Proposal Title

Impact of innovative model of agricultural extension on agricultural performance and food security of households in Benin: a Randomized Control Trial approach

PIERI EVALUATION PROPOSAL

(Revised version)

Presented to

Partnership for Economic Policy (PEP)

By

Assogba HODONOU, ahod2@yahoo.com
(PhD. Researcher – Université de Liège,
Campus de Gembloux - ABT,
Unité d’Economie et Développement Rural, Belgique)
et
Centre d’Expertise en Evaluation du Développement (CEED), Bénin

&

Deo-Gracias HOUNDOLO
(PhD Researcher – International Institute of Social Studies)

Rahamatou HAMIDOU YACOUBOU
(Studies and Planning Unit - Ministry of Agriculture, Livestock and Fisheries)

Dislene SOSSOU
(African School of Economics)

Benin
29 June 2017
There are three main areas/dimensions to all PEP-supported projects: research, capacity building and policy engagement/impact. The PEP proposal template is structured around these three dimensions. Each section must be completed with due care and attention, as they are reviewed individually and concurrently to assess the overall quality of a proposal.

Please do not exceed the number of words limits. Failure to do so indicates unwillingness to abide with PEP rules and will penalize the overall project.

**SECTION I – RESEARCH**

1. **Introduction**

1.1. **Abstract (max. 250 words)**

The abstract should state the main research question, the context and its relevance in terms of policy issues/needs in relation to PAGE thematic focus, complete with a brief description of the data that will be used.

This study is a randomized control trial to evaluate the impact of the project titled “Project for Support to Food Production and Build Resilience in the departments of Alibori, Borgou, and Collines (PAPVIRE-ABC)” implemented by Benin Ministry of Agriculture, livestock and fisheries. Benin crop producers have faced low productivity problems due mainly to little use of climate smart high yield seeds of food crop like maize. They have also lacked fertilizers and pesticides adapted for food crop production. As a result, when drought and floods hit their production zone, their living conditions have been worsened because of loss of production; rural exodus and social conflicts over the use of land and transhumance corridors have been exacerbated. PAPVIRE-ABC is designed to help solve these problems in order to improve productivity and food and nutrition security, as well as to help reduce poverty in the project impact area by applying an innovative model of agricultural extension.

Our research’s main objective is to evaluate the impact of this innovative model of agricultural extension as implemented by PAPVIRE, on productivity and food security of households in Benin. From a policy perspective, findings from this research will assist policymakers reshape rural development policy, projects and programs to improve living conditions of the most vulnerable segments of the population.
1.2. Evaluated Intervention and Context (max. 500 words)

Briefly describe the context in which the program takes place. E.g., for a job training program, describe current supply and demand for jobs, how these compare to other places and other periods; major market frictions and issues facing employers/job seekers; alternative and previous programs. Then describe extensively the program that you intend to evaluate. What are the objectives of the program? What are the program benefits? What are the program eligibility rules? Who is in charge of implementing the program or delivering the benefits? Who is in charge of funding? How are benefits delivered? Indicate whether the intervention/programme has already started, whether in pilot or at scale and give a brief and a timeline for the roll-out of the interventions.

Benin have faced low productivity in agriculture for decades, mainly in food production. For example, agronomic research shows that maize yield could reach seven tons per hectare, but in reality, we barely get 1.4 ton/ha (Hodonou, A, 2014; MAEP, 2014; MAEP, 2015). Also, maize varieties used in Benin are most of the time not climate smart as the production cycle may last more than 105 days. As a result, maize may not come to the end of its production cycle before drought or flood hits. Therefore, loss of production due to non-resilient variety of maize will have a negative impact on household income. Other problems faced by food producers in Benin are lack of credit to purchase high yield food crop seeds, access to market not well organized; as a result of that, it is difficult to come up with a sustainable mechanism of agricultural credit. The other crucial problems are lack of training for use of climate smart technologies in agriculture, farm management in context of climate change. Their consequences on productivity and food security are well-known.

The project that we intend to evaluate, “Project to Support Food Production and Build Resilience in departments of Alibori, Borgou, and Collines (PAPVIRE-ABC)” is designed to help come up with solution to these problems. In general, the Republic of Benin used to be a non-critical food and nutrition security situation country. In fact, the global hunger index at Benin level showed that a big effort has been made in that more than 50% reduction have been observed in the value of this index between 1990 and 2014. However, due to severe climatic hazards which cause drought and floods with serious consequences since 2010, some parts of the country have reached an alarming level of food and nutrition security. The three Departments of Alibori, Borgou and Collines, being supported by the project, are the most stricken (CFSVA, 2014). As a result, household income was affected, and precarious living conditions have increased, rural exodus and social conflicts over the use of land and transhumance corridors have been exacerbated.

It will be implemented by a coordination team recruited on a skills and competency-based procedure, with technical support from the African Development Bank and financial support from the Global Agriculture and Food Security Program (GAFSP) administered by the World Bank. The project impact zone is constituted of nine communes that are seen to be fragile and disadvantaged as regard their economy, social and environmental conditions, probably because of an under-exploitation of their agricultural potentials (58,000 hectares).

According to the project documentation, “The overall goal of PAPVIRE-ABC is to help improve food and nutrition security, as well as to help reduce poverty. The specific project objective is to boost food production in the three administrative departments of Alibori, Borgou and Collines in a sustainable manner by improving productivity, building resilience to climate change, ensuring sustainable management of agriculture and natural resources, reducing gender inequalities, and increasing household incomes, particularly the income of the most vulnerable segments of the population in the
The project will be implemented over a five-year period, and comprises three components: (i) Support for rural infrastructures; (ii) Development of Agriculture Value Chains and Resilience; and (iii) Project Management. The second component “Development of Agriculture Value Chains and Resilience” is the main goal of this experimental study. This component aims to increase agricultural productivity, engender more added value, stimulate entrepreneurship among youth and women, alleviate food and nutrition insecurity, and reinforce the household resilience. It will mainly focus on the following activities: (a) improve farm productivity and technological innovations; (b) build stakeholder capacity; (c) develop agricultural value chains; (d) promote youths and women agricultural entrepreneurship and employability; and (e) support nutrition-oriented activities.

