists helped them distinguish between certified and non-certified inputs, and in turn they supplied certified products to farmers. The programme also encouraged farmers to buy inputs from recognized input stockists who had been trained by SHoMaP. Interviews with input stockists reported increased sales and increased range of technical services offered to farmers after 2010. They attributed their increased sales to training provided by SHoMaP.[26] It was expected that stockists would pass some of the gains from increased sales of the inputs on to the farmers in the form of reduced prices or discounts. However, interviews with stockists and farmers revealed that this had not occurred.

121. There was evidence of lower transport costs incurred by beneficiaries of SHoMaP. Table 15 shows that on average, as compared to the control group, beneficiaries were likely to pay less per trip to the nearest selling point for transporting their produce, using a motorized form of transport. The results of FGDs further allude to this point.[27]

[26] For instance, an input trader from Nandi County said, "*After training I could balance my books. Also, after farmers were trained, they came in large numbers to buy our products.*"

[27] A trader from Chwele market said, "*Before 2008 especially in the 1990s, the road had not been constructed. We used donkeys as a means of transport. We would buy our produce, leave it with them, and the journey would start at 3 pm till 5 am the next morning. We used to pay around 80 shillings per sack but nowadays we pay 60 shillings per sack. Furthermore, we used to go with bicycles, then walk into the river and get another bicycle on the other side, but nowadays we just spend 40 shillings for the same journey by car."* Similarly, an FGD participant in Maara market said, *"That time [in 2010], the road network was not good. Transport by motorbike used to cost 50 shillings. Because of the improved roads at present, the transport costs have been reduced to 20 shillings. So, if we purchase produce for say 200 shillings, we are now able to make more profit. It is now easy to transport produce from my farm because the market is near the road. This has helped to reduce the transport cost."*

Table 15
Transport cost effects (local currency)

Variable		*Value*
Transport cost	ATT	-64.86
	standard error	(58.51)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

122. One of the expected outcomes that would have led to impact was better terms of sales for farmers from traders due to their improved bargaining power after being trained by SHoMaP to sell in bulk as a group. However, the group formation activity was not a complete success. The majority of FGDs and interviews conducted under this evaluation showed that mostly horticulture groups had not been a success.[28] This was mainly due to negative group dynamics. In terms of outcomes related to market structures, these were not realized as expected because of the state of markets, as outlined in detail in the section on effectiveness. Finally, the absence of billboards and messaging system meant that benefits of informed decision-making could not be realized in the form of increased incomes through better prices.

Human and social capital and empowerment

123. Human and social capital and empowerment entail assessment of the changes that have occurred in the empowerment of individuals, quality of grass-roots organizations and institutions, and poor people's individual and collective capacities.

124. *Human capital.* Several activities conducted by SHoMaP were aimed at improving individual skills and fostering group cohesion. For instance, training on better agricultural practices helped several farmers, in particular, farmers producing bananas and Irish potatoes, to improve their productivity (although yield results for banana are not statistically significant). SHoMaP-conducted training for input stockists on bookkeeping, farm input dynamics and use of new products, safe use of products, and supporting farmers to improve quality of outputs and quality and nature of inputs, helped them improve their sales,[29] although most interviews conducted showed that the training time was far too short and was based on the assumption that beneficiaries had a certain level of knowledge to start with, which was not always true.

125. *Social capital*. SHoMaP activities included training farmer groups on improving group cohesion and planning and managing group-based marketing activities and investments. Quantitative analysis conducted by this evaluation shows that household members belonging to households that participated in SHoMaP's activities were more likely to form groups than non-SHoMaP households. As per table 16 below, in 2017, 86 per cent of beneficiaries belonged to a group as compared to 58 per cent of control group households. More than 20 per cent of the membership of beneficiaries belonged to a horticulture-related group; however, an important caveat here is that the majority of these 20 per cent belonged to producer groups as opposed to marketing groups.

126. This aspect was also highlighted in FGDs; although farmers did come together to form producer groups (in order to learn farming practices from each other), when it

[28] *"The groups were useful by all means but failed to allow group sales. We do not have any plans of selling as a group. We formed groups in order to work together but where we are, we have no help to be able to sell as a group"* - Matulo Banana Group in Bungoma. *"Farmers in a group is hard because these people have not been educated, many people fear planting in groups they think they can take their money, or they can take their hard work and not get what they want but in business they are some who are in groups they are some in the market they work together they are two or three that work together"* - Nalondo agrovet.

[29] A SHoMaP-trained stockist from Embu told the evaluation team, "I totally attribute the change in my sales to SHoMaP. This is because after the training I am now able to stock commodities and farm inputs that are directly demanded by farmers."

came to marketing in a group, most shied away from it due to issues of trust. The approach related to marketing in a group was that group members would aggregate the produce and a few members would approach market intermediaries and traders to sell on behalf of the entire group. However, group members did not trust the fact that a few designated members would be transparent with others about the actual price received or that they would not pay the others on time.

Table 16
Group membership

Variable		*Value*
Member of household belonging to a group	ATT	0.28***
	standard error	(0.03)

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

127. *Participation of the beneficiaries in development*: A feature of SHoMaP was the participatory approach to design and implementation. For instance, diagnostic VCA used a participatory approach involving farmers, traders and other stakeholders along the specific product value chain in each district to come up with interventions and priorities for each district. Similarly, the formation of local committees at divisional and district levels such as the horticulture committees, market management committees and road management committees was an effective strategy towards involvement of locals in programme activities. Finally, beneficiaries played a significant role in the design of market structures.

Institutions and policies

128. This domain assesses the changes in the quality and performance of institutions, policies, and the regulatory framework that influence the lives of the poor.

129. *Institutions.* SHoMaP supported the capacity-strengthening needs of service providers (including the PMU and Government staff of collaborating ministries). For instance, the programme facilitated training of GoK staff in counties on effective agricultural practices, agribusiness, value chains, business management and entrepreneurship. While the trainings were useful in building capacities, beneficiary farmer groups lamented the lack of adequate and timely support from the local extension offices.

130. In terms of *grass-roots-level institutions*, SHoMaP's activities aimed at supporting the formation of enterprise-based producer groups/associations and marketing networking structures. For example, the programme initiated the formation of a potato council, banana producer associations, mango producers associations, input stockist associations and marketing fora. The groupings were developed to help farmers to bulk enough volumes to access bigger markets and also to provide avenues for networking and sharing information. However, as has been mentioned earlier in the document, the marketing group activities did not bear the desired fruit.

131. *Policies.* One of the activities undertaken by SHoMaP was to support the development of an improved horticultural sub-sector policy and legislation framework through a grant to the Agricultural Sector Coordination Unit (ASCU), KePHIS and the Pest Control Products Board (PCPB). The programme was expected to support the development of improved horticultural policy through the ASCU as well as support to improved regulatory services through KePHIS and PCPB. Accordingly, the programme provided for a grant of US$500,000 towards these envisaged support functions to the ASCU, and a draft "National Horticultural Policy" document was developed through a participatory process involving a wide range of stakeholders. The policy, which provides a framework for the horticultural sub-sector and improved regulation of the sector, was eventually promulgated.

Overall assessment of impact on rural poverty

132. The evaluation considers the overall assessment of SHoMaP's impact on its beneficiaries as modestly positive. Empirical evidence collected through the quasi-experimental approach to impact evaluation showed differences in agricultural incomes for farmer beneficiaries which were statistically significant. These were caused by yield increases, as shown by statistically significant results. The training on crop production imparted by the programme helped build the human capital of both GoK staff and beneficiary farmers. Gross margins for some SHoMaP-promoted crops increased. Incomes of female-headed households were greater than in control households. There is also evidence that there was a food security-related improvement for beneficiaries. Farm gate prices increased for beneficiaries of spot improvements. Finally, the programme helped support the draft policy formulation of the Government related to horticulture sub-sector.

133. An analysis of gross margin effects by type of crop, however, showed that the increases were affected mainly through a few products. Incomes of female-headed households, although greater than in control households, were less than those of male-headed households. The programme's thrust on creating pro-poor linkages, by training farmers on organizing themselves into marketing groups and selling in bulk, did not bear the desired fruit. The evaluation did not quantitatively assess the impact on beneficiaries of market structures and pilot initiatives, but as mentioned previously in this document, the results of observations and interviews point that these two interventions did not work as expected. The evaluation rates the rural poverty impact criterion as *moderately satisfactory* (4).

Sustainability of benefits

134. IOE defines sustainability as "the likely continuation of net benefits from a development intervention beyond the phase of external funding support. It also includes an assessment of the likelihood that actual and anticipated results will be resilient to risks beyond the programmes' life."

135. **Commercial villages**. To ensure sustainability of programme initiatives, the programme supported the formation of enterprise-based producer groups/associations and marketing networking structures. For example, the programme initiated the formation of a potato council, banana producer associations, mango producers associations, input stockist associations and marketing fora. However, the evaluation found mixed chances of their sustainability given deeply ingrained governance issues in groups that have afflicted several groups visited by the evaluation team, and the lack of adequate county staff[30] and resources to provide continuous support to these groups.

136. **Market structures.** The physical structures implemented were of high quality, as observed by the evaluation mission, and are expected to last. However, as mentioned earlier, several of them are not functioning, awaiting engagement from the newly formed county governments. Further, different categories of market users/beneficiaries including farmers and consumers were identified beforehand, alongside their market needs and other considerations. These were used as a basis for developing market specifications, and for designing as well as developing a market management system that recognized and allowed beneficiaries to be an integral part of the management team. The programme thinking was that it was more productive for traders and other market users to share responsibilities for development, management and maintenance of market infrastructure and services, and thus to ensure sustainability.

[30] For instance, in an FGD with a commercial village group in Nyandarua, members of the group narrated as follows: "*Agriculture officers are demotivated, have no adequate facilitation such as transport, have no vehicles, no motorcycles, and are rarely replaced after retirement. Agriculture officers have not given us for any extension services in 2017 while input stockists are in contact when we go to purchase farm inputs.*"

137. However, there are some doubts about the capacity of these groups. It was noted that the communities have no capacity to develop comprehensive market business plans[31] to guide them to manage these markets efficiently and sustainably. Further, the MoU between the local counties and horticulture market committees does not provide adequate legal backing, especially recognizing that the committees are not themselves legal entities.

138. **Road and bridge maintenance.** The quality of the spot improvements (roads) and construction of bridges carried out by SHoMaP was good, as observed by the evaluation team. To ensure that the benefits are sustained, during the programme exit phase the programme established division and district horticulture sub-committees for lobbying and advocacy to enable beneficiaries to access funding from the county governments and Constituency Development Fund for their maintenance. A continuous stream of benefits will depend on the level of engagement of the horticulture sub-committees with their respective counties.

139. **Pilot initiatives**. As outlined earlier, several pilot initiatives were not functioning at the time of this impact evaluation, and some had never started, thus mirroring the lack of sustainability of this activity. As per the analysis of the evaluation, factors that will undermine the sustainability of the pilot initiatives that are working include: under-capitalization, which will affect their resilience and competitiveness; lack of effective management structures with no clear business growth and vertical linkage strategy; and lack of availability of continuous training. On the other hand, some of the initiatives such as greenhouses have good prospects for the future.

140. To summarize, the evaluation notes mixed success on the sustainability of commercial villages and pilot initiatives. The spot improvements can be expected to be sustained longer given the formation of committees and the funding from the county governments. The sustainability of market structures, where the lion's share of the programme funds were invested, is delicately poised. Roadblocks remain in the way of sustainability, notably injection of capital by county governments to complete all works and their preparedness to ensure smooth functioning of the markets. It is possible that these roadblocks are due to the teething problems associated with devolution and, when the necessary changes have occurred, the markets will function as expected. The county officials who were interviewed were quietly confident of the county governments taking responsibility of these markets once the dust of devolution has settled down. The evaluation rates sustainability as *moderately satisfactory* (4).

B. Other performance criteria

Innovation

141. IOE defines innovation as the extent to which IFAD development interventions have introduced innovative approaches to rural poverty reduction.

142. The programme's activities related to domestic market system analysis – two nationwide studies, an upstream inputs supply systems study and a downstream horticultural produce wholesale and retail marketing study, and the 14 district-focused VCA studies – were innovative in the context of value chain projects in the horticulture sub-sector of Kenya. However, the two nationwide studies were not carried out.

143. The aims of the VCA studies were to help in determining the most productive ways in which the programme would support value-adding activities that were beneficial to poor households. However, this innovative approach was not effective. In the first instance, there was a delay in the preparation and completion of all the 14 district-focused VCAs. These studies were to be completed within six months of

[31] Market business plans to inform the community on the quantities of produce required to be traded in those markets and strategies of how to produce them, the levels of income and expenditure expected from the markets, and what percentage of revenue should be retained for market maintenance.

programme start-up (i.e. during the second half of 2007 and first half of 2008), but the first six VCA reports were completed in 2011, while the other eight VCA reports were completed in 2012, at programme mid-term.[32] Another issue was the low quality of reports produced. They omitted important aspects such as production trends and underlying factors, identification of key production clusters, overlays (quantification) relating to number of players and volumes handled, as well as sub-sector dynamics, including driving forces and leverage points.

144. Another innovation promoted by the programme was the formation of commercial villages. This consisted of bringing together and training a number of groups of commercial producers with common interest in the farming of similar horticultural commodities. In essence, within one village, several commercial producer groups would come together to form one bigger group which was named commercial village. The aim was to increase farm productivity, bulk the produce and access bigger and more lucrative markets, engage in contract farming, and access group credit. As articulated by the evaluation earlier in the analysis, commercial villages were a mixed success due to a number of reasons, including negative group dynamics and a lack of the necessary market conditions (e.g. contract farming).

145. The pilot initiatives were supposed to foster innovation as one of their central tenets. A total of 80 pilot initiatives were implemented, of which 26 were in agriculture production and 50 in value addition and agri-processing, and 4 included both agriculture production and value addition. However, an analysis of these initiatives shows that most of the production-oriented initiatives, such as greenhouses, were not expressly innovative. Further, as stated in the effectiveness section of this report, the pilot initiatives produced mixed outcomes, with more than half failing.

146. In summary, SHoMaP was designed with a number of innovations to promote best practices and to ensure effective programme implementation, and the evaluation finds this noteworthy. On the other hand, it is also clear that of these innovations, some: (i) were not implemented at all (two nationwide studies); (ii) were not produced in the intended quality (VCA studies); and (iii) gave mixed results (commercial villages and pilot initiatives). The evaluation rates innovation as *moderately unsatisfactory* (3).

Scaling up

147. IOE defines scaling up as the extent to which IFAD development interventions are likely to be replicated and scaled up by government authorities, donor organizations, the private sector and other agencies.

148. Of the numerous activities carried out by SHoMaP, there are instances of one activity, i.e. support to value chains, that was scaled-up. In Bungoma county, for instance, the county government had set aside funding to promote value addition in the banana and tomato value chains. In Nyandarua, the county had adopted the value chain approach and had come up with a strategy for promoting the potato and carrots value chains. More specifically, the Nyandarua county government had posted officers in charge of value chain development and market access to ensure the success of its value chain support initiatives. In Kericho county, the SHoMaP VCA approach had influenced the development of the County Horticulture Development Programme. The county government had allocated Ksh 160 million towards the promotion of irrigated horticulture, development of the pineapple value chain and support towards the development of cottage industries in the horticulture sub-sector. *The evaluation rates scaling up as moderately successful (4).*

[32] The reasons for the delay were related to procurement delays and the fact that a cluster of VCA studies to be prepared by one of the consultancy firms did not meet the desired standard and subsequently the contract was re-issued to another firm.

Gender equality and women's empowerment

149. IFAD's women's empowerment objectives include: (i) expanding women's access to and control over fundamental assets – capital, land, knowledge and technologies; (ii) strengthening women's agency – their decision-making role in community affairs and representation in local institutions; and (iii) improving women's well-being and easing their workloads by facilitating access to basic rural services and infrastructures. In this section, an evaluation of SHoMaP's achievement on gender related objectives is provided.

150. *Women's participation*. As per the PCR, the targets for women's participation were achieved for the majority of beneficiary groups, such as female members of marketing groups (173 per cent of the target), of pilot initiatives (119 per cent), of producer groups (108 per cent), produce traders (126 per cent), marketing agents (179 per cent), and for trained government officers on programme implementation (153 per cent) and on business and entrepreneurship (109 per cent). The programme monitoring system also revealed some minor achievements regarding female participation of trainings for agro-processors (72 per cent). The number of trained women in agro-processing was much higher than the number of trained men (750 vs 170). The number of trained input stockists achieved 75 per cent of the target for both men and women. Overall, 50.7 per cent of the programme beneficiaries were women.

151. *Programme management*. A framework for mainstreaming gender issues in SHoMaP was part the programme implementation manual. In addition, a training module on gender sensitization was delivered. Sex-disaggregated data were collected by the programme management and used to inform the RIMS.

152. The PCR states as one of the elements of the gender strategy that women would be encouraged to take part in programme planning and particularly in decision-making relating to the use of programme finance. Female and male candidates would be treated equally during the recruitment of PMU staff and service providers. However, the programme implementation structure was male-dominated at both central and district levels. Only one woman (out of seven staff) was part of the PMU. At the district level, at the programme start, 10 of the 14 sub-country agricultural officers were men (during the programme life, two men were replaced by women). In addition, 11 of the 14 desk officers were men. Similarly, there was no gender specialist in the PMU; the M&E staff were asked to assume the role of gender specialist.

153. *Decision-making roles*. The evaluation explored the programme impact on household decision-making. As part of the household survey, information was collected on a variable regarding who in the household participates in making decisions about how to spend income received from crop and livestock activities. The questions allowed respondents to choose from five options about who makes the decision: household male, household female, joint household (male and female), non-household member, and other.

154. The results show a positive effect of the programme on the probability of women in treatment groups making a decision relative to the comparison groups. Treated households were five percentage points more likely to have a female managing the cash from both crop and livestock activities relative to non-SHoMaP households. Also, SHoMaP households were 9 and 18 percentage points more likely than the comparison group to have joint decision-making (male and female) for crop and livestock activities, respectively (the results were statistically significant). FGDs with women-only groups also revealed that decisions on how to use money earned were generally taken together by the wife and the husband.

155. *Women's work burden*. FGDs and interviews with beneficiaries revealed that the programme generated employment opportunities and incomes for both men and women. During FGDs and KIIs, women also reported increased levels of work since

the programme started considering their engagement in the pilot initiatives, though they were satisfied with this increased work, considering that it led to increased incomes.

156. The SHoMaP-UN Women partnership was conceived with a view to promoting gender equality by supporting women's groups in food-insecure areas of selected SHoMaP sub-counties. Under this partnership, drip irrigation kits were supplied to each of the ten women's groups, and capacity building was provided on the use of drip agriculture, soil sampling and testing.

157. In summary, the programme elicited an equal participation of women and men. Similarly, most targets set for women were achieved. The programme M&E collected sex-disaggregated data. Further, SHoMaP had a positive impact on women; beneficiary households had more women involved in household decision-making than control group households. Incomes of women-headed beneficiary households were found to be greater than in the control group by the quantitative analysis. On the other hand, the programme lacked a gender specialist; this was a missed opportunity, especially when half the programme's beneficiaries were women. The evaluation rates gender equality and women's empowerment *as satisfactory* (5).

Environment and natural resources management

158. This impact domain involves assessing the extent to which the programme contributed to changes in the protection, rehabilitation or depletion of natural resources and the environment.

159. The President's Report classifies the Programme in Category B, i.e. being unlikely to cause a significant negative environmental impact. While a focus of the programme was on increasing production, some of its activities were directed to avoid over-exploitation of natural resources and to contribute to their restoration. For instance, the programme provided training on the safe and efficient use of pesticides and fertilizers to reduce the risk of soil and water degradation. The trained input stockists found these to be particularly important for their trade. Given the issue of spurious fertilizers in Kenya, however, some negative impact of their increased use on the soil is likely. Training of farmers on sustainable agricultural practices through, for example, crop rotation, will help reduce land degradation in the near future. Several farmers reported using these better practices now. As reported by the beneficiaries, training on risk management, including risks emanating from the environment, developed the community's capacity to understand and manage environmental risks, and reduce their vulnerability.

