Drivers and Constraints of Conversion to Organic Farming in the Kingdom of Bhutan

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Abstract: Organic Farming is one of the several approaches towards environmental conservation and aims to increase agriculture production and household income for small scale farmers to enable them to come out of poverty and improve livelihood. The objective is to identify the major drivers and constraints and provide policy recommendation to the government and other relevant agency. A survey data of 146 respondents were collected from Gasa district of Bhutan. The analysis includes the use of descriptive statistics and the study recognize the drivers and constraints in organic practices according to the ranked order of importance by the farmers. The variables included in the questionnaire were measured using five point Liker scale. The result suggests that environmental awareness, health benefit, economic benefit and education and employment benefits are the predominant drivers for organic production. Constraints experienced by the farmers includes low productivity, market aspects, education and research aspects and economic and financial aspects. To promote organic farming, the Bhutanese government should consider to overcome barriers through investment in research, capacity building, market intensification, policy support, information and awareness and formation of groups and cooperatives.

Keywords: Bhutan, Constraints, Drivers and Organic Farming

I. INTRODUCTION

Bhutan is an agrarian country where majority (56.7%) of its population depends on agriculture for livelihood. Agriculture contributes 16.77 % of the total economy by Gross Domestic Product [1] and is largely traditional in nature and small holder based with average land holding of 0.8 hectares and is associated with low productivity and low inputs [2], poor soil fertility, labor intensive and low farm mechanization.

In the process of transition to modern agriculture the Ministry of Agriculture has imported and distributed chemical fertilizers and insecticides, seeds, farm machineries, tools and irrigation schemes either free or at subsidized rate for income generation, poverty reduction and environmental conservation [3]. When the use of agro-chemicals were in rise government declared to go fully organic in RIO+ 20 submit in 2012 [4] due to several negative impacts of modern agriculture such as loss of biodiversity, increases pollutions (air, water & soil), soil degradations and falling of yields, health and environmental concerns [5].

Organic farming (OF) not only produces organic food but also protect the natural environment, promote better health, increase income and contribute to sustainable development. OF methods improves the soil fertility by use of organic manure and not by input substitutions.

Under the Ministry of Agriculture (MOA), the National Organic Program (NOP) was launched in 2007 [6]. This is first step towards organic agriculture (OA) development and to make agriculture safe, sustainable as well as profitable for rural farmers. Despite policy and acts, the growth of OA is gradual and has less than 10% of land under OA productions [7]. The gradual growth can be attributed to lack of technical support [8], early stages of research and development [7] and lack of fund to support OA development.

The then Prime Minister has made major announcement during Rio+ 20 Sustainable Development submit and proclaimed to become the first country to be 100% organic [9]. However, the country have just 13,265 hectares of organically managed land as of 2015 including 6315 hectares of wild collections and 6950 hectares of agricultural land with a total of 2680 organic producers [10]. However, the interviewed experts are of the view that large majority of land is “organic-by- default” as farmers rely on traditional methods and neglect chemical fertilizers and pesticides. Being largely organic-by default they argues that it would be easier for the country to go fully organic.

Bhutan has developed national organic standards but have no certification system and is certified by external agency [7]. However, the government has initiated Bhutan organic domestic assurance system since 2015 and in country certification and inspection is done by Bhutan Agriculture and Food Regulatory Authority (BAFRA) under MOA and involves “zero cost” [11].

Despite importance the research in the country is very limited as most of the studies has been conducted in developed countries and factors identified may not apply to developing countries [12]. For instance, the key motivating factors in developed countries were subsidies [13]-[14], health [15], environmental reason [16] access to market, consumers demand, policy support and willingness of consumers to pay [14]. Whereas, the developing countries lack incentives, labor shortages, limited plant protection materials, lack of consumer awareness and lack of clarity in...
policy [17] and there must be other compelling reasons due to which farmers are reluctant to take up OF. This reluctance of the farmers calls for investigation on the drivers and constraints for conversion to OF at household level keeping in mind the following objectives: to explore the status of organic farming, investigate drivers & constraints in conversion process and to provide policy recommendation to government or relevant agency to promote OF in future.