The project will directly benefit 50,000 people (40% of them will be women), including 25,445 smallholder farmers who will receive support to cultivate corn, rice and vegetables. On average, each smallholder farmer will get support for 1.5 hectares for corn, 0.5 hectare for rice, and 0.25 hectare for vegetables through an innovative model of agricultural extension.

1.3. Research gap (max. 400 words)

Clearly lay out the research questions that you aim to address with the RCT methodology. Explain whether the program has been evaluated before and if your research question has been addressed before in similar contexts or using different techniques (cite key references, i.e., references offering literature reviews on similar research questions as well as references to previous evaluations of the same program or of similar programs in other contexts). Explain how your evaluation will contribute to closing any remaining knowledge gap and what you wish to achieve by investigating your research question.

This study uses the randomized controlled trials (RCT) methodology to address the impact of innovative model of agricultural advisory on agricultural performance and food security of households in Benin. In other words, the research question we are going to tackle is stated as follow:

To what extent could the issues of agricultural performance and food insecurity be solved among maize producers through the implementation of the innovative model of agricultural extension in the vulnerable area of Alibori, Borgou and Collines?

More specifically, this research project is designed to assess the extent to which participation of maize producers in an innovative model of agricultural extension as developed and implemented by the PAPVIRE ABC project, could:

a) affect food production;

b) improve income of farmers, including women and young farmers;

c) reduce gender gap in access to production factors;

d) impact agricultural value addition;

e) change food and nutrition security pattern.

In general, it is well-known that agriculture plays an important role in the economic growth and industrialization of low-income countries, and potentially have impacts on poverty reduction, food security, environmental sustainability, and community development (World Bank, 2007). In particular, agricultural extension is crucial in achieving agricultural development, poverty reduction, and food security (Swanson, Bentz, and Sofranko 1997;
Dercon et al. 2009; Davis 2008; Swanson and Rajalahti 2010; Feder, Birner, and Anderson 2011). It seeks to solve some inefficiencies such as limited access to credit, low capacity to pay for extension services, through training and provision of technology to beneficiaries (Cerdán-Infantes P. et al; 2008) in order to show its whole potential in improving farmers’ livelihood. In fact, Dercon et al. (2009) had proven using data from Ethiopia that receiving at least one extension visit per year could result in reducing the likelihood of being poor by 10 percent. Extension services help farmers control their productivity and give them confidence in increasing the quantity of food produced. This could help the country as a whole increase the availability of food and consequently help reduce the food price, and thereby improve food security as it is explained by food prices and physical food availability (Margaret A., 2000). As far as revenue is concerned, Cawley et al (2015) found that there is a positive impact of extension engagement on farm income. This would mean that increasing advisory activity will improve sector’s performance significantly.

The gender equity dimension of agricultural extension is an aspect that is widely addressed in the literature (Catherine R., 2012). Swanson, Farmer, and Bahal 1990; World Bank and IFPRI 2010; and Ragasa 2012, showed in their studies that, access to extension services is lower for women as compared with men.

In the literature, different approaches have been used to evaluate the impact of agricultural extension services. Achakzai J. (2013) used the Randomized Controlled Trials (RCT) approach to evaluate the impact of agriculture extension on agricultural productivity and farmer’s income through the use of fertilizers in Baluchistan (Pakistan). Pedro Cerdán-Infantes et al. (2008) used a combination of fixed effects and different matching methods to evaluate the impact of agricultural extension on yield and grape quality in Argentina. Cawley et al (2015) used an instrumental approach to evaluate the impact of extension services on farm level outcomes. Robert E. et al (1998) used a quantile regression technique to find that productivity effect of agricultural extension is highest at the extreme ends of distribution of yield residuals.

In Benin context, rigorous impact evaluations of public investments of the size of the PAPVIRE-ABC are rare. The only known recent example is that of the land project of MCA Benin, first compact, led by the World Bank. Our study will use the RCT methodology to address its research questions. A recent review of the World Bank’s interventions impact studies in agriculture has shown that, based on 200 selected studies, hardly 83 met the criteria for being considered a serious impact assessment (IEG, 2011). However, the agricultural value chain approach which will be the basis of the implementing approach is not new in the impact evaluation literature (Bammann H., 2007; and Bolwig et al, 2008).

1.4. Theory of Change (max. 400 words)

Impact evaluations take root in a program’s theory of change (see manual link here). Outline how the evaluated intervention will achieve the intended results. Describe the causal logic (the chain of events) of how and why the program or policy will reach its intended outcomes. What are the main barriers that could lead the program fails to achieve its objectives?
The overall goal of PAPVIRE-ABC is to help improve agricultural production, food and nutrition security and reduce poverty in Alibori, Borgou and Collines Departments. Moreover it plans to do so in a sustainable way by using resilient technologies. In order to achieve those objectives, the project plans a package of activities including extension advisory, easy access to improved maize seeds, easy access to bio-fertilizers and pesticides to support maize, rice and vegetable producers. This study focuses on maize producers as it is the first and most common staple in the country and it plays an essential role with respect to food security.

If the project achieves its objectives, there would be an improvement in maize productivity, farmers’ capacities to resilience to climate change will increase, a reduction in gender inequalities in agriculture, and an increase in household incomes in the project impact area.

In that respect, the project plans short terms and long terms interventions. This include activities with immediate effects such as providing means to develop agricultural value chains and resilience through access to improved and high productive technologies (dissemination and counselling on the use of resilient technologies, facilitation for access to and use of certified improved seeds, agricultural inputs (fertilizers and pesticides) of good quality, agricultural mechanization); stakeholders capacity building (support for farm organizations (FO), support for registration and compliance of Farmer’s Organizations with the OHADA Uniform Act, etc.); construction of storage and marketing facilities, provision of post-harvest equipment, improvement of market access; nutrition support (sensitization campaigns on food sanitation, capacity building for public administration structure at regional level to set up a sanitary inspection surveillance plan according to international food sanitary inspection standards, etc.); to mention but a few. Considering activities with long term effects there are essentially related to rural infrastructures (irrigation, land development and construction of agricultural feeder roads) that the project will build.

However for the above perspective which captures the project’s theory of change to hold, they are a few assumptions that must be verified. In that respect, production of maize for instance is rain-fed and therefore, any shortage of rainfall could stress the causal even if farmers use appropriate improved seeds, fertilizers and pesticide. Also, in the project causal chain, farmers will get access to knowledge about how to use pesticide, fertilizers and eventually participate in “Lab farm activities”. This approach is supposed to help them improve their productivities. However, unless concerned farmers participate regularly in those activities and are not shy in asking questions and taking an active part in the activities, they might not apply the technology properly and eventually fail to have an increase in their productivity as expected. One other critical assumption in the project theory of change is about food and nutrition security. It is not clear how the project nutrition support activities would affect food security at household level. In that respect, one thing is to provide nutrition and food security training and knowledge to households but it takes quite some efforts to have them change their behaviour. For instance, training advice with respect to water, sanitation and hygiene may not be implemented if households do not have availability and access to clean water; also households would not be able to diversify their food composition if there is limited availability of food types in all seasons in their areas. Those are few key assumptions that needs to be accounted for in the project theory of change.
and during the design of the impact evaluation survey instruments in particular.

1.5. **RCT Methodology (max. 400 words)**

Describe the randomization process that you intend to implement to assign units to the treatment and control groups. Very often, randomization will only occur in a limited geographical location because of implementation or political constraints. How large is the geographical location that you will use to conduct the RCT? How many villages/districts? What is the size of these primary units? How large is the population (number of villages/districts, number of individuals/households)? Justify based on available (census or administrative) data. Often enough, randomization happens at an aggregate level (we then talk of cluster randomization). Clearly state:

- unit of analysis (household, individual)
- randomization level (village, district),
- if you plan to stratify and with respect to which factors,
- any other particularities or innovations of your randomization process.

This study uses a randomized control trial to evaluate the effect of an “innovative model of agricultural extension” on agricultural performance and food security of farmers’ households.

The **randomization scheme.** The randomization is implemented in two steps. First of all, all participants are provided with improved maize seeds. However, the duration of the vegetation cycle varies as a function of climatic hazards risk aversion of each village. By doing so, we account for equity and ethical problems that researchers use to face when it’s come to impact evaluation in the social science, and government implemented projects. Secondly, training on farm management, intensity of maize specific extension advice (either intensive or loose advisory), and access to fertilizers and pesticides are randomized in 60 villages (30 treated and 30 control) chosen among those selected to benefit from the project in the first round, which coincides with the first rainy season in the project implementation phase.

The **treatment.** In reference to the randomization scheme as described above, the treatment is “innovative model of agricultural extension”, as it is a package of improved seeds, fertilizers, pesticides, technical advisory and farm management training.

The **study area** is composed of the nine communes who are the project communes. Farmers of this area use to produce food crops like maize, rice, vegetables, as well as cash crops such as cotton, mangoes, and cashew. They also raise cattle. Farmers are settlers, but cattle raisers are more nomadic than crop producers. This area also used to receive the non-planned visit of transhumant from Mali, Niger and Nigeria once a year. In terms of administrative organization, the study area comprises 67 sub-districts and 345 villages, 175,178 households with an average size of 7.9, and 114,505 farm households (in reference to Benin National census in 2013), that is an average farm households of 332 per village.

The project has already produced the list of farmers by crops (maize, rice and vegetables). We will focus on the sub-population of maize producers which is distributed into 87 villages for the first round. More details are presented and used, with respect to the statistics of the maize producers, in the power calculation section of this proposal.
The study unit will be households of maize producers involved in the project. Though, the assignment will be at village level.

Threats to internal validity. Ideally maize farmers would be randomly assigned to the treatment. However, considering the nature of the interventions (information notably) it is necessary to have a design that limit very much any risk of contamination. That is why we randomize at village level. Usually, researchers face two type of contamination. The first one occurs when farmers in the control group get benefices from the project. The second one could happen if farmers of the treatment group share knowledge with other peers in the control group. However, the probability of this to happen with PAPVIRE ABC is very small in that the beneficiaries will not receive only training, or only seeds, or only advice, etc. It is planned that they receive a complete package including all these. Nevertheless and despite the low risk, the randomization will be at village level while unit of observation will be at household level to safe guard against such risks.

2. Data requirements

This is a critical part of the proposal. The key objective is to show your ability to collect sufficient data to detect an impact.

2.1. Outcome variables (max. 200 words)

Briefly describe your primary outcome variable and two secondary outcomes that you plan to measure. Mention for which outcome power calculations will be conducted.

For each outcome:
- describe the corresponding variable and its unit of measure,
- state its nature (continuous, binary, multinomial, ordered, etc.)
- describe the data source for each outcome (self-reported survey or census data, observational measure by enumerators, institutional records such as bank records or tax records, administrative data, etc.)

The main outcome variable is maize productivity, and maize production and food security are secondary outcomes. A questionnaire survey will be used to collect data on production and food security. As for maize productivity, the team will set a few squared plots (25m²) in maize farms and harvest actual production, weigh the production and run necessary conjecture to estimate the productivity for each farm land. Maize productivity will be measured at plot level and expressed as the average quantity of maize produced on one hectare of farm land, in kg/ha. It is a continuous variable that will be collected by the research team in research plots set up by the study team in participants’ maize farms. The system we plan to use is called in French “Méthode de carré de rendement” which can be translated as “productivity square”).