160. Some of the activities of SHoMaP were geared towards environmental risk assessment. For instance, the programme undertook environmental impact assessments for every market structure which outlined the positive and negative impacts emanating from the construction of markets. Environmental impact assessment licenses were mandatory for contractors to whom contracts for construction of markets were issued. Consequently, mitigation measures were proposed for each negative impact and were implemented, and an attendant environmental management plan was developed for each market to monitor implementation and act as a reference for an environmental audit.

161. The programme also introduced several environmentally friendly features and items of equipment with regard to the market structures. For instance, some markets had roof-water catchment systems for harvesting rainwater for use in toilets and in cold rooms. Provisions were made for disposal of waste (organic and non-organic) generated in the markets. Guidelines were established for safe and environmentally friendly disposal of rubble left behind after the construction of market structures. However, in several of the markets which the evaluation team visited, the above measures were not in use. In addition, some of the pilot

initiatives that the evaluation team visited had installed solar dryers to harness renewable energy.

162. Thus, a considerable number of activities undertaken by the programme were to protect and restore the environment and natural resources. The evaluation team observed several of these in use. Training helped increase the community's understanding of how to manage environmental risks. The compulsory use of an environmental assessment and the implementation of mitigation measures ensured that markets with negative environmental impact were not financed, and that they were implemented in an environmentally acceptable manner. However, there is chance that the likely use of spurious fertilizers to increase production and the fact that some of the activities meant to protect against environmental degradation, such as waste disposal, are not in use, could negate or hinder some of the outcomes with regards to the environment. The evaluation rates environment and natural resources management as *satisfactory* (5).

Adaptation to climate change

163. The extent of the threat of climate change in Kenya is mirrored in the fact that the Government of Kenya developed the National Climate Change Response Strategy in April 2010 to address vulnerability in the country and potential future responses. The Strategy concluded that "the evidence of climate change in Kenya is unmistakeable: in many areas, rainfall has become irregular and unpredictable; extreme and harsh weather is now the norm; and some regions experience frequent droughts during the long rainy season while others experience severe floods during the short rains." Further, IFAD's approach to climate change was rooted in its Strategic Framework 2007-2010; it was focused exclusively on climate change issues as they affect poor rural people in developing countries.

164. The programme did not have an explicit strategy related to climate change although at the time of SHoMaP's implementation climate change had been recognized by IFAD as an issue affecting the livelihoods of smallholders. However, some of the pilot initiative proposals were related to adaptation to climate change. For instance, 16 out of the 80 initiatives were for greenhouse farming (including the Nakewa youth group initiative in Bungoma East, which used rainwater harvesting for greenhouse farming). The use of greenhouse farming was intended to provide a controlled environment for crop growth with little regard to the weather conditions. In addition, one proposal was for drip irrigation for production (the Miruriiri Growers Self-Help Group in Imenti South). The evaluation rates adaptation to climate change as *moderately satisfactory* (4).

C. Overall programme achievement

165. SHoMaP's overall achievement can be described as mixed. The programme's objectives aimed at improving both the efficiency and the effectiveness of selected value chains, and at supporting value addition. Given the value chain focus, its activities rightfully targeted the different actors along the chain. However, the fact that the value chain activities were district-based meant that the scope was kept restricted to geographic boundaries and did not encompass an entire chain, which can go beyond administrative boundaries.

166. Some of the programme objectives were not fully attained, while others produced mixed results. For instance, income effects were positive, while fostering group formation to enable better terms of trade for producers did not succeed as expected. The programme reached an equal number of men and women, and incomes of the latter were found to be greater than those of the control group but were lower than those of male beneficiaries.

167. Cost-benefit analysis was lacking, but at the time of the evaluation, the costs for the most-funded activity i.e. market structures, out-weighed the benefits emanating from it (which were yet to fructify). Given this, the sustainability of

market structures will depend on a host of factors, not in the least the political will of the county governments and the extent of ownership that they will award to the market management committees. The programme introduced some innovations, and some of its activities have been scaled up. Several of the activities were cast in good environment and natural resource management. The evaluation rates overall programme achievement as *moderately satisfactory* (4).

D. Performance of partners

Government of Kenya

168. **Programme management.** The programme's key implementing agencies comprised the MoALFI (as the Lead Agency), collaborating ministries of public works, roads and local Government, steered by the Programme Steering Committee (PSC), and including the PMU, programme district staff and the beneficiary communities. The role of the PSC was important to provide guidance to the programme to ensure compliance with national policy goals and consistency with activities of the line ministries in order to minimize duplication. However, the PSC did not convene as expected and was even inactive from 2012 to 2014. It was also established that due to lack of oversight provided by the PSC to the PMU, programme management was not effective in all areas. For example, the delay in completion of construction of market infrastructure projects was also attributable to poor contract management by the PMU.

169. Emphasis on the value chain approach in the programme put considerable managerial and coordination strain on the PMU and its co-implementers, many of whom were not familiar with this approach. As per the MTR, the PMU relied on its district-level co-implementers, especially for management and coordination of actual implementation at the grass-roots level, which was itself besotted with issues of staff transfers. The wide geographic span of the programme districts also exerted considerable strain on PMU staff, especially in terms of travel time. To its credit, the PMU eventually strengthened its working relations with the district-based implementing agencies, which was a challenge given that the latter also experienced challenges such as low technical capacity and a multiplicity of other time-consuming projects that were running concurrently with SHoMaP. However, there is also evidence of lack of adequate communication initially between districts and the PMU.

170. There were issues of staffing in the PMU – lack of key staff for several periods at a stretch and high turnover of staff without appropriate and timely replacement; and staff conflict, which affected the team morale and, importantly, the timely implementation of programme activities. For example, the Agribusiness and Marketing Officer left the programme in July 2014 and this position was not filled; the Infrastructure Officer also left at the same time and the duties were performed by an engineer (deployed from MoALFI headquarters); the M&E Officer left in January 2013 and an officer was deployed from MoALFI headquarters in July 2013; the M&E/ICT Assistant left in November 2011 and an officer was eventually deployed from MoALFI headquarters to perform the duties.

171. **Monitoring and evaluation.** According to the programme appraisal report, SHoMaP was supposed to develop properly integrated planning and M&E systems within 12 months of the loan effectiveness date. However, for the first four years there was no formal M&E structure in place. This meant that reliable, timely information on output delivery and initial outcomes for a large part of the programme did not occur, and if they did occur, they were in the absence of a proper and systematic M&E framework. The baseline survey was not conducted until four years into programme implementation, which meant that basic technical and socio-economic data did not accurately reflect a "before-project status". To its credit, though, the programme commissioned an internal impact evaluation study towards the end.

172. On the other hand, the Government displayed active commitment to the programme by injecting additional funds for a total of US$7.2 million, reflecting an increase of 440 per cent over its commitment at appraisal. Although the M&E was a sticking point, the programme aptly promoted knowledge management. This was done through documentation of best practices (both in print and video) concerning programme activity successes and challenges. This information was shared with clients, community members and development partners and agents.

173. Thus, to summarize, the sheer scale of the programme, the extent of collaboration required among collaborating agencies, and the issues related with staff left the PMU exposed on several fronts. The PMU did not help its cause by delaying the establishment of an M&E system. However, the Government showed its commitment by providing extra funds to complete the market structures and by accelerating implementation post-MTR. Although M&E was a weak point, the attention to knowledge management was noteworthy. Admittedly, the devolution process that occurred mid-way through the programme life cycle affected the implementation plans, especially for market structures. On its part, the national government developed and signed Memoranda of Understanding with the county governments to ensure the completion and upkeep of the markets by the latter. The evaluation rates government performance as *moderately satisfactory* (4).

IFAD

174. The programme was directly supervised by IFAD, and its supervision and implementation support was deemed adequate by the programme staff interviewed by the evaluation team. IFAD fielded 11 supervision and support missions during the seven years of the programme, which were of use to the programme implementers. The MTR was rightfully critical of the programme's progress and raised some pertinent questions. The evaluation found the recommendations in the supervision mission reports to be sound.

175. Further, IFAD's timely guidance and coordination facilitated the achievement of 96 per cent cumulative disbursement of the IFAD loan and 100 per cent of the grant. Since the programme faced difficulties in completing the infrastructure activities, especially the markets, IFAD provided the programme with a one-year no-cost extension to complete the market infrastructure projects. Annual audits were carried out by abiding to required international audit standards, and reports were accepted by IFAD.

176. On the other hand, IFAD could have done more about the lack of M&E system apart from solely raising the issue in the supervision reports, especially given the corporate emphasis on measuring results (through RIMS). There was some disconnect between the sheer scale of the programme (geographic spread and number of activities) and the capacity on the ground to implement it, and IFAD could have been more proactive to assess this gap. Some of the proposals that were approved for the pilot initiatives did not have the basis for long-term sustainability and these should not have been approved. The matter of undertaking the two nationwide studies and completing the VCA studies on time should have been more vigorously pursued by IFAD. The evaluation rates IFAD's performance as *moderately satisfactory* (4).

E. Assessment of the quality of the programme completion report

Scope

177. The PCR for SHoMaP contains all the sections that are mandatory as stated in the Guidelines for Project Completion, including vital annexes showing costs and disbursements, and achievements against targets. The calculation of economic internal rate of return was omitted, and environmental resource management and the programme's adaptability to climate change have not been addressed. When

considering the length of the PCR, it is much longer (at 42 pages) than the stipulated guidelines of being between 19-25 pages. Considering these factors, the scope of the PCR is rated *moderately satisfactory* (4).

Quality

178. The quality of the PCR is compromised by the poor data collection and analysis over the course of the programme. The baseline survey was delayed by four years, and the programme lost vital information that should have been available at inception. It also had a weak M&E system and depended on the physical data collected by the stakeholders, including the local government institutions. Instead, the programme made annual assessment surveys but did not methodically illustrate the results to allowing conclusions on impact to be inferred. Another notable feature is that the PCR is a document without a bibliography, thereby suggesting that the work was not verifiably evidence-based. Considering the above factors, the evaluation assigns a rating of *moderately unsatisfactory* (3).

Candour

179. Along with examples and supporting evidence from the baseline data, the PCR is not conveying an impression of critical distance. It hardly ever asks the "why" question, thus eliminating the possibility of shedding light on facts and figures that deserved additional insight. One example is the apparent contrast between low government performance in the first years of the programme and the surprising over-achievement in government funding. The beneficiaries also contributed more than estimated at appraisal, a positive feature that would have deserved some explanation. However, for some aspects such as pilot initiatives and market structures, the PCR rightfully acknowledges the associated critical failures. The evaluation rates this section *moderately satisfactory* (4).

Lessons

180. The PCR highlights some noteworthy points but fails to give them weight in the form of lessons to be learned for other similar operations. One of these points refers to the implementation of pilot actions that then entailed local replication in the sub-counties covered by the programme. Another positive point mentioned in the PCR is the formation of horticulture, market management and road management committees. But it only indirectly infers that the lack of properly preparing and training such committees resulted in their failure to become operational at programme completion. Likewise, the PCR does recognize that the scattered programme intervention area and the overcomplicated design of decentralized market infrastructure made in difficult to follow up all the required activities, but does not conclude that there would have been a lesson to learn on simplicity of design. Therefore, the evaluation rates lessons as *moderately satisfactory* (4).

III. Conclusions and recommendations

A. Conclusions

181. **The impact on horticulture producers' incomes and food security was primarily realized through the production node of the value chains.** The focus of the training provided by the programme was primarily on selling in groups and marketing (creating marketing linkages) and some on agronomic practices. However, training given by the programme to commercial village groups impacted more on agronomic practices at the cost of marketing knowledge. The greater incomes in the treatment group compared to the control group were a result of greater gross margins for the former, driven mainly by differences in yields in some of the programme-promoted horticultural commodities such as bananas and Irish potatoes.

182. **The programme's proposition to value chain development rightfully targeted several building blocks, but an integrated approach was lacking.** The programme targeted several activities associated with a value chain: market analysis; improvement of input markets; increased capacities of farmers to engage with value chains; formalized sustainable trade linkages; and investments in infrastructure. However, issues in a commodity value chain were to be addressed using districts as the basis, as opposed to using a holistic approach that could transcend administrative boundaries. Even the district-based value chain studies themselves, which were to be the core tool for the design of interventions for pilot initiatives and commodity producer groups, were conducted late, while several activities which would have followed from this analysis, such as selection of groups, were conducted beforehand. Further, market analysis through two nationwide studies that was to be the starting point for the value chain activities was not undertaken at all.

183. **The negative relationship dynamics within groups led to limited success of the programme with marketing groups.** Lack of trust among group members was the most common denominator in explaining the less-than-desired outcomes of commercial villages. Issues of lack of accountability and poor governance and management acted as barriers to successful group-working. The delayed start of the programme with respect to its core activities meant that there was no adequate time to remedy the situation by providing additional support to groups.

184. **The effects of the devolution process were most visible for the market infrastructure aspect.** There was a lack of common understanding among the various stakeholders regarding responsibility, ownership and management framework of market facilities after the handing-over of the markets to the county governments. While the existence of MoUs between national government, horticulture market committees and county governments was useful, it did not provide adequate legal backing, especially considering that the committees were not legal entities.

185. **The success of pilot initiatives was mostly driven by those that were production-oriented.** Almost two-thirds of the initiatives were for value addition and agro-processing (such as making banana-based products), and most of them did not perform as expected. On the other hand, initiatives that were production-oriented (such as greenhouses) performed far better. Most initiatives that the evaluation team saw were under-capitalized, poorly managed and had no clear business growth and linkage strategy. Also, the small grant size received by groups meant that many initiatives were unsustainable and collapsed.

186. **The programme produced mixed outcomes in terms of improving power relations along the value chains.** In some cases, such as construction of roads, the programme interventions benefited both farmers and traders. Thus, for instance, roads made access to production areas easier for traders and at the same

time provided better prices to the producers. In other cases, such as commercial villages, the programme's aim to shift the balance of power in trade relations in favour of smallholder growers was not as effective as desired because not all commercial villages were able to enhance their capacity to bulk-produce, and access to market information was not effective. Further, while the programme attempted to link commercial villages to commodity-specific apex farmers organizations, it stopped short of fostering market linkages for the apex organizations.

B. Recommendations

187. **Recommendation 1: In value chain-related interventions, adopt an integrated approach and a proper sequencing of activities.** The successful development of a value chain requires both an integrated design and a proper sequencing of its building blocks or activities. The former entails considering the chain in its entirety, not restricted by internal geographic boundaries, and placing emphasis on upstream, production and downstream activities. Further, an integrated approach also requires proper sequencing of value chain interventions. Given the limited duration of IFAD-supported projects, when detailed design of activities is to occur after programme start, then meticulous planning and strict timelines become even more important for realizing the intended results.

188. **Recommendation 2: When strengthening relationships among value chain actors, allocate sufficient time and support for capacity development and behavioural shifts to take shape.** Relationships exist between different groups of actors (e.g. producer and trader) and within the same group of actors (e.g. farmer to farmer). Enhancing and helping coordinate stronger relationships can potentially achieve a number of benefits to make the value chains work more effectively. However, programmes need to factor-in sufficient time and constant support for attitudinal shifts among actors to take effect, especially in contexts where trust among marketing group members can take longer to build. In this regard, training programmes should accord priority to sensitization and training on group approaches and dynamics.

189. **Recommendation 3: Target individual entrepreneurs or smaller enterprises for agro-processing while positioning farmers as suppliers of raw materials.** The quantitative and qualitative results of this evaluation clearly underline three facts: (i) working in groups did not succeed as desired; (ii) the pilot initiatives for value addition did not work as expected; and (iii) increases in incomes were mainly from increased production of commodities in primary form. Thus, focusing on a few, individual entrepreneurs or micro, small and medium enterprises and providing them with support for both upstream and downstream activities would have more impact, since farmer groups usually lack the necessary capital and entrepreneurial attitude to make small agro-processing enterprises sustainable. This is supported by the results of the evaluation, which demonstrated that production of primary horticultural products was a gainful activity for farmers.

190. **Recommendation 4: For infrastructure-related interventions, establish mechanisms for collaboration among stakeholders as part of the programme exit strategy.** Long-term sustainability of social infrastructure such as markets requires effective mechanisms that establish clear rules of engagement among stakeholders and help imbibe ownership. The point of departure for establishing such mechanisms should be a negotiation of the respective roles and responsibilities of the stakeholders, an area where IFAD programmes can play an important role to facilitate agreement. The collaboration should also encompass governance, including a dispute-settlement mechanism and risk mitigation measures, and a clear and transparent revenue-sharing mechanism. For mechanisms to be appropriately enforced, it is important that they be institutionalized through a legal framework.

Basic programme data

				Approval (US$ m)		*Actual (US$ m)*	
Region	East and Southern Africa		Total programme costs		26.59		32.15
Country	Kenya		IFAD loan and percentage of total	23.43	88.1per cent	23.03	71.6
Loan number	KE 720		Borrower	1.62	6.1 per cent	7.23	22.5
Type of programme (subsector)	Agricultural Development		IFAD Grant	0.50	1.9 per cent	0.50	1.6
Financing type	Loan/Grant		Cofinancier 2				
Lending terms*	HC		Cofinancier 3				
Date of approval	18 April 2007		Cofinancier 4				
Date of loan signature	10 July 2007		Beneficiaries	1.04	3.9 per cent	1.39	4.3
Date of effectiveness	23 November 2007		Other sources				
Loan amendments	0		Number of beneficiaries	*Direct:*12,000 smallholder farm households or 60,000 individuals.		*Direct:* 21,311 households or 152,304 individuals.	
Loan closure extensions	1			31 December 2013		30 June 2014	
Country programme managers	Samuel Eremie; Robson Mutandi; Henrik Franklin; Salem Hani Abdelkader Elsadani		Loan closing date			30 June 2015	
Regional director(s)	Jatta Sana		Mid-term review			08 April 2012	
Project completion report reviewer	Ernst Schaltegger		IFAD loan disbursement at programme completion (per cent)			96	
Project completion report quality control panel	Avraam Louca Michael Carbon		Date of the programme completion report			30 June 2015	

Source: Project Completion Report, IFAD President's Report, EB 2007/90/R.15/Rev.1

* There are four types of lending terms. The loan portion of IFAD financing was a special loan on highly concessional terms, free of interest but bearing a service charge of three fourths of one per cent (0.75per cent) per annum and having a maturity period of 40 years, including a grace period of 10 years.

Definition and rating of the evaluation criteria used by IOE

Criteria	*Definition* *	*Mandatory*	*To be rated*
Rural poverty impact	Impact is defined as the changes that have occurred or are expected to occur in the lives of the rural poor (whether positive or negative, direct or indirect, intended or unintended) as a result of development interventions. *Four impact domains* • Household income and net assets: Household income provides a means of assessing the flow of economic benefits accruing to an individual or group, whereas assets relate to a stock of accumulated items of economic value. The analysis must include an assessment of trends in equality over time. • Human and social capital and empowerment: Human and social capital and empowerment include an assessment of the changes that have occurred in the empowerment of individuals, the quality of grass-roots organizations and institutions, the poor's individual and collective capacity, and in particular, the extent to which specific groups such as youth are included or excluded from the development process. • Food security and agricultural productivity: Changes in food security relate to availability, stability, affordability and access to food and stability of access, whereas changes in agricultural productivity are measured in terms of yields; nutrition relates to the nutritional value of food and child malnutrition. • Institutions and policies: The criterion relating to institutions and policies is designed to assess changes in the quality and performance of institutions, policies and the regulatory framework that influence the lives of the poor.	X	Yes No No No
Project performance	Project performance is an average of the ratings for relevance, effectiveness, efficiency and sustainability of benefits.	X	Yes
Relevance	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, institutional priorities and partner and donor policies. It also entails an assessment of project design and coherence in achieving its objectives. An assessment should also be made of whether objectives and design address inequality, for example, by assessing the relevance of targeting strategies adopted.	X	Yes
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.	X	Yes
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted into results.	X	Yes
Sustainability of benefits	The likely continuation of net benefits from a development intervention beyond the phase of external funding support. It also includes an assessment of the likelihood that actual and anticipated results will be resilient to risks beyond the project's life.	X	Yes
Other performance criteria			
Gender equality and women's empowerment	The extent to which IFAD interventions have contributed to better gender equality and women's empowerment, for example, in terms of women's access to and ownership of assets, resources and services; participation in decision making; work load balance and impact on women's incomes, nutrition and livelihoods.	X	Yes
Innovation and scaling up	The extent to which IFAD development interventions: (i) have introduced innovative approaches to rural poverty reduction; and (ii) have been (or are likely to be) scaled up by government authorities, donor organizations, the private sector and others agencies.	X	Yes
Environment and natural resources management	The extent to which IFAD development interventions contribute to resilient livelihoods and ecosystems. The focus is on the use and management of the natural environment, including natural resources defined as raw materials used for socio-economic and cultural purposes, and ecosystems and biodiversity - with the goods and services they provide.	X	Yes
Adaptation to climate change	The contribution of the project to reducing the negative impacts of climate change through dedicated adaptation or risk reduction measures	X	Yes

Criteria	*Definition* *	*Mandatory*	*To be rated*
Overall project achievement	This provides an overarching assessment of the intervention, drawing upon the analysis and ratings for rural poverty impact, relevance, effectiveness, efficiency, sustainability of benefits, gender equality and women's empowerment, innovation and scaling up, as well as environment and natural resources management, and adaptation to climate change.	X	Yes
Performance of partners			
• IFAD	This criterion assesses the contribution of partners to project design, execution, monitoring and reporting, supervision and implementation support, and evaluation. The performance of each partner will be assessed on an individual basis with a view to the partner's expected role and responsibility in the project life cycle.	X	Yes
• Government		X	Yes

* These definitions build on the Organisation for Economic Co-operation and Development/Development Assistance Committee (OECD/DAC) Glossary of Key Terms in Evaluation and Results-Based Management; the Methodological Framework for Project Evaluation agreed with the Evaluation Committee in September 2003; the first edition of the Evaluation Manual discussed with the Evaluation Committee in December 2008; and further discussions with the Evaluation Committee in November 2010 on IOE's evaluation criteria and key questions.

Rating comparison[a]

Criteria	*Programme Management Department (PMD) rating*	*Impact Evaluation rating*	*Rating disconnect*
Rural poverty impact	4	4	0
Project performance			
Relevance	5	4	-1
Effectiveness	4	3	-1
Efficiency	4	3	-1
Sustainability of benefits	4	4	0
Project performance[b]	**4.25**	**3.5**	**-0.75**
Other performance criteria			
Gender equality and women's empowerment	5	5	0
Innovation	5	3	-2
Scaling up	4	4	0
Environment and natural resources management	n.a.	5	
Adaptation to climate change	n.a.	4	
Overall project achievement[c]	4	4	**0**
Performance of partners[d]			
IFAD	5	4	-1
Government	4	4	0
Average net disconnect			**-6/10 = -0.6**

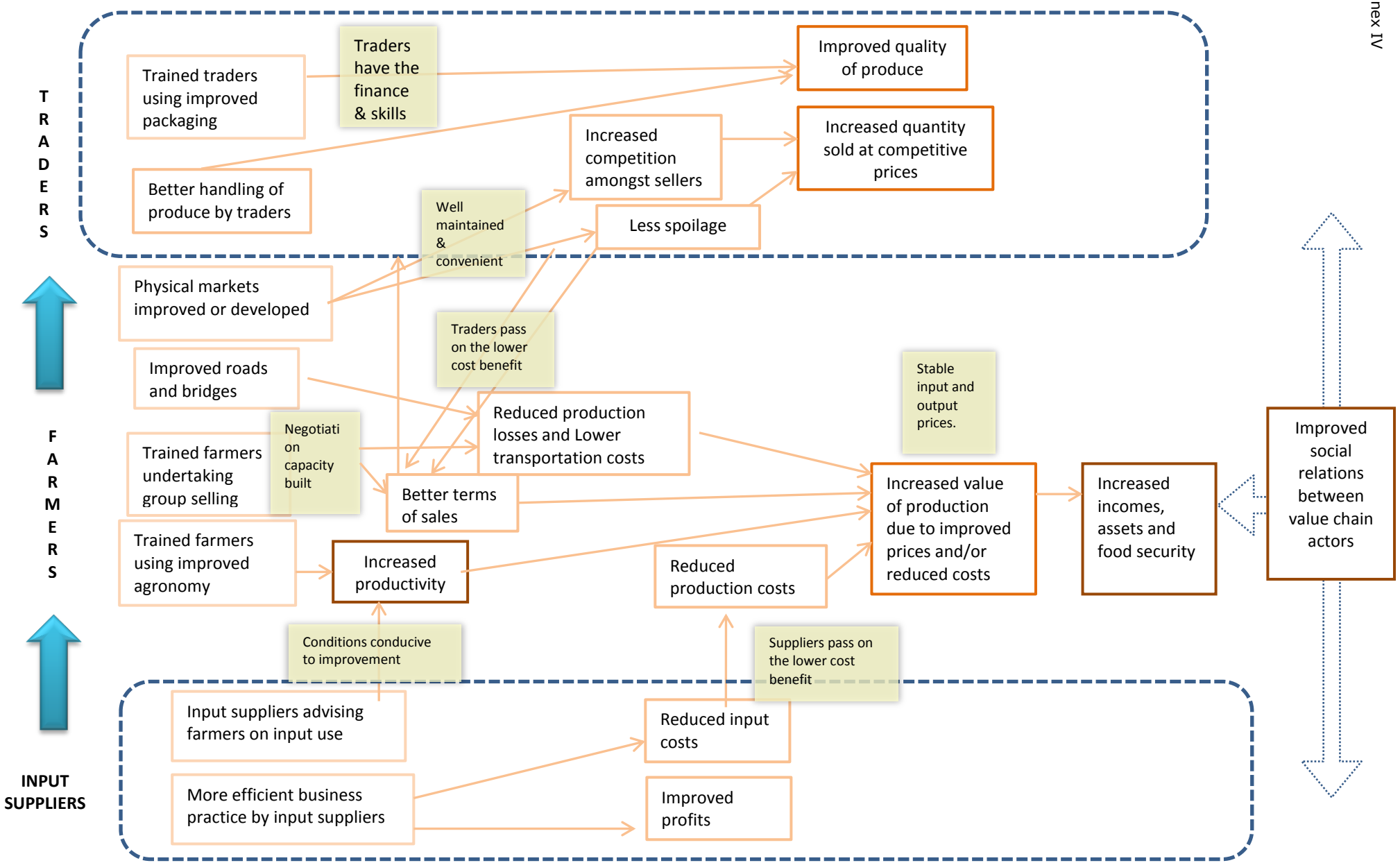
[a] Rating scale: 1 = highly unsatisfactory; 2 = unsatisfactory; 3 = moderately unsatisfactory; 4 = moderately satisfactory; 5 = satisfactory; 6 = highly satisfactory; n.p. = not provided; n.a. = not applicable.
[b] Arithmetic average of ratings for relevance, effectiveness, efficiency and sustainability of benefits.
[c] This is not an average of ratings of individual evaluation criteria but an overarching assessment of the project, drawing upon the rating for relevance, effectiveness, efficiency, sustainability of benefits, rural poverty impact, gender, innovation and scaling up, environment and natural resources management, and adaptation to climate change.
d The rating for partners' performance is not a component of the overall project achievement rating.

Ratings of the Project Completion Report quality

	PMD rating	*IOE rating*	*Net disconnect*
Scope	n/a	4	n/a
Quality (methods, data, participatory process)	n/a	3	n/a
Lessons	n/a	4	n/a
Candour	n/a	4	n/a

Rating scale: 1 = highly unsatisfactory; 2 = unsatisfactory; 3 = moderately unsatisfactory; 4 = moderately satisfactory; 5 = satisfactory; 6 = highly satisfactory; n.a. = not applicable.

Reconstructed programme theory of change



Programme logframe

Results Hierarchy	Indicators a/	Means of Verification
Goal: Contribute to reduced Poverty and improved health among poor rural households in medium-high potential horticultural farming areas	• 10% reduction of poverty prevalence rate among 12,000 households participating in the project by Year 7 (Baseline 35% in 2003)RIMS3 • 3% reduction in malnutrition prevalence (weight for age of children under 5) in project area by Year 7 (reduction in chronic malnutrition – 36% in 2003, underweight 17% in 2003 and ***wasting 6% in 2003***) • 5% increase in inventory of household assets among 12,000 participating households in project area by Year 7 (Baseline 35% in 2003)	• Household income and expenditure surveys. • RIMS impact survey questionnaire (baseline and final) • Demographic and health surveys conducted by Kenya National Bureau of Statistics • Annual household asset surveys by M&E
Development Objectives: Increased domestic horticulture productivity and improved functional input and produce marketing system	• 10% increase in average real incomes for 12,000 households engaged in Sustainable domestic horticulture enterprises by Year 7 (Baseline to be determined). • 10% increase in value of marketed horticultural produce by year 7 (Baseline). • 10 % Increase yield per ha (Baseline to be determined). • 10 %Net margin per unit area (Baseline to be determined). • 5% Increase in unit price for producers *(Baseline for unit price for producers* to be determined). • 10% decrease in price of inputs (suppliers and producers) (Baseline for input prices to be determined).	• Baseline and annual production and income surveys in Project area by M&E and during impact survey in Year 5. • Specific evaluation studies
Outcome A1: Informed Investment Decision	• Number of community projects implemented (RIMS2) ,(Baseline 0 in 2007) target 80 in year 7 implemented (RIMS2)	• Annual Project reports. • infrastructure registers • PMU Assessment
Output A1.1 Analytical Studies conducted	• 14 No. VCA studies conducted ,(Baseline 0 in 2007) target 14 in year 7 • Upstream/downstream/Price stability study conducted,(Baseline 0 in 2007) target 1 in year 7 • **Number of community action plans included in local government plans ,(Baseline 0 in 2007) target 80 in year 7 implemented (RIMS2)** • Number of community action plans formulated and implemented(RIMS1), target of 80 in year 7, Baseline 0 in 2008	• Contract register • study reports
Outcome B 1: Empowered Horticulture System Actors	• 10 % increase of market actors benefiting from improved market access. (Baseline to be determined). • 10 % increase Volume of business per unit enterprise (Baseline to be determined).	- Impact assessment survey report - Baseline survey reports
Output B1.1 Capacity of GoK Staff in marketing systems improved	• Government officials trained (RIMS) Baseline of 0 in 2007 (target of 2000 by Year 7).	• DAO Progress report • Infrastructure register • group register
Output B1.2 Capacity of value chain players in marketing service provision Improved	• No. of value chain players trained by category:- • People trained in post-production, processing and marketing (RIMS1) (target of 12,000) • Marketing groups formed and/or strengthened (RIMS1) (target of 600 by Year 7) • Marketing groups with women in leadership positions (RIMS1)(target of 200 by Year 7)	• DAO Progress report • Infrastructure register • group register
Output B1.3 Existing Marketing Information Systems improved	• Percentage of value chain players accessing timely and reliable market information (60% compared to a baseline of 12% in year 2007)	individual enterprise report
Output B1.4 Access to affordable financial services supported	• Enterprises accessing facilitated financial services (RIMS 1) (baseline of 0, target of 5,000 by year 7) • Value of gross loan portfolio (RIMS 1) (target of KSh1 billion by Year 7)	• District Reports • Equity Bank

Results Hierarchy	Indicators a/	Means of Verification
Output B1.5 Development of legal and regulatory environment for input and produce (policy Developed) facilitated	• National Horticulture Policy developed(baseline of 0 in 2007, target of 1 by year 7) • Number of pro-poor legislation and regulations enforced at the local or central level (RIMS 2) ,(baseline of 0 in 2012, target 2 of by year 7)	• ASCU report • Sub-County reports
Outcome C1. Developed sustainable marketing Support Systems	• Number of functioning infrastructure (RIMS2) (target 60 by Year 7).	• DAO Progress report • Infrastructure register • group register
Output C1.1 Innovations in value addition and market oriented production technologies enhanced	• **Number of pilot initiatives supported by category** (Baseline of 0 in 2007, target of 80 by year 7) • Numbers of innovations adopted/replicated (RIMS2) (Baseline of 0 in 2007)	• DAO Progress report • Infrastructure register • group register
Output C1.2 Rural access roads improved	• Number of roads improved (target of 92 by Year 7). Baseline 0 in 2008) • **Length of rural roads opened up** through spot repairs (target of 230 km by year 7) baseline of 0 in 2007	• Infrastructure register • Baseline survey
Output C1.3 Physical market infrastructure improved	• Number of market facilities developed/improved(RIMS) (target of 50 by year 7, baseline of 0 in 2008) • Volumes of priority crops traded ,(baseline of --in 2007, target of -- by year 7) • Environmental management plan formulated (RIMS 1)(baseline of 0 in 2008, target of 72 by year 7)	• EIA report • Infrastructure register • Local authority records • Infrastructure register
Outcome D 1: Effective and efficiently managed programme	• Project activities fully integrated in mainstream GoK systems and institutions with functional management, monitoring and reporting (target of --- by Year 7)	• NIMES M&E reports
Output D 1.1: Fully functional governance, management, monitoring and reporting systems.	• Project implemented on schedule with performance ratings of satisfactory or better. • Increasing measures of institutional capacity.	• Supervision and implementation support mission reports, and audit reports. • Formal institutional capacity assessments
Output D 1.2: Knowledge about NRM effectively managed and disseminated to stakeholders.	• Increasing dissemination and use by stakeholders of knowledge generated by Project. • Regional knowledge centres effectively networked.	• Number of information materials produced and distributed project-wide as monitored by M&E. • Reports of regional knowledge networks. • Surveys on awareness of sustainable NRM.

Methodology used for undertaking the quantitative and qualitative analyses

1. As part of the impact evaluation process, an evaluability assessment of the impact assessment study conducted by the programme at the time of programme completion was undertaken. This was to assess the strengths and weaknesses of the study in order to utilize data or information contained therein for the purpose of IOE's own impact evaluation. The following box shows the results of the analysis.

Box 1
Preliminary evaluability assessment of the programme

In addition to the selectivity framework that assists in selecting projects for the impact evaluation, an evaluability assessment was undertaken with the aim of giving priority to projects that have an adequate amount of usable self-evaluation data to ensure that impact evaluations by IOE can be done in an effective and efficient manner. Availability of data helps reduce the costs and time taken for IOE to undertake impact evaluations. An evaluability assessment was accordingly undertaken for SHoMaP which revealed the following.

The list of all sub-counties where the programme was implemented was available, as was the list of all commercial villages (villages where producer groups were trained by the programme). In addition, annual monitoring reports (in terms of outputs achieved), monitoring and evaluation and value chain analysis reports were available. The programme undertook both baseline and endline studies. However, the baseline study was prepared in 2011, late into programme implementation (during the mid-point year of the programme's life span). Furthermore, one baseline was conducted in each of the 14 sub-counties of programme area. Thus, there were 14 separate baseline studies instead of one comprehensive baseline. Also, a fixed number of 150 respondents were sampled in each sub-county rather than having a proportional sample. The baseline study was conducted using only beneficiaries as respondents; there was no control group. As a consequence, the baseline studies could not be used by this impact evaluation.

The programme had conducted an impact assessment at the time of programme completion; it was conducted using quasi-experimental methods with a comparison group using mixed methods. A total sample of 2,852 households out of the total estimated 12,000 households was interviewed. This included 2,187 beneficiaries and 665 non-beneficiaries for the comparison group. The recall method was used to construct some of the baseline indicator values. However, the formal method used for selecting the comparison group, which is a key requirement for establishing internal validity and therefore for attributing programme effects, is missing in the methodology. The majority of outcome indicators of the impact assessment were estimated by comparing average values of the beneficiaries with those of non-beneficiaries, but no matching procedure was applied. In addition, the size of control group was far lower than the beneficiary group. Finally, at the time of its conducting the evaluation, some of the programme activities such as physical market structures were still not completed, and hence the expected impact of the programme in its entirety could not be ascertained.

2. The impact assessment used a **quasi-experimental** design to attribute programme results to the programme interventions. The identification of impact was achieved through a counterfactual, i.e. what would have happened to the treatment group in the absence of the programme. The key evaluation question was: *how does the easing of inefficiencies in inputs and produce marketing constraints increase incomes in medium-to-high potential farming areas where horticultural is an important source of livelihood?* The specific sub-questions allowed the development of indicators for measuring impacts at household, community and institutional level and relevant study hypothesis. The indicators were to assess both intended and unintended benefits, and spill-over effects of the intervention.

3. The impact evaluation used a **mix of quantitative and qualitative methods** in order to utilize the strengths and overcome the shortcomings of each. The two methods were carried out simultaneously for reasons of cost and time efficiency. The core instrument for the evaluation was the household survey, which was used to collect primary quantitative data. A household questionnaire was designed and administered to both treated and control groups using computer assisted personal interviews. The questionnaire gathered data on socio-demographic information, education, health, and other characteristics.

Sampling frame

4. The sampling strategy involved creating the sampling frame. The Kenya National Bureau of Statistics (KNBS) using the Kenya Population and Housing Census Survey database, developed the enumeration areas (EAs) for the sampling frame for this study. Prior to the promulgation of the current constitution in 2010, the country was administratively divided into provinces which were further divided into districts. Each district was divided into several divisions, and each division into locations; and locations into sub-locations. In addition to these administrative units, each sub-location was subdivided into census EAs i.e. small geographic units with clearly defined boundaries.

5. A total of 96,251 EAs were developed during the 2009 census cartographic mapping. Therefore, the primary sampling units for this survey were the EAs based on the 2009 Kenya Population and Housing Census. To prepare the sampling frame a listing process was undertaken in the selected EAs. This entailed household listing and structure numbering to get a complete list of all the households in each of the selected EAs.

6. The selection of the households was used by the KNBS. The selection of the EAs was done using the probability proportional to size sampling method using the total number of households in each EA as the measure of size. From each selected EA a uniform sample of 13 households was selected systematically, with a random start. The systematic random sampling method was adopted as it enables the distribution of the sample across the EA evenly and yields good estimates for the population parameters. The households were selected after the listing process was completed in each EA.

7. The selection of treated villages was based on the listing from IFAD. From a listing of all the villages that benefited from SHoMaP, commercial producer groups were systematically selected with a random start based on an interval of 5. The number of households to be interviewed in each village was then proportionately determined using the population of treated households in that village.

8. **Sample size.** The sample size was calculated using the following parameter values: alpha=0.05, beta=0.2, a minimum detectable effect of 0.20 for income variable (assumption based on the programme endline survey), an intra-cluster correlation value of 0.1 and adjusting for possible non-response (5 per cent), a sample size of **1,522 households** was to be obtained, with 697 in the treated group and 825 in the control group. The oversampling of the control group was in order to find the best quality matches possible for the treated group and to confront the issue of the control group sampling units dropping out due to lack of adequate matching.

Table 1
Sampling

County	*No. of commercial producer groups*	*No of treated farmers*	*No. of untreated farmers*	*Total no. of households*
Bungoma	34	220	251	471
Kisii	17	114	130	244
Nyandarua	21	135	154	289
Nandi	9	63	72	135
Kericho	7	40	46	86
Meru	13	88	101	189
Embu	6	40	46	86
Target	107	700	800	1 500
Achieved		697	825	1 522

9. Similarly, the selection of villages for the control group was determined by the agro-ecological zones in which the treated households belong. Only villages in high and medium potential zones and those that grew similar crops as the treated groups were selected. The control villages did not benefit from any of the SHoMaP interventions. The households were selected EAs within the same agro-ecological zone as treatment groups. The households were selected from the census sampling frame managed by KNBS. Based on the total number of non-treated households, the number of households interviewed for each selected village was proportionate to the number of treated households selected in final sample within the same district. The construction of both the treatment and control group took advantage of a national sample conducted by KNBS at the start of the programme in 2009. Data were collected on the same outcomes and characteristics (plus additional others) on treatment and control groups of households in 2017.

10. The quantitative part of the evaluation was complemented by a set of qualitative methods which provided an understanding of the causal mechanisms by which the intervention either achieved or failed to achieve its goals. Key informant interviews (KIIs) and focus group discussions (FGDs) were used as instruments for qualitative data collection. The KIIs elicited individual perspectives from input stockists and traders and transporters. A total of 48 KIIs were collected, distributed across all the 14 districts. They represented all categories of beneficiaries and most important key informants. A total of 17 FGDs elicited perspectives from retailers who sell their produce in markets constructed by SHoMaP, members of pilot initiatives and commercial villages, and from management committees (for bridges and markets). Table 2 shows the sub-questions and the tools used in this evaluation. Details of KIIs and FGDs are reported in table 3.

Table 2
Evaluation tools used for the impact evaluation

Sub-questions	*Quantitative tools*	*Purpose*
What was the impact of SHoMaP on incomes, agricultural productivity, assets and food security of beneficiary households?	Structured impact survey	Administered to all the sampled households for the collection of primary quantitative data.
- To what extent were commercial villages and pilot initiatives successful and why?	Focus Group Discussions	Conducted separately for women and men by project component and sub-component to triangulate with quantitative information.

- To what extent did SHoMAP caused changes in the social and economic conditions of women? - Which was the main perceptions of hot-spot improvements?		
- To what extent did the different categories of beneficiaries participate in the programme's implementation? - To what extent were pilot initiatives successful and why? - What is the current state of use of market infrastructure and what are the main reasons for this? - To what extent did SHoMaP cause changes in the distribution of agricultural inputs?	Key Informant Interviews	Conducted with different project partners to identify project successes and failures and with beneficiaries to triangulate with quantitative information.
What is the current state of market infrastructures and hot spot improvements?	Observations	Conducted by the IOE team to assess the status of market infrastructures and of hot spot improvements

Table 3
Details of KIIs and FGDs

Categories of KII	*Number*
PMU	3
Beneficiaries - stockists	10
Beneficiaries -committee members	3
Beneficiaries - representatives of PI	2
Beneficiaries - transporters	4
Beneficiaries - traders	5
Service providers	2
MoALFI at county level	15
County government	3
Categories of FGs	
Pilot initiatives	4
Commercial villages	5
Market management committees	2
Bridge committees	1
Retailers	4
Women	1

Table 4
Participants of key informant interviews

Position	*Category*	*Venue*
M&E	PMU	Nairobi
Sub-county agricultural officer	MoALFI / county government	Embu
Bridge committee chairman	Beneficiary	Embu
Stakeholder committee member	Beneficiary	Meru
Chairman market management committee	Beneficiary	Meru
Sub-county agricultural officer	MoALFI / county government	Meru
Former desk officer Imenti South	MoALFI / county government	Meru
Chairmen of county markets	County government	Meru
County director of agriculture	MoALFI / county government	Kericho
Director of trade department in Kericho	County government	Kericho
Agricultural officer	MoALFI / county government	Kericho
Sub-county agricultural officer	MoALFI / county government	Kericho
Shop owner / stockist	Beneficiary	Kericho
Deputy director of agriculture	MoALFI / county government	Kisii
Sub-county agricultural officer	MoALFI / county government	Kisii
Shop owner / stockist	Beneficiary	Kisii
Deputy director of agriculture	MoALFI / county government	Bungoma
Assistant director agriculture	MoALFI / county government	Bungoma
Assistant director Trade development	County government	Bungoma
Sub-county crop officer	MoALFI / county government	Bungoma
Agribusiness officer	MoALFI / county government	Imenti North (interviewed on the phone)
County deputy director	MoALFI / county government	Nandi
Secretary of the Kamobon women group	Beneficiary	Nandi
Assistant director of agriculture	MoALFI / county government	Kalao
Ward agricultural officer	MoALFI / county government	Kanjouri
Stockist	Beneficiary	Kinangop
Chairman of the road committee	Beneficiary	Wendi Muega
Secretary of Jersey SHG	Beneficiary	Nyandarua
Agribusiness and marketing officer	PMU	Nairobi
Ex programme accountant	PMU	Nairobi
Head business development Kibit	Service provider	Nairobi

Table 5
Participants of focus group discussions

Name of the group	*Group type*	*Place*
Kiagoro Star	Banana value addition group	Embu
Kibugu PMC	Market management committee	Embu
Kipkerieny hort. Community group	Tomato processing group	Kericho

Nyaburumbasi	Vegetable cleaning, sorting and marketing group	Kisii
Buyonge commercial village	Commercial village	Kisii
Indivisi farmers marketing federation	Commercial village	Bungoma
Hequendo Enterprise	Pilot initiative	Bungoma
Kaptumo market management commitee	Market management committee	Nandi
Kihoto bridget commitee	Stakeholder committee for bridge	Nyandarua
Kipospar	Commercial village	Nyandarua South
Not applicable	Retailers	Kisii
Webuye bananas	Commercial village	Bungoma
Not applicable	Retailers	Bungoma
Not applicable	Retailers	Bureti
Not applicable	Retailers	Nandi South
Nkathano women group	Women	Embu

Note: Not applicable refers to participants that were not part of a common group.

11. **Quantitative data analysis methods.** Data utilized in this study was collected during December 2017. About 20 research assistants were contracted to administer questionnaires to the selected households. A total of 1,522 questionnaires were administered to both control and treatment groups.

12. The impact evaluation relied on a propensity score matching method to estimate the impact of the programme activities on households' wellbeing. Propensity scores predicting the likelihood of receiving treatment were obtained for each household based on cross-sectional data collected in 2017. Selected pre-programme characteristics hypothesized to influence probability of treatment and relevant wellbeing and other outcomes of interest were used in a standard *probit*[1] model to calculate propensity scores for each participant and the control group. The nearest neighbour matching procedure (with replacement) was used. All covariates used to predict the likelihood of treatment were balanced between the treatment and control groups after weighting by the propensity score. The quality of matching was assessed using the standardized bias approach, which compared the bias before and after matching. The quality of matching helped to establish whether the distribution of variables was balanced in both the treatment and control groups.

13. The impact evaluation made use of with and without comparison analysis for estimating programme effects. The former involved comparing the values of outcome variables at the same post-programme time point, i.e. 2017 in this case, for both treatment and control groups.

14. The general specification of the matching model is given by

$$Di = f(Xi)$$

where Di is the dummy for household i's participation in SHoMaP and Xi is a vector of the associated covariates. Annex VII gives a listing of the covariates, and other variables, used in the study.

$$Di = f(age\ of\ household\ head, female\ headed, average\ age\ of\ household\ members, household\ size,$$

[1] A probit model (also called *probit regression*), is a way to perform regression for binary outcome variables. Binary outcome variables are dependent variables with only two possibilities (for e.g. yes/no or positive /negative). The probit model estimates the probability a value will fall into one of the two possible binary (i.e. unit) outcomes.

$$average\ age\ of\ adults, primary\ education, land\ used\ for\ agricultural\ purposes, land\ tenure\ system, land\ owned\ at\ baseline, total\ livestock\ owned\ in\ 2007, horticultural\ crops, staple\ food\ crops, fruit\ crops, tuber\ crops, crops\ promoted\ by\ SHoMaP)$$

15. Two assumptions must hold if propensity score matching is to work: first, Conditional Independence Assumption (CIA) and the second is the Common Support requirement (Caliendo & Kopeinnig, 2008). For CIA to hold, it is assumed that given set of observable covariates (X), which are not influenced by the treatment, the potential outcomes are independent of the treatment assignment. This means that participation is solely determined by the observable characteristics, the things SHoMaP wants to influence have no role in participation. The choice of independent variables (the covariates in the Di function above) satisfies this condition. The Xi vector is not influenced by participation in SHoMaP. The common support requirement on the other hand, ensures that households with similar X values belong in both participation and non-participation groups; otherwise the two groups cannot be expected to be statistically the same.

16. The region of common support in this study is found to lie within the minima (0) and the maxima (1) and all observations were on -support. In the next step, each participant *i* was paired with a group of comparable non-participants based on propensity scores. The nearest neighbor matching procedure (with replacement) was adopted. The quality of matching was assessed using the standardized bias approach, which compared the bias before and after matching. The quality of matching helps to establish whether the distribution of variables is balanced in both the treatment and control groups. In our case matching was successful. There is no standardized measure of success about this approach. The rule of thumb provides for 3-5 per cent reduction in bias is satisfactory (Caliendo & Kopeinnig, 2008).

17. The Average Treatment-effects on the Treated (ATT) was calculated as the mean of the specific outcome variable (z) for participants less the mean for the matched control household.

$$ATT = \frac{1}{n}\sum_{i=1}^{n}\left[Z_i^{i\epsilon T=1} - Z_i^{i\epsilon T=0}\right]$$

18. The treatment effects were estimated for the following outcome variables: Gross margin per acre, yields per ha, agricultural income, value of horticultural crops, household dietary diversity score (HDDS), household food insecurity access (HFIAS), transport costs, food consumption expenditure, member of household belonging to a group and asset index (Ballard, Coates, Swindale, & Deitchler, 2011; Coates, Swindale, & Bilinsky, 2007).

Variable descriptions

This annex presents descriptions of the variables used in the impact evaluation.