II. MATERIALS AND METHODS

2.1 Study area
The study was conducted in Gasa district of Bhutan covering Khatoe and Khamaed blocks. Gasa was selected because the district has been declared as the first organic district since 2004 and the farmers there practice organic commercial farming as well as subsistence farming. The district serves as good representation for the country due to its full conversion and this will enable us to understand how they change and why they change, when, the rest of the districts are just thinking to change and has the same farming pattern. Moreover, the agriculture activities initiated in this district are very similar to rest of the districts such as focus on ‘high value low volume’ products for local and national market, facilitates in market infrastructure development, technical support and supply free inputs, training, certification and encourages farmers to form groups and cooperatives.

2.2 Data collection
The survey questionnaire was developed to collect primary data based on the relevant factors that has been identified through literature review and field observation was recorded and studied. Purpose sampling technique was applied due to small size of the households in the study area and data was collected from 146 farmers of Khatae and Khamaed block under Gasa district. Further, the expert interview was conducted with different stakeholders of agriculture sectors both formally and informally to gather supplementary information and the questions on the drivers and constraints, access, market and production, technical support and strategies to promote OF were discussed. A total of nine experts were interviewed, consisting of 3 government officials, 4 local government officials and 2 member of organic group. The interview were conducted either in the interviewee’s office or residents so that they could speak freely on the topic.

2.3 Data analysis
The primary data collected from farmers through survey questionnaire were analyzed using SPSS (Statistical Package for the Social Science). Analysis also included descriptive statistics and this study identified the drivers and constraints factors for farmers conversion to OF according to the ranked order of importance by the farmers [18]. The factors were ranked based on mean value and standard deviation. The variables included in the questionnaire were measured using five point Likert scale with (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree and (5) strongly agree to measure the responses of the questionnaires. Based on the results, the mean values were classified into three groups such as: ‘very important’ group represented by the mean value of higher than 4; ‘important’ group with a mean value ranging from 3 to 4; and the ‘least important’ group represented by the mean value of lower than 3. The information gathered through expert interview was analyzed using descriptive analysis tool.

III. RESULTS & DISCUSSION

3.1 Social and demographic description of respondents
Out of surveyed farmers (n=146), majority of them were female (69.18%) and the remaining were male (30.82%) this shows the women empowerment as important agriculture decision were taken by women and reflects the division of labor. This study found that women has high potential in OF based on their high representation in agriculture. The survey questionnaire was mostly (76.03%) attended by farmers representing age category of 31-59 years. This shows that they are economically active and productive citizens. Whereas, the older farmers (above 60 years) & younger farmers (18-30 years) were relatively lesser (13.7% & 10.27%) respectively. This shows that the age plays insignificant role in conversion to OF. This finding is inconsistent with previous studies which concluded that the organic farmers were relatively younger as compared to conventional farmers [19]. The result also shows the social trends of rural urban migration and labor shortages in rural area as younger population aged 18-30 mostly migrate to town and cities in search of better employment opportunities and senior citizens are left back in the villages.

Education level of the respondents in the study area was low. Among the farmers, large majority (78.08%) were illiterate, 15.75% had primary
Drivers and Constraints of Conversion to Organic Farming in the Kingdom of Bhutan

79

education and 2.05 % high school. The finding on education contradicts with the previous studies [20]. This shows that education plays insignificant influence in conversion to OF & is in line with the study in Nepal [21]. This is encouraging result for developing countries where majority of the farmers are illiterate and lack of education will not limit conversion to OF. However, due to lack of education farmers may face difficulty in record keeping, certification and inspection.

3.2 General perception of farmers
The study also collected data on farmers source of information, income, familiarity with OF & policy awareness, willingness to continue farming organically or not and their experience on organic practices. The surveyed farmers has chosen three main sources of information such as governmental official (78.29%), neighbors (15.07%) and radio (2.53%) through which they could gather information and has influenced them to convert to OF. This finding contradicts with the finding of previous study where books, farmers own education and conversations among organic farmers were the main sources of information [19]. However, the respondents rated low for newspaper (0.68%) and television (2.53%) may be because OF is still infant and media does not cover much and there is lack of cable television (visual media) services in the study area. The result shows an important role played by NOP under MOA and district agriculture sector in dissemination of information and awarebasered on high rating for information from government officials.

The farmers cultivated wide varieties of ‘high value low volume’ vegetables such as broccoli, garlic, chili, ginger and carrot after conversion to OF. Potato was grown by majority (99.31%) and is a main source of income with annual earnings of US $ 12, 265.87 and US $ 17,122.30 in Khatae and Khamaed blocks respectively. Garlic was second most important vegetable grown by 91.77% of the farmers and could fetch an annual income of US $ 10, 435.55 in Khataeand US $ 10, 492.06 in Khamaed block. Whereas, cereal crops were mostly cultivated for family consumption.

All of the surveyed farmers (n=146) are familiar with OF although their definition were limited to none use of chemicals and pesticides. This according to interviewed experts is because the study area was identified as trail organic “community” since 2004 and due to dissemination of information by NOP and other stakeholders. When asked about organic policy, 81.51% stated that they are aware of the policy, whereas, the rest (18.49%) were not. This according to surveyed experts is due to inadequate policies, lack of monitoring and strict implementation by government and farmers lack information.

We were interested to know whether the respondents intend to continue farming organically because the government does not compel farmers nor does it provide direct financial support and is undertaken voluntarily by the farmers. The result was very optimistic with overwhelming majority (99.31%) willing to continue farming organically due to environmental, health and economic benefits.

To the question ‘Do you think Bhutan should promote OF?’ As expected large majority (99.31 %) stated that government should promote OF to enable farmers to come out of poverty and increase income. Based on the above facts, (93.15%) stated OF is ‘very important’, (6.85%) stated ‘important’ and none of the farmers stated that it’s ‘not important’. This shows that farmers’ attitude in general is very positive and very strong and they intend to continue farming organically.

When asked about their experience in OF, majority (76.72%) stated that they have been farming over 10 years, 11.64% stated between 1-5 years and another 11.64% between 5-10 years. This shows that OA in Gasa is as old as NOP of Bhutan.

3.3 Farmers drivers for conversion to organic farming
We analyzed the drivers for conversion to OF in two steps. Firstly, based on the ranked order of importance by the farmers where factors are ranked by measuring mean value and standard deviations. Secondly, based on result the mean value are classified into three groups such as: ‘very important’, ‘important’ and ‘least important’.

The result shows four key drivers for conversion to OF. The factor 1 “environmental awareness” that consists of four motivating reasons: “environment conservation”, “improve soil fertility”, “protect biodiversity” and “reduce pollutions”. Factor 2 “health benefits” consists of two variables such as “personal health and family health” and “help enhance food quality”. The factor “economic benefits” play a significant role in organic production and finally the factor named “employment and education benefits” (see table 1). Interestingly, the factors identified in this study are similar to the findings in Iran where the author identified economic motivations, health and safety concerns and environmental problem as major factors for conversion, whereas the social as well as ethical motives were minor factors [15].

“Environmental awareness” is most important factor influencing farmers conversion to OF. Farmers are wholly dependent on fragile ecosystem for livelihood and their actions directly influences nature. Awareness encourages farmers to preserve, protect and nurture environment and promote sustainable development as whole of the district falls under protected area. Due to environmental awareness and advocacy farmers are most likely to operate their farm in environmentally friendly way whereby reducing pollutions, protecting biodiversity and enhancing soil fertility. Farmers are aware of the importance of environment protection and conservation and are equally concerned with the use of chemical fertilizers and pesticides in modern
agriculture that effects environment. The environmental protection and preventing degradation of ecosystem is also due to strict constitution mandates such as maintaining minimum of sixty percent land under forest cover for all time[22]. The surveyed experts indicated that awareness is critical in developing countries where majority of the farmers are illiterate as farmers can learn and practice better farming techniques and reduce negative impacts on environment.

“Health benefit” is another important factor motivating farmers’ conversion to OF and this has been found by previous studies in Iran by Veisi H, Carolan MS, Alipour A., in Bangladesh by Sarker MA, Itohara Y., in France by LatruffelL, Bougherara D, Sainte-Beuve J and byPornpratansombat P, Bauer B, Boland H in Thailand [15], [23]-[25]. The use of chemical fertilizers and pesticides has effect on individual health, family health (women and children) and consumers’ health. The farmers are not only concerned about individual and family health but also consumers’ health and is committed to environment. Farmers are seriously concerned about pesticides content in imported vegetables from bordering town in India and aims to produce ‘healthy products’ not only for family consumptions but also for sale. This types of farmers show higher possibility for conversion to OF thereby increasing food safety, security and nutrient content. The interviewed experts are of the view that in the developing countries where majority of the farmers are illiterate the best possible solution to reduce the health risks due to use of chemical fertilizers and pesticides is to permanently ban. They strongly argues that chemicals fertilizers can be easily banned in the country (Bhutan) due to its limited use, strict regulations by government and due to non-authorization of the private firms to import and distribute freely.

Not surprisingly “economic benefit” that includes reasons such as increase income, reduce external input costs and provision of subsidies is another important factor for farmers conversion to OF. Farmers are most likely to convert to organic production if they get economic benefits. The factor economic benefits motivating farmers’ conversion to organic production was found by Veisi H, Carolan MS, Alipour A., in Iran [15] and by Sarker MA, Itohara Y in Bangladesh [23]. The farmers’ in the study area cultivated wide varieties of ‘high value low volume’ vegetables for consumption and sale after conversion to OF. Although the demand and price for the certified and non-certified vegetables were low farmers could still generate some income to support the households. Subsidies in the forms of supply of farm machineries and tools, seeds and seedlings, irrigation schemes were provided to farmers. Whereas, direct financial subsidies during conversion period was found not feasible due to budget constraints.

Factor named “employment and education benefits” is another important factor for conversion to organic production, as it has been found by Qiao Y, Halberg N, Vahees S, Scott S for small scale farmers in Asia [26] and by Van Elzakker B, Eyhorn F. [27]. Large majority (69.18%) of the farmers noticed increase in employment opportunities in rural areas as women were actively involved in organic production (kitchen gardening, marketing and field preparation). The labors from households were gainfully employed and the temporary labors are hired from within the community during plantation and harvesting season thereby providing seasonal employment. However, the interviewed experts and farmers stated that its contribution to family education is negligible at the moment due to small production, market constraints and because education is provided free off cost by the government till tenth grade and higher education is based on merit. Nevertheless, they strongly belief that the increase in organic production with access to market and premium price will definitely complement on education, better health and improve livelihood. Based on the finding of this study we can conclude that farmers were not only motivated by financial reason but also due to environmental and health benefit.

3.4Farmers constraints for conversion to organic farming

Aside from the drivers this study also identified constraints for farmers’ conversion to OF and classified them into three groups such as: ‘most challenging’, ‘challenging’ and ‘least challenging’. The results shows four challenging factors for conversion to OF. The factor “low productivity” that consists of three reasons such as ‘ineffective organic pests and disease control’, ‘weeds control’, and ‘labor shortages’ is the most challenging factor. The factor “market aspects” is challenging factor for organic production. Another factor, “education & research aspects” which reflects on the lack of education of farmers and lack of research and access to organic inputs is challenging factor. The factor named, “economic and financial aspects” consisting of two variables: lack of access to credit and costly certification and inspection is challenging factor for conversion to OF. The challenges identified in this study is similar to the factors identified by Nandi R, Bokelman-W, Nithya VG, Dias G. in India [28], by Niemeyer K, Lombard J in South Africa [19] and by Tashi S, Wangchuk K in Bhutan [17].

As expected, “low productivity” with mean value of 4.340 is the most challenging factor for farmers’ conversion to organic production, as is found by Mader et al in Switzerland, [29] and by Seufert V, Ramankutty N, Foley JA [12] and Ponisio et al [30] based on comprehensive meta-analysis studies. Farmers realized the reduction in yields for crops and vegetables and more specifically for major cash crops like potato, cereal crops like rice and vegetables and are seriously worried as it threatens the food security
Drivers and Constraints of Conversion to Organic Farming in the Kingdom of Bhutan

and hunger reduction. This they attributed to poor management of pests and diseases, weeds control, lack of bio-pesticides and labor shortages. Unlike conventional farmers who depends on herbicides to eliminate weeds and chemicals to control pests and disease, organic farmers rely on biological control of pests and diseases (natural enemies), hand weeding and better cropping practices (crop rotation and inter cropping). The surveyed experts confirmed the reduction of yields and stated that training are provided to farmers on seed selection, pests and disease control and electrical fencing were also provided to farmers to reduce crop damages by wild animals.

The factor “market aspect” consisting of three variables such as lack of access to market, lack of market information and ineffective transport facilities with mean score 3.688 is another challenging factor for organic production. The market problems is more relevant in developing countries as compared to developed country. Farmers lack access to local, national and regional market due to which they cannot increase production, increase investment, increase income and reduce poverty. In the absence of market the farmer’s sale to middlemen or trader and supply to school agriculture program but the demand and price is very low. This finding is echoed by the previous study conducted in Sub-Saharan Africa by SmaleM, Byerlee D, Jayne T [31],and is strongly support by the surveyed experts and farmers. The market constraints in developing countries is due to low production, poor transport facilities, lack of market information and consumer awareness.

The third factor “education & research aspects” consists of two variable and is represented by mean value 3.496. This factor is associated with lack of education of farmers and organic research and lack of access to organic inputs and is identified as a challenging factor for organic production. This finding support the finding of previous study that showed lack of education of farmers and lack of organic research as well as lack of organic inputs as hindrance to OA development [30], [32],[33]. The majority of the farmers in the study area (78.08%) are illiterate and lack knowledge on organic certification, processing, grading and marketing. The interviewed experts indicated the need for capacity building of farmers through training, workshops and seminars and they strongly argue that even if farmers lack knowledge they can learn from the training and exchange program. The research in the country too is limited and this according to experts is due to budget constraints and lack of technical expertise. Thus the government need to invest more on research culture despite budget constraints, infrastructure development (seeds production facilities) and encourage local seed breeding.

The factor “economic and financial aspects” with mean value 3.236 consists of two elaborated variable such as lack of access to credit and costly certification and inspection. This study supports the finding of previous study which showed that organic farmers lack access to credit [34] and the certification is costly [16], [19], [35]. Although agriculture loans is provided by government agency and financial institution the process is lengthy and the interest rate differs and even with 4% interest charge by Rural Enterprise Development Corporation Limited (REDCL) farmers are unable to repay their loans. To promote access to market and empower farmers’government has initiated domestic organic certification system which involves ‘zero costs’ but is only for local market and farmers and experts strongly feel that government should support in organic certification.

The mean score for the constraints ranges from 3.236 to 4.340 and if we analyze this all of the factors falls under most challenging and challenging groups and none in least challenging group. Further analysis shows that “economic and financial aspects” is ranked as 4th challenging factor. This shows that farmers are facing other pressing challenges than financial constraints.

CONCLUSION & RECOMMENDATION

This study investigated the major drivers and constraints of small scale farmers conversion to OF. Farmers’ views in general is very strong and very positive and they intend to continue farming organically.

The results shows that farmer prioritized ‘environmental awareness’ as most important factor responsible for conversion, followed by ‘health benefits’ ‘economic benefits’ and ‘education & employment’.

Aside from drivers we also identified constraints. Based on the result ‘low productivity’ was most challenging factor, followed by ‘market aspects’, ‘education and research aspects’ and ‘economic and financial aspects’. Hence, the government and important stakeholders should overcome the barriers through investment on research despite budget constraints, educate consumers on several benefits of OA as well as harmful effects of CA through media campaigns, workshop and seminars. Capacity building of the farmers in plant protection, preparation of bio-pesticides, bio-fertilizers and improving of soil fertility is important and can be enhanced through training and workshop.

The market access can be improved through rural connectivity, formation of farmers’ groups and cooperatives and developing direct market linkage to institutions and high end hotels and infrastructure development (godowns and cold storage) that are connected with market information. Another promising strategy may be policy support in the form of access to credit and crop insurance schemes, land lease (government reserved forest) for small scale farmers and including OA studies in
educational programs. Further, the farmers should be encouraged to form groups and cooperatives at the local level so that they can enter the market collectively, reduce certification & inspection costs and increase income. However, the future development of OA is mostly likely to be policy driven and depends on rules and regulation and policy support to reduce the challenges faced by the farmers and take best advantages of the available opportunities.

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REFERENCE


Table 1. Prioritization of drivers for Organic Farming

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. deviations</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>I decided to convert to organic farming because of…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 1 Environmental awareness</td>
<td>4.077</td>
<td>0.501</td>
<td>1</td>
</tr>
<tr>
<td>Environmental conservation</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Improve soil fertility</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Help protect biodiversity</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Reduce pollutions (air/water/ soil)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 2 Health Benefits</td>
<td>4.0034</td>
<td>0.4875</td>
<td>2</td>
</tr>
<tr>
<td>Personal health &amp; family health</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Help enhance food quality</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 3 Economic benefits</td>
<td>3.8127</td>
<td>0.5420</td>
<td>3</td>
</tr>
<tr>
<td>Help increase income</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Reduces external input costs</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Provision of subsidies (tax holiday)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 4 Education &amp; employment benefit</td>
<td>3.3869</td>
<td>0.6436</td>
<td>4</td>
</tr>
<tr>
<td>Provide employment opportunities</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Contribute to education of family members</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
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</table>

\[\text{Ranked order of importance: > 4 mean very important}\]
\[\text{3-4 mean important}\]
\[\text{< 3 mean least important}\]

Table 2. Prioritization of constraints for Organic Farming

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. deviations</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion to OF is challenging because of…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 1 Low Productivity</td>
<td>4.340</td>
<td>0.564</td>
<td>1</td>
</tr>
<tr>
<td>Ineffective organic pests &amp; disease control</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ineffective organic weeds control</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Increase in labor requirement (labor intensive)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 2 Market aspects</td>
<td>3.688</td>
<td>0.611</td>
<td>2</td>
</tr>
<tr>
<td>Lack of access to market</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ineffective transport facilities</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lack of market information</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 3 Education &amp; research aspects</td>
<td>3.496</td>
<td>0.708</td>
<td>3</td>
</tr>
<tr>
<td>Lack of education &amp; research</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lack of access to organic inputs</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Factor 4 Economic and financial aspects</td>
<td>3.236</td>
<td>0.808</td>
<td>4</td>
</tr>
<tr>
<td>Lack of access to credit</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Costly certification and inspection</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

\[\text{Ranked order of importance: > 4 mean most challenging}\]
\[\text{3-4 mean challenging}\]
\[\text{< 3 mean least challenging}\]