Maize production will be measured at household level as a continuous variable measured in Kg (kilograms) using self-reported survey approach. In that respect, participants will be asked the number of bags or bowls of maize they harvest during the production season. An actual weighing of the local measurements tools (bags and bowls) will be done and later on the team will make necessary conversion of the production from local units into kilograms.

Food insecurity will be measured using self-reported household survey data to determine the prevalence of food insecurity in percentage, in the study population.
2.2. Sample size (max. 400 words)

Provide an approximate value and discuss the following factors that will determine the sample size required for your evaluation:

- expected baseline levels for the outcome variables,
- expected effect size of the program or intervention for each outcome,
- if relevant, expected take-up rates,
- if relevant, expected attrition in the treatment and control group
- number of units used for the evaluation (sample size)
- if different from the unit of analysis, number of randomized units
- if relevant, expected correlation of units within a randomized cluster with respect to the outcome variables.

Following the PEP Conference in Nairobi (June 2017), the research team managed to get access to the National Monitoring and Evaluation database on maize production which is managed by the Ministry of Agriculture and disaggregated at individual farm level and presents details such as farm location (Department, Commune, Arrondissement, Village and Name of the farmer), farm land area owned, productivity, production, sex, etc. The data received from the Direction of Planning and Prospective was for the production season 2014 – 2015. We use that as baseline data to inform our sample size determination. In reference to maize productivity as our main outcome variable, it is used to determine the sample size required for the study.

In that respect, the expected baseline level of maize productivity in our study area (All 9 communes of Alibori, Borgou and Collines departments) is 2299.02 Kg/ha with a standard deviation estimated at 1524.07 Kg. Following our discussions with PAPVIRE ABC staff, the implementation team expects an effect size of at least 40%, which is equivalent to 919.64 Kg in the beneficiary farms.

We expect take-up to be as high as 90% in the worst case scenario. That optimism is based on past experiences with farmers when they are invited to receive Government or NGO support to improve their production, and moreover considering the nature of the intervention (support to maize production) and the discussion we had with the project implementation team.

Considering that, the study will run over just two agricultural seasons in rural areas, knowing that farmers in general come back to farm even when they migrate during lean season, and taking into account past experiences in conducting panel data surveys in rural Benin, the team considers that attrition would be at most 5% of initial sample size.

In our study design, unit of assignment (village) is different from units of measurement (farmers) and therefore we account for intra-cluster correlation in the sample size determination. Using a conservative approach, we account for an intra-cluster correlation of 15% among farmers in reference to their villages.

Following recent discussions with the project implementation staff, and taking into account the implementation challenges and environment, 60 “maize-villages” will be considered for the randomization. It is worth indicating that in each village around 15 farmers will participate into the project. Hence we have 60 clusters of 15 unit of observation each.

In reference to the parameters above, we use Optimal Design Plus Empirical Evidence Version 3.1 cluster randomized trial with person level outcomes with treatment at level 2, to determine the sample size required to have 80% power at 5% significance level. It appears that 7 farmers per village would be enough to detect the effect size expected if it exists. Considering all 15 farmers participants in each one of the 60 villages, the study design is very well powered, as the power increases up 91%.

2.3. Power Calculations (max. 400 words)
Use the information above to compute power calculations for your evaluation. Explain how many units you will use to estimate the impact of the program. In order to conduct proper power calculations please consult Duflo et al. (2007), 3ie manual (2016) and List et al. (2010).

On the basis of our secondary data (from the study area) analysis, the average maize productivity is 2299 Kg in the absence of the intervention. The project, PAPVIRE ABC, expects to increase that productivity by 40% through its intervention.

Considering 60 villages that are assigned to treatment and control groups, 15 farmers per village, and an intra-cluster correlation of 15%, a power of 80% and a significance level of 5%, we require 7 farmers to detect if the intervention has an effect, if such an effect exists. Knowing that there are 15 farmers (two times more than required) in each village, the study design is very well powered even after accounting for possible attrition and a low take up. Hence we are very confident to detect an impact if in reality such an effect exists.

2.4. Baseline (max. 50 words)

Do you plan to collect baseline data yourself? Yes No

If not, explain why. Remember that baseline data correspond to information collected before any experimental unit is treated, i.e. before the start of the intervention for your study sample.

The implementing agency has commissioned a project baseline survey before even the impact evaluation study was designed. Following coordination meetings, our team discussed with them and they agreed to incorporate the impact evaluation survey instrument in their overall survey material with respect to baseline data collection. In that respect, the impact evaluation team leader is now officially connected with PAPVIR-ABC baseline survey team to ensure that the impact evaluation baseline data is collected.

Following recommendations from PEP Conference in Nairobi, June 2017, our team sought actively for secondary data sources and we got access to two database. One is the Monitoring and Evaluation database (agricultural season 2014-2015) on maize which is maintained by the Ministry of Agriculture and the second from PAPVIRE ABC on maize (agricultural season 2016-2017) in our study area that we have not explored fully yet. We plan to explore and analyse the PAPVIRE ABC database in order to get insight of our baseline characteristics.

2.5. First follow-up (max. 50 words)

How long after the treatment starts are you planning to collect the first follow-up data? Describe the data collection technique for the treatment and the control group (self assessment through a survey, observational measure by enumerators, institutional records such as bank records or tax records, etc.)

The first follow-up data will be collected at the end of the agricultural season, around November /
December. Note that the intervention evaluated has activities that take place at different stages of the production cycle and therefore it will be implemented throughout the agricultural season. The study timeline presents more details about our data collection timeline.

2.6. **Second follow-up**

Do you plan to conduct a second follow-up?  
Yes ☐  No ☐

The second follow-up data will be collected at the end of the agricultural season, around November / December 2018 using the same pattern like in the first follow-up. As indicated earlier, the study timeline presents more details about our data collection timeline.
SECTION II – CAPACITY BUILDING

1. List of team members

Fill the required information for all team members starting with team leader. Note that PEP favours gender-balanced teams, composed of one senior (or experienced) researcher supervising a group of junior researchers, including at least 50% female researchers, all contributing substantively to the research project. (Each listed member must post an up-to-date CV in their profile on the PEP website – refer to “How to submit a proposal”).

<table>
<thead>
<tr>
<th>Full name</th>
<th>Age</th>
<th>Sex (M,F)</th>
<th>Highest education level &amp; country</th>
<th>Field of expertise</th>
<th>Affiliations (working institution)</th>
<th>Nationalities (all nationalities)</th>
<th>Main country of residence</th>
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<tbody>
<tr>
<td>Assogba HODONOU</td>
<td>55</td>
<td>M</td>
<td>PhD Researcher</td>
<td>Economics; Impact evaluation; Statistics; Micro-econometrics; M&amp;E.</td>
<td>Centre d’Expertise en Evaluation du Developpement (CEED) Institut National des Recherches Agricoles du Benin (INRAB)</td>
<td>Benin</td>
<td>Benin</td>
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<tr>
<td>Rahamatou YACOUBOU</td>
<td>37</td>
<td>F</td>
<td>MSc.</td>
<td>Agricultural Policy; Agri-business and Access to market; Management of Natural Resources including water and soil for agricultural development; Food production in urban and semi-urban areas</td>
<td>Ministry of Agriculture Livestock and Fisheries-Benin</td>
<td>Benin</td>
<td>Benin</td>
</tr>
<tr>
<td>Déo-Gracias</td>
<td>36</td>
<td>M</td>
<td>PhD</td>
<td>Impact Evaluation Design and</td>
<td>International Institute</td>
<td>Benin</td>
<td>Benin</td>
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<tr>
<td>HOUNDOLO</td>
<td>Researcher</td>
<td>Management; Impact estimation using quantitative methods; Poverty dynamic analysis; Micro-credit and Management of Natural Resources including agricultural land and water and Economics; survey design and primary data collection.</td>
<td>of Social Studies</td>
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| Dislène SOSSOU | 23 | F | MSc | Econometrics; Survey database management. | African School of Economics | Benin | Benin |
2. **Expected capacity building**

Describe the research capacities that team members (and potentially their affiliated institutions) are expected to build through their participation in this project.

This is an important aspect in the evaluation of proposals and should be presented with detail. What techniques, literature, theories, tools, etc. will the team and their institutions learn (acquire in practice) or deepen their knowledge of? How will these skills help team members in their career development? What is the current state of knowledge of each team members in regard to the project you are proposing?

<table>
<thead>
<tr>
<th>Name</th>
<th>Benchmark and expected capacity building</th>
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| Assogba HODONOU            | 1- As a professional Statistician-Economist, I have a good command of data analysis methods. But this study has the particularity to be an experiment and it will allow me to improve my Stata skills with respect to advanced impact evaluation data analysis capacities.  
2- I have not used theory based to inform data analysis before and this study is a great opportunity to build my capacity in that respect.  
3- I expect with this research to build my understanding and knowledge of the literature on RCT in agricultural intervention and poverty considering that in the past I have a publication on household poverty from a general perspective. |
| Rahamatou YACOUBOU        | 1- I have a substantial know-how in agricultural development that is useful to develop theory of change. But I have not yet used a theory-based approach to lead a research which is a capacity I will build with this study.  
2- Considering my work as a Government staff at the Department of Planning, I often try my best to use evidence to inform policy design but I have never been in a process to develop a policy engagement plan and disseminate research finding. I expect to learn from that process in this study, build my capacity and moreover apply whatever I learn to make my work more effective at the Ministry for evidence informed policy.  
3- I have a basic knowledge in applied econometrics. This study will definitely contribute to build my capacity in econometrics and interpretation of impact estimates in reference to programme theory of change. |
| Déo-Gracias HOUNDOLO      | 1- Considering the technical capacities I have in impact evaluation designs, I expect this study to give me hands-on capacities in doing by managing an impact evaluation research  
2- Even though I have developed a few times survey instruments namely questions, I expect this study to help building my capacity in developing a programme theory of change and use it to develop survey questionnaire and do in practice a theory based analysis of
3- Though I have some exposure to work with policymakers, this study is a unique opportunity to engage with policy makers, programme managers and beneficiaries to design a research. Moreover the study will build my capacities in writing research results in a plain language, friendly to decision-makers in order to increase uptake and ensure research results inform policy decisions in this particular context.

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<tr>
<th>Name</th>
<th>Task and contribution to the project</th>
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<tr>
<td>Dislène SOSSOU</td>
<td>1- I bring to the team my capacity in econometrics and data analysis technical skills. However considering that I have very limited experience in applying my skills to primary research, this study would help me building my capacities in analysing primary data with all the challenges that come with.</td>
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<td>2- During my academic training, I was introduced to RCT but I never had the opportunity to conduct one, and I still have a few areas of fuzzy understanding of the design. This study will contribute to build my capacity in carrying out a randomization,</td>
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<td></td>
<td>3- Finally the study will also give me the opportunity to work on sample size determination for appropriate effect size and do some practice.</td>
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Add comments and describe institutional capacity building if applicable.

This project is designed and implemented by the Ministry of Agriculture for the Government of Benin. The Government with the support of the African Development Bank is considering this project as a pilot project to improve agricultural extension policy.

In that respect, other than outcome and process evaluation, the project management is very much open to conduct an impact evaluation that can produce rigorous results to inform scaling-up of the program, and make specific, measurable, achievable, realistic and time-bound policy recommendations. This is a way for the evaluation to build operational capacities of the project.

One key institutional capacity that the study will build is the perspective to run a technical inception workshop for M&E staff of the Ministry with respect to impact evaluation methods, development of theory of change and how impact evaluation can support effective project development and choice of policy from a Government perspective.

Indicate which specific tasks each team member would carry out in executing the project.

<table>
<thead>
<tr>
<th>Name</th>
<th>Task and contribution to the project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assogba HODONOU</td>
<td>✓ Finalisation of proposal: Validation of evaluation question, theory of change and details around implementation of randomization</td>
</tr>
<tr>
<td></td>
<td>✓ Development of Survey instrument</td>
</tr>
</tbody>
</table>
3. **List of past, current or pending projects in related areas involving team members**

Name of funding institution, title of project, list of team members involved. This includes funding from other sources for the current project and for projects related to the current project.

<table>
<thead>
<tr>
<th>Name of funding institution</th>
<th>Title of project</th>
<th>Team members involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-contracting with Mr. Moustapha Djima</td>
<td>The impact of education on women and youth participation to job market</td>
<td>Assogba HODONOU</td>
</tr>
</tbody>
</table>
### SECTION III – POLICY ENGAGEMENT

#### 1. Policy context and needs

<table>
<thead>
<tr>
<th>Organization / Institution / University</th>
<th>Description</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Institute of Social Studies (Erasmus University _ Rotterdam)</td>
<td>Evaluation d’Impact du Programme du Millénaire pour le Développement sur la pauvreté au Ghana (On-going - PhD Research)</td>
<td>Deo-Gracias Houndolo</td>
</tr>
<tr>
<td>Coopération Universitaire Belge au Développement</td>
<td>Agriculture urbaine et péri-urbaine : Cas de la ville de Cotonou au Bénin (2015)</td>
<td>Yacoubou H. Rahamatou</td>
</tr>
<tr>
<td>Waterloo Foundation - UK</td>
<td>Market access for parboiled rice produced by rural women in the district of Glazoué in Benin.</td>
<td>Yacoubou H. Rahamatou</td>
</tr>
<tr>
<td>Bourse de recherche - Faculte des Sciences Économiques et de Gestion</td>
<td>Analyse des déterminants de la production du coton au Nord-Benin de 1989 à 2012</td>
<td>Sossou Dislène</td>
</tr>
<tr>
<td>Banque Mondiale</td>
<td>Analyse préliminaire de l’impact de la microfinance sur la pauvreté au Bénin</td>
<td>Sossou Dislène</td>
</tr>
</tbody>
</table>
Describe the specific policy issues or needs that your research aims to address; how your potential outcomes and findings may be used in policy making? Please be as precise as possible, indicating specific current or prospective policies and the specific contributions your research would make.

Also, justify timing of your research in terms of policy and socioeconomic needs and context – e.g. reference to existing, planned or potential policies at the national, regional or local level; specific political context; international examples of similar policy problem or solution, etc.

The study seeks to address the impact of an innovative model of agricultural extension on productivity, income, and food security at farm household level. It will focus on maize as it is the most cultivated crop among smallholders.

The agricultural sector is characterized by a large proportion of family farms. Most farmers have very little use of improved inputs (fertilizers and pesticides) and are engaged in agricultural practices that increase degradation of natural resources. This situation of the family farms is exacerbated by their vulnerability to climate variability (drought or flood) and other shocks. Since 2009 and 2010, there are extreme weather conditions which lead to floods. Those of 2010 caused damage approximately estimated to 200 million euros. As consequence, food insecurity is linked to unevenly distributed food supplies in the country in a context of recurring rising prices of staple foods.

In general, the situation of malnutrition in Benin remains worrying and is acute in both rural and urban areas. For example, the results of the Global Analysis of Food Security and Vulnerability (AGVSA) conducted in 2013 by the Benin Government with the support of the World Food Program (WFP) indicate that at national level 1.1 million people are food insecure. Food insecurity is more pronounced in rural areas (15%) than in urban areas (8%). The same applies to the risk of food insecurity affecting 43% of the rural population and 25% in urban areas, a total of 34% of the population at the national level (AGVSA, 2013). Moreover, the demographic growth of 3% on average, one of the highest in west Africa, is not good at all to allow economic performance gained from public policies put in place to have the desired impacts.

In view of these problems, Benin has put in place an initiative to strengthen the resilience of households to climate change, to ensure food security of population in areas called red areas of food insecurity and malnutrition (areas at risk) in Alibori, Borgou and Collines (north and Center parts of Benin) using an innovative model of agricultural extension. The extension model as planned by the project is innovative in that it is a package of many thing that can have positive impact on our indicators of interest.

In the past, Benin had experimented several agricultural extension strategies. The most common is the Training and Visit scheme, which aimed to reinforce smallholder farmers’ capacity of adopting technologies. In this scheme, extension workers did not care about the other factors of success. For example, farmers need money to get improved seed, fertilizers, pesticides etc. in order to assure a minimum conditions of success in the adoption pathway. But training and visits programs failed to provide necessary supports to farmers to get these other production factors. As a result, new technology adoption rate is very low. The same applies to fertilizer use, and other agricultural
practices aiming at preserving loss of soil fertility.

The innovative modality of agriculture extension project, which will be implemented for 5 years, will supply stallholder farmers with improved seed, fertilizers, pesticides, training and visit, monitoring and advisory support, and farm management.

This study will provide evidence of its accuracy and relevance in solving low productivity problem, as well as food insecurity, gender gap in access to production factors specific to maize.

The study results will come out at the project mid-term evaluation stage, and therefore can help policymakers resize the intervention accordingly.

1.1. **Consultations to date**

List all (past) consultations with potential research users (e.g. policy makers or stakeholders) that have helped define your research question, and/or informed you of the specific policy context described above. Include a list of names, institutions and email addresses (add rows when needed).

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOUNDONOUGBO Martin</td>
<td>National Coordinator of PPAVIR</td>
<td>Ministry of Agriculture</td>
<td><a href="mailto:marhound2006@yahoo.fr">marhound2006@yahoo.fr</a></td>
</tr>
<tr>
<td>Patrice Y. Adegbola, PhD</td>
<td>Director General</td>
<td>Benin National Institute of Agricultural Research</td>
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</tr>
<tr>
<td>Dossa Aguemon, PhD</td>
<td>Deputy Director</td>
<td>Agricultural Policy Analysis Programme</td>
<td><a href="mailto:dossaguemon@gmail.com">dossaguemon@gmail.com</a></td>
</tr>
<tr>
<td>Justin EDAH</td>
<td>Manager</td>
<td>Prospects analysis Unit</td>
<td><a href="mailto:justinedah@gmail.com">justinedah@gmail.com</a></td>
</tr>
</tbody>
</table>

1.2. **Identify target audiences**

Identify potential users of your research findings, including policy makers, advisors and other key stakeholders. Provide a list of institutions and, whenever possible, specific individuals to be targeted for effective policy influence. Please also indicate whether you have already made contacts within the institutions (add rows when needed).

<table>
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<tr>
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</tr>
</tbody>
</table>
1.3. Define outreach and engagement strategy

How, from proposal design to the dissemination of your research results, will you consult and communicate with these users to both gather their inputs and keep them informed of your project, in order to increase chances of research uptake? You can refer to PEP’s research communications strategy and guidance to have a better idea of what is expected in terms of activities for policy outreach and dissemination.

The objectives of outreach is three folds:
- Inform stakeholders about the usefulness of conducting an impact evaluation for PAPVIRE ABC as a pioneer program on one hand; and on the other hand, build their capacities on evaluation designs (namely randomized control trials) and conducting impact evaluation. This process will increase stakeholders understanding involvement and ownership of findings.
- Maintain continuous interest and support of key stakeholders.
- Communicate the result of the evaluation and foster the uses of results to inform future program policy.

In that respect, we intend to list all the stakeholders using the combination of approaches starting from a desk-review to snow-bowling including check list, etc. This process would be participatory. Once we have the list of stakeholders we will produce a mapping of stakeholders on a continuum of influence, on an alignment and interest matrix, assess stakeholders’ expectation at the state of the studies and finally conduct a stakeholder’s analysis.

In doing so, the profile of key influencers will be produced using their contacts details position, the role they play in decision making process, organization they belong to, the relevance or level of their perceived influences and interest in the evaluation process.

In the strategy we will also intend to account for assessing the risks of the strategy. In that respect communication difficulties or delays in addressing request may be an issue. A mitigation mergers anticipated could be request key influencers support. Another risk may be a non-compliance with randomization results. Though this is not a likely to happen the team plans a continuous monitoring of the project implementation on the ground.

In that respect stakeholders would be described on regarding their exercise of power to their influence on how they can made change happen formally and informally. We will consult and communicate...
with the stakeholders in various ways depending on the research stage: inception stage, research design, data collection, preliminary result, final report. Capacity building activities namely technical workshops on research design, theory based evaluation, formulation of evaluation questions, would be conducted in collaboration with the implementing agency and all the other stakeholders. The team will prepare that consultation in close partnership with the project coordination staff. Randomization would be implemented using an inclusive field process with format and informal meetings at community and regional levels. Inform about the starting the evaluation data collection using administrative letters of the implementing agencies. Communicate preliminary results of the evaluation to officials at central level, regional level, community level (including beneficiaries of the program). Report on the evaluation final results and request comments from stakeholders in order to refine data analysis and produce evaluation report. We expect this strategy to facilitate a closed consultation and communication among all the stakeholders. Ultimately the strategy proposed will increase chances research uptake and the use of evidence to inform policy.

1.4. Outline your preliminary dissemination strategy

Identify potential and relevant communication channels (e.g. direct stakeholder meetings, conferences, media/press, web platforms, etc.) through which you will be able, or attempt, to communicate and disseminate your research and research findings.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>Email</th>
</tr>
</thead>
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<td>Prospects analysis Unit</td>
<td><a href="mailto:justinedah@gmail.com">justinedah@gmail.com</a></td>
</tr>
</tbody>
</table>

Outline your preliminary dissemination strategy. Note that PEP expects grantees to disseminate information about their research work and (expected) outcomes throughout the project cycle, and not only after publication.

Capacity building activities will target participants from PAPVIRE’s staff, the Ministry of Agriculture, monitoring and evaluation from concerned districts using workshop and conferences.

Preliminary results and final evaluation findings will be presented in a user friendly format on one hand, and also in academic format for relevant audience. In order to conduct an effective dissemination of findings and engage with potential results users, the team will organize meetings and events at different level and for different audiences (national, district, communities, policy makers,
practitioners and academics. The following will be used as support document: policy brief, short report, newspapers, article using the language of our audience. An innovation we intend to include in the dissemination strategy is a study tools. From an academic perspective other than producing working papers, academic articles the team will also publish at least two blogs in the frame of the study.

SECTION IV – OTHER CONSIDERATIONS

1. Describe any ethical, social, gender or environmental issues or risks that should be noted in relation to your proposed research project.

Following discussion with the National Institute of Statistics and Economic Analysis which is responsible for ethics assessment in research, it appears that this study does not require a national IRB considering its scale and focus on agriculture. They indicate that if we get approval from the project implementing agency it would be enough.

Hence, the research team would go by PEP’s ethics committee.

1.1. Ethical approval

Does your institution have an Institutional Review Board in order to provide Ethical Approval for conducting the RCT?  

Yes [ ]  No [ ]

If yes, you will be asked to submit the relevant documentation when needed. If not, the project will be reviewed by PEP’s ethics committee.

1.2. References and plagiarism

Applicants should be very careful to avoid any appearance of plagiarism. Any text of three or more consecutive words that is borrowed from another source should be carefully contained between quotation marks with a reference to the source (including page number) immediately following the quotation. It is essential that we be able to distinguish what you have written yourself from what you have borrowed from elsewhere.

Note also that copying large extracts (such as several paragraphs) from other texts is not a good practice, and is usually unacceptable. For a fuller description of plagiarism, please refer, for example, to the following website:

- http://writing.yalecollege.yale.edu/advice-students/using-sources/understanding-and-avoiding-plagiarism

PEP will be using software to detect cases of plagiarism.

References
Achakzai, J. (2013). IMPACT OF AGRICULTURAL EXTENSION SERVICES ON THE USE OF FERTILIZER IN BALOCHISTAN PROVINCE, 29(2).


Independent Evaluation Group (IEG) annual report 2011: results and performance of the World Bank Group: Main report (English)


Ragasa Catherine, Guush Berhane, Fanaye Tadesse, and Alemayehu Seyoum Taffesse; 2012. Gender Differences in Access to Extension Services and Agricultural Productivity


Robert E. Evenson, Germano Mwabu. 1998. THE EFFECTS OF AGRICULTURAL EXTENSION ON FARM YIELDS IN KENYA. CENTER DISCUSSION PAPER NO. 798


SECTION V – Timeline and Budget

1. Budget allocation

PEP will provide a closed budget of $100,000 US to the selected teams to undertake an experimental evaluation. Provide a detailed budget allocation\(^1\) of the evaluation.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
<th>Amount (US Dollars)</th>
<th>Amount (Franc CFA where 1 USD = 594 XOF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>0.25</td>
<td>25000</td>
<td>14850000</td>
</tr>
<tr>
<td>Research staff</td>
<td>0.6</td>
<td>15000</td>
<td>8910000</td>
</tr>
<tr>
<td>Field staff</td>
<td>0.4</td>
<td>10000</td>
<td>5940000</td>
</tr>
<tr>
<td>Travel</td>
<td>0.15</td>
<td>15000</td>
<td>8910000</td>
</tr>
<tr>
<td>International and local airfare</td>
<td>0.2</td>
<td>3000</td>
<td>1782000</td>
</tr>
<tr>
<td>Local ground transportation</td>
<td>0.5</td>
<td>7500</td>
<td>4455000</td>
</tr>
<tr>
<td>Subsistence (hotel and per diems)</td>
<td>0.3</td>
<td>4500</td>
<td>2673000</td>
</tr>
<tr>
<td>Data collection</td>
<td>0.45</td>
<td>45000</td>
<td>26730000</td>
</tr>
<tr>
<td>Survey design</td>
<td>0.1</td>
<td>4500</td>
<td>2673000</td>
</tr>
<tr>
<td>Piloting</td>
<td>0.1</td>
<td>4500</td>
<td>2673000</td>
</tr>
<tr>
<td>Training</td>
<td>0.1</td>
<td>4500</td>
<td>2673000</td>
</tr>
</tbody>
</table>

\(^1\) Describe in detail data collection costs.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
<th>Amount (US Dollars)</th>
<th>Amount (Franc CFA where 1 USD = 594 XOF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel and per diems</td>
<td>0.5</td>
<td>2250</td>
<td>13365000</td>
</tr>
<tr>
<td>Survey materials &amp; equipment</td>
<td>0.15</td>
<td>6750</td>
<td>4009500</td>
</tr>
<tr>
<td>Printing questionnaires (or electronic items for data collection)</td>
<td>0.05</td>
<td>2250</td>
<td>1336500</td>
</tr>
<tr>
<td><strong>Data analysis and dissemination</strong></td>
<td><strong>0.15</strong></td>
<td><strong>15000</strong></td>
<td><strong>8910000</strong></td>
</tr>
<tr>
<td>Workshops</td>
<td>0.3</td>
<td>4500</td>
<td>2673000</td>
</tr>
<tr>
<td>Computers</td>
<td>0.15</td>
<td>2250</td>
<td>1336500</td>
</tr>
<tr>
<td>Office space</td>
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<td>1500</td>
<td>891000</td>
</tr>
<tr>
<td>Software</td>
<td>0.15</td>
<td>2250</td>
<td>1336500</td>
</tr>
<tr>
<td>Budget administration</td>
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<td>3000</td>
<td>1782000</td>
</tr>
<tr>
<td>Other</td>
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<td>1500</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100000</strong></td>
<td><strong>59400000</strong></td>
</tr>
</tbody>
</table>

Use the provided forms to illustrate your plan. The listed items are indicative; add any required explanation and items to the table. Remember to take into account overhead costs, withholding taxes and other expenses indirectly related to the research activity.

### 1.1. Other funding sources

Does your team have other sources of funding for this evaluation?

Yes [ ]  No [ ]
### 2. Timeline

All teams should complete their evaluation by late 2018. Use the provided forms to illustrate your timeline. The listed items are indicative; add any required explanation and items to the table.

<table>
<thead>
<tr>
<th>Years</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J u n</td>
<td>J u l</td>
<td>A u g</td>
</tr>
<tr>
<td>Months</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MAIN ACTIVITIES**

- PEP annual meeting
- Revised proposal submitted with Questionnaire follow-up 1 and sampling details
- Contract signed (after approval of revised proposal with the changes agreed in Nairobi)
- Baseline database (from Ministry of agriculture’s M&E unit) analyzed
- Baseline report submitted
- Follow-up 1 survey
- Follow up 1 data analysis
- Follow up 1- interim report submitted
- Follow up 1- interim report approved
- Follow up 2 questionnaire submitted
- Study visit
- Follow-up 2 survey
- Report on Follow-up 2 prepared (Consolidated follow-up 1 and 2 reports)
- Follow-up 2 Interim Report submitted
- Final Report
- Final report submitted
- Final report approved
<table>
<thead>
<tr>
<th>Years</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
</tr>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
</tr>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
</tr>
</tbody>
</table>

**MAIN ACTIVITIES**

- Final report conference version
- PEP annual meeting 2019
- Working Paper
- Policy briefs
- Incentive for acceptance in peer reviewed journals.