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Assessment and Finance in the Fruit and Vegetable Value Chain. Evidence from Small Island Developing States in the Caribbean and the Pacific

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Abstract

The paper analyzes agricultural risks and risk management in selected Small Islands Developing States which are part of the African Caribbean Pacific country group. Focus is on the value chains of fruits and vegetables, as well as spices. A survey was conducted in Grenada, Jamaica, Fiji and Vanuatu, aimed at identifying the sources of risk which are most important to value chain stakeholders; the nature and quality of existing and potential risk management mechanisms; and the possibility of enhancing them in view of improving the functioning of the value chains. A questionnaire was administered to stakeholders involved in production, processing, retailing, trading, extension and other public and private services. Results reveal limited ability to handle price and production variability, due to lack of both horizontal and vertical co-ordination along the value chains, reduced use of support service, notably credit; and underinvestment in new equipment. In addition, and in part as a consequence, a complete insurance market is missing, due to lack of demand which leads to undersupply and lack of customized products.

1. Introduction

Diversifying agriculture and supporting business development is the centrepiece of a number of rural development programmes in several countries, and in a number of Small Islands Developing States (SIDS) belonging to the African Caribbean Pacific (ACP) group. In these countries, a clear indication emerged in the last years of the need to promote and support an increased integration of agriculture into wider business chains, while at the same time overcoming the economic regime shaped by trade preferences. Taking a value chain perspective implies looking holistically at all activities leading from primary production to consumption, including primary production, services, post harvesting handling, agro-processing, marketing, logistic, packaging, and the services associated with each of these stages. Value chains have been recognized as effective entry points to support small farmers, and promote their incomes through better market integration and value addition. Hence, quality compliance with international product and safety standards, volume and supply consistency are increasingly seen as hallmarks of success, and in some case may be more important than price competitiveness.

The development of value chains in SIDS is hindered by a number of constraints, mostly attributable to their lack of economies of scale, remoteness, and vulnerability to natural disasters. Despite differences among countries, most SIDS are characterized by high transaction and communication costs that make all businesses more difficult, and prevent a full exploitation of potential comparative advantages (Winters and Martins, 2004; FAO, 2005; IFC, 2009)[1].

The formation of increasingly complex value chains, however, entails both increased opportunities and risks for all those who are involved in them -- throughout the paper we

1 According to the IFC (2009), SIDS rank 89th in terms of the ease of doing business out o f a list of 181 economies. Ranking is based on 10 indicators of business regulation.

shall refer to them as stakeholders -- and especially for farmers, which are normally more numerous, more physically dispersed, and operate on a relatively smaller scale. Common risk sources that can affect farmers and other stakeholders operating along relatively complex value chains include price, production and personal risks; but farmers are often the most vulnerable agents. Such risk sources not only can produce temporarily or permanent negative effects on revenues; they can also generate indirect negative effects on the organisation of the value chain: in absence of tools that can mitigate their effect, risky events can disrupt business relationships that can take very long time to rebuild.

To further complicate matters, risks can affect value chain stakeholders in different ways and to different extents. For instance, the risk of a loss for one stakeholders group may turn out to be the possibility of a gain for another group. A production loss experienced by farmers may not be a problem for processors, as long as they can source their inputs elsewhere. In fact, value chains normally incorporate more or less formal and effective arrangements aimed at managing risks, which are also defined by the institutional environment. Policies can be easily conceived as tools mostly aimed at reducing risks, typical examples being protection, subsidies or price stabilization for farmers.

This paper aims at shedding light on risks and risk management mechanisms in selected SIDS which are part of the ACP country group, and are striving to diversify their agriculture, switching from the traditional agricultural economy based on sugar and bananas, driven by trade preferences, to the development of more complex value chains such as those based on other fruits, vegetables and spices. The aim of the diversification policy is to increase income opportunities in non-traditional products; allow for access to larger value added shares, and to increase small farmers' participation.

Reviewing risk management mechanisms was identified as an important element of this process. Over a number of meetings with stakeholders and discussions with policy makers it became evident that several of the difficulties encountered by farmers and other stakeholders in organizing production and marketing along value chains and maintaining this organization through time could be framed as risks, and the possible solutions as risk management mechanisms. For this reason, an exploratory survey was organized on risks and risk management along value chains in selected countries.

Stakeholder meetings held in Grenada and Jamaica, and in Fiji and Vanuatu provided the opportunity to administer an ad hoc questionnaire. Risk was considered in a broad sense, taking into account simultaneously all the elements that contribute to shape it along the value chain. Policies and access to credit, for instance, are considered as elements affecting farmers' and other stakeholders' ability to retain the risks that arise from price variability while reducing their impact on economic welfare. Technical capabilities, the availability of expertise and advice, can typically affect farmer's ability to retain part of the risk arising from unexpected changes in production. And the participation in associations, commodity group and other more or less formal institutions, can affect individuals' capability to retain several sources of risk. Consistently, the questionnaire employed in this work collected information on a broad array of issues.

The next section offers a review of basic concepts in the area of risks and risk management along value chains, while section 3 discusses risk measurement and layering. Section 4 describes the survey and the methods applied to analyze the data collected while the results of the analysis are illustrated in section 5. The last section concludes and discusses areas for further investigation and action.

2. Risk management along the value chain

Risks affecting agri-businesses activity can be classified according to different criteria; the following six categories are frequently used in the literature (Eeckhoudt and Gollier, 1992; Hardaker, 2004).

- Price risk, is the risk of a sudden unanticipated change in input and/or output prices, which could either damage all agents in the chain or only some of them, depending on the source of the change[2].