Table 1
Descriptions of the variables: dependent, covariate and outcome variables

	Name	*Label*	*Type and definition*	*Measurement*
		Dependent Variables		
1	treat	Treatment	Dummy variable representing SHoMaP participation	1 if participated on SHoMaP, 0 if non-SHoMaP participant
		Covariates		
1	AHH	Age of household head	Continuous, age of household head	Years
2	FHH	Female headed HH	Dummy, representing gender of head	1 if female, 0 if male
3	AAM	Average age of HH members	Continuous, average age of all household members	Years
4	HSZ	Household size	Continuous, number of members in the household	Number of members
5	AAA	Average age of adults in HH	Continuous, average age of adults (18 and above) in the household	Years
6	PEO	Primary education and above	Dummy, representing level of education of HH member	0 if no education, 1 otherwise
7	LAP	Land used for agricultural purposes	Continuous, land used for agricultural purposes	Acres
8	LTS	Land Tenure System	Dummy, land tenure system of the land owned	1 if freehold, 0 otherwise
9	LOB	Land owned at baseline	Continuous, land owned at baseline	Acres
10	LO7	Total livestock owned at baseline	Continuous, total number of livestock owned at baseline	Number of livestock
11	HRT	Horticultural crops	Dummy, if household cultivated horticultural crops	1 if household cultivated horticultural crops, 0 otherwise.
12	STP	Staple food crops	Dummy, if household cultivated staple food crops	1 if household cultivated staple food crops, 0 otherwise.
13	PCC	Permanent cash crops	Dummy, if household cultivated permanent cash crops	1 if household cultivated permanent cash crops, 0 otherwise.
14	FRT	Fruit crops	Dummy, if household cultivated fruit crops	1 if household cultivated fruit crops, 0 otherwise.
15	TBC	Tuber crops	Dummy, if household cultivated tuber crops	1 if household cultivated tuber crops, 0 otherwise.
16	ACC	Annual cash crops	Dummy, if household cultivated annual cash crops	1 if household cultivated annual cash crops, 0 otherwise.
17	CRP	Crop was promoted	Dummy, if crop was promoted by SHoMaP in the district	1 if crop was promoted by SHoMaP in the district, 0 otherwise

Definitions of selected indicators and variables

1. Gross margin per acre

$$GM_i = \frac{\frac{VS_i}{QS_i} x\,(TP_i - L_i) - (IC_i)}{CA_i} \qquad \text{[Eq. 1]}$$

Where:
GMi: Gross margin for crop i
VSi: value of sales for crop i
QSi: quantity sold for crop i
TPi: total production for crop i
Li: losses for crop i
ICi: Value of purchased cash input costs for crop i

In Eq. 1 production for self-consumption is implicitly priced as sold production.

2. **Agricultural income**

$$AI = \sum \left[\frac{VS_i}{QS_i} \, x \, (TP_i - L_i) - (IC_i + HL_i + IP_i) \right] - PL \quad \text{[Eq. 2]}$$

Where:
AI: Agricultural income
VSi: value of sales for crop i or livestock product i
QSi: quantity sold for crop I of livestock product i
TPi: total production for crop I of livestock i
Li: losses for crop i
ICi: Value of purchased cash input costs for crop I or livestock i
IPi: value of in-kind payment for unpaid labour for crop i
HLi: Money spent on causal hired labour for crop i
PL: paid wage for permanent labour

As in the case of the gross margin, production for self-consumption is implicitly priced as sold production.

3. **Transport costs.** It refers to the transport cost paid on average in a month by the respondent of the household questionnaire.

4. **Household Food Insecurity Assessment Scale (HFIAS).** The respondents were asked to consider whether any of the listed nine food insecurity related conditions had happened in the past 30 days. If the response was affirmative, the frequency for each was recorded. The options for the frequency was rarely (once or twice), sometimes (three to ten times) or often (more than ten times) over the past 30 days. A value was assigned for each response per condition (never = 0; rarely = 1; sometimes = 2 and often = 3). The HFIAS was calculated by summing the frequency for the nine food insecurity related conditions. The maximum possible score for a household is 27 (answered often for all nine conditions) and lowest possible score is zero (answered never for all nine conditions). Therefore the higher the score, the more food insecurity the household experienced (in terms of access to food).

5. **Household dietary diversity score (HDDS).** The respondents were asked to recall the foods that they, their spouse or anyone else in the household ate the day before. This data was used to construct HDDS as an indicator of the nutritional quality of the household's diet, using the food groupings described by Steyn et al. (2006), namely:

   - grains, roots and tubers
   - vitamin A rich fruit and vegetables
   - fruit other than vitamin A rich
   - vegetables other than vitamin A rich
   - meat, poultry and fish
   - eggs
   - legumes, nuts and seeds
   - dairy products
   - oils and fats

   The lowest possible HDDS therefore is zero and the highest possible HDDS is nine. Sugars and beverages were not considered when calculating the HDDS as these foods do not add to the nutritional quality of the diet. The respondents were also asked how many days during the past seven days the household ate foods from the various food groups. The main source where the foods were obtained was also recorded.

6. **Yield.** Crop yields were calculated as the number of kilograms grown per hectare of land for each crop.

Match balance statistics

1. This section presents the balance between treatment and control groups for each group analysis that was carried out.

Estimation of propensity scores and matching procedure

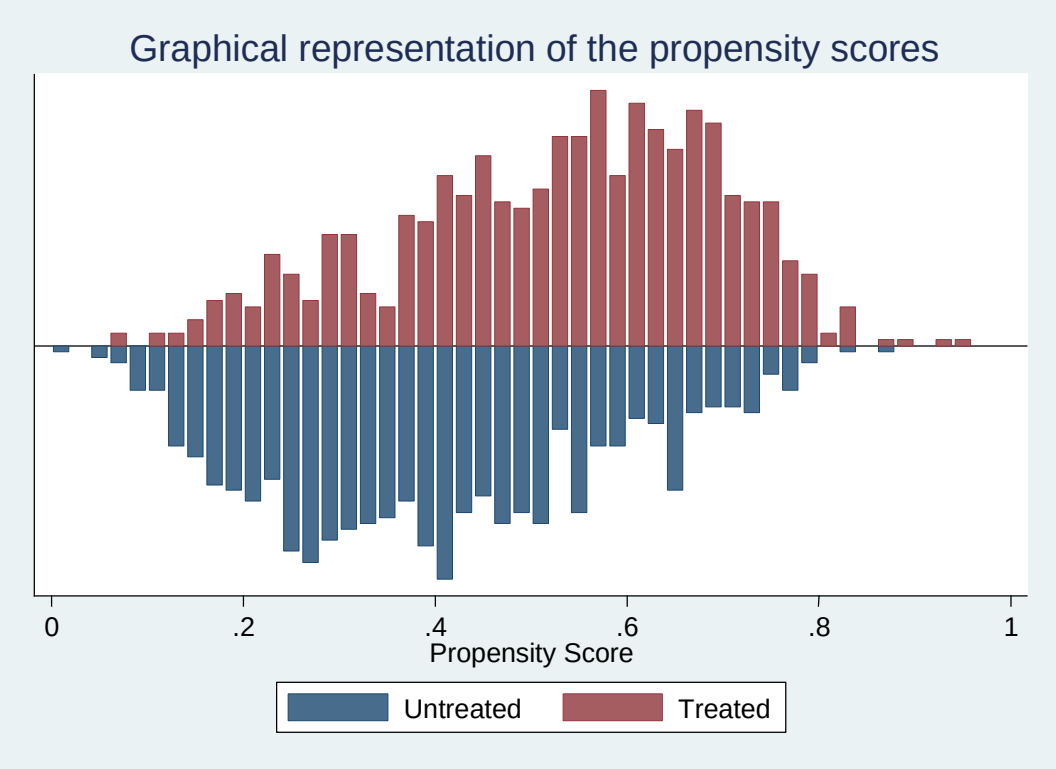
2. The propensity scores for treatment and control groups range between:

Treatment: 0.0744795 <= pscore <= 0.9437173
Control: 0.00002<= pscore <= 0.8694403

3. Invoking the common support (using the minima and maxima comparison condition) results in both treatment and control group being on common support. This means that the common support assumption is well satisfied.

4. The matching procedure was implemented using the psmatch2 command in STATA, as developed by Leuven and Sianesi (2003). After matching and testing for matching quality, the results indicate that there is a significant reduction in the mean bias, from 21.4 (before matching) to 2.2 (after matching), representing 89.7 per cent reduction. In addition, there is a significant reduction in the standard deviation and variance after matching. Based on these results, we conclude that the matching was successful.

Graph 1
Propensity scores for treated and control groups



Test of significance of the difference of means between SHoMaP and non-SHoMaP households

Variable	*Mean*			*t-test*	
	Treated	**Control**	**Average % absolute bias**	**t**	**p>|t|**
Age of household head	54.78	54.79	0	-0.0100	0.995
Female headed HH	0.207	0.219	-3.100	-0.560	0.574
Average age of HH members	32.37	32.76	-2.900	-0.520	0.605
Household size	5.301	5.182	5	0.880	0.381
Average age of adults in HH	43.40	43.60	-1.800	-0.330	0.743
Primary education and above	0.782	0.767	3.400	0.670	0.505
Land used for agricultural purposes	1.833	1.605	0	1.060	0.290
Land Tenure System of	0.756	0.754	0.400	0.0900	0.931
Land owned at baseline	2.532	2.326	0	0.760	0.446
Total Livestock owned at baseline	13.86	12.98	2.300	0.380	0.701
Horticultural crops	0.415	0.426	-2.400	-0.430	0.665
Staple food crops	0.779	0.767	3	0.550	0.583
permanent cash crops	0	0	.	.	.
Fruit crops	0.504	0.494	2.100	0.370	0.708
Tuber crops	0.396	0.417	-4.300	-0.800	0.426
Annual cash crops	0	0	.	.	.
Crop was promoted	0.782	0.790	-1.800	-0.370	0.715

Source: analysis by IOE impact evaluation team.

SHoMaP promoted crops and counties

	Bungoma East	*Bungoma North*	*Bungoma South*	*Bungoma West*	*Bureti*	*Embu*	*Gucha*	*Imenti North*	*Imenti South*	*Kisii Central*	*Meru Central*	*Nandi south*	*Nyandarua North*	*Nyandarua South*
Amaranth	✓	✓			✓		✓			✓				
Banana	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Cabbage				✓									✓	✓
Carrots													✓	✓
Chillies			✓											
Garden peas													✓	✓
Irish potato					✓			✓					✓	✓
Managu	✓	✓			✓		✓			✓				
Mango						✓			✓		✓			
Melon			✓											
Onion	✓	✓	✓	✓	✓									
Passion fruit		✓				✓			✓			✓	✓	
Pineapple					✓		✓			✓				
Saga	✓	✓			✓		✓			✓				
Sweet potato	✓			✓	✓			✓						
Tomato	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	

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The evaluation mission also met numerous beneficiaries of SHoMaP.

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