- Production or yield risks, such as those arising from natural hazards that could negatively affect crops quantity and/or quality; both farmers and the other agents further along the chain, such as processors or retailers, can be exposed to such risks.

- Asset risks: are those associated with theft, fire and other types of loss or damage of equipment, buildings and other agricultural assets used for production, processing, trading or transportation.

- Institutional risk, resulting from changes in national and international policies or in the concentration of market power along a value chain.

- Financial risk, arising from unexpected changes in the cost of capital, exchange rate fluctuations or disruptions in the ability to access credit and/or equity losses.

- Human or personal risk, due to death, illness or injury of the labour force.

Value chains are conceived as networks that support three types of flows: physical, financial and informational. Each of these flows is responsible, respectively, for movements of physical product, payments and lending arrangements, and co-ordination among physical and financial flows. Hence, the value chain is conceived as an entity that interacts with markets and consumers in order to extract revenues from the sale of given products (Khan and Burnes, 2007).

Analyzing the above mentioned sources of risks and their respective risk management implications with reference to a value chain is much more complex than the analysis of individual risks. Risk transmission along a value chain has not yet been fully explored.

[2] For instance, a collapse in the retail price will typically affect all stakeholders along the value chain, while an increase in the price of a fertilizer will affect mostly farmers, by squeezing their profits if they cannot modify output prices.

The Commodity Risk Management Group of the World Bank has recently proposed an operational framework to assess agri-food value chains (CRMG 2007). Risk and vulnerability are framed in a system approach, which takes into account exposure, potential losses, and options for risk management within the chain as well as through interactions outside the chain, by both individual stakeholders and groups of stakeholders.

The CRMG (2007) framework allows analysing agro-food supply chain risk management (SCRM), borrowing extensively from the literature on vulnerability. Risk, in that context, is mostly related to the chain as a whole, with limited or no attention devoted to its distribution among the participants in the chain. An important element of the supply chain analysis, however, is study of the way in which transactions are organized along the value chain, within the continuum that extends from spot market transactions, on the one hand, and full vertical integration, on the other. In turn, the organization of transaction stems from the transaction costs that characterize flows along the value chains; which are the outcome of technical characteristics of production.

Stakeholders involved with trade in storable products – such as grains – can exploit organized markets in which risks can be hedged, such as those for forward and option contracts (Glover, 1984). More generally, the range of price risk management tools widens when storage is possible. Warehouse receipts, for instance, provide a way to convert inventories into readily tradable assets, are directly negotiable, and can be traded, sold, swapped, used as collateral to support borrowing or accepted for delivery against a derivative instrument such as a futures or be traded in a commodity exchange (Lacroix and Varangis, 1996).

Transaction costs embedded in perishable products, instead, require a different organization. Fresh fruits and vegetables, which are highly perishable, carry significant transaction costs in production and trade. This creates an incentive to organize and pre-determine key transactions, for instance through contracts (Minten et al., 2006) [3]. Contracts are in fact an intermediate term between full vertical integration and spot markets, that farmers and buyers, use frequently as a mechanism to transfer and share risk along value chains (da Silva, 2005). Also, the complexity of contracts calls for a wider role for producer associations in dealing with other participants in the value chains; typically farmer associations negotiating contracts with traders or retailers. The details of such contracts, in fact, can include mechanisms to transfer risk, whose direction indicate whether and how idiosyncratic risks are effectively pooled along the chain, or where market power is employed to increase the risk borne by some stakeholders.

When seen from a transaction cost perspective, any vertically integrated structure, such as a value chain, can be conceived as the response of the agents in the market to the very existence of widespread risks associated with both the natural environment and the

[3] There are several types of contracts. Swinnen and Maartens (2006) classify them in two main categories: Marketing contracts, which are (verbal or written) agreements between a contractor and a grower that specify *ex ante* some form of price and outlet. Production contracts, instead, are more extensive forms of coordination, in which contractor supplies items such as detailed production practices, extension services, inputs, quality and quantity of a commodity and a price.

functioning of markets. In other words, the prevailing structure of a supply chain could be considered as the revealed best response to risk. However, this may not be the case when markets are either incomplete, or characterized by structural constraints that prevent their development as it is the case for SIDS, or simply not competitive.

For instance, if markets surrounding the value chain – such as input market, or the credit or the insurance markets – are incomplete or fragmented, stakeholders encounter difficulties in accessing convenient tools to manage risk. If structural constraints prevent communication, or information sharing, or access to relevant markets, the observed organization of the value chain may indeed reflect these constraints rather than the transaction costs structure of the commodity chain itself.

It is frequently observed in the practice of several value chain, that the distribution of market power along the value chains tend to be asymmetric. Particularly, processors, traders and retailers tend to be more concentrated than farmers, and this often corresponds to a greater ability to set prices and other contractual terms and conditions, given also that these segments of the value chain tend to be closer to final consumers, and thus in a better position to receive and react to demand signals.

Evidence from a number of Pacific and Caribbean countries confirms the presence of the mentioned types of risks and bottlenecks. According to processors/retailers, one frequent difficulty in sourcing primary products from local producers is the uncertainty about the availability of consistent, timely and standardized supplies, together with, in some cases, the difficulty of interacting with small farmers scattered across wide territories. The lack of credible market outlet clearly undermines incentives to invest in activities required to comply with standards. Cases have also been reported in which contractual arrangements have not been honoured due to an inadequate forward price level; and of default risks further down the chain, for instance due to foreign buyers that decided to source elsewhere in response to changed market conditions. This can be the consequence of market fragmentation and the scarce knowledge about each stakeholder risk exposure, as well as a week legal system for contract enforcement. The availability of this kind of information would allow stakeholders, for example, to subscribe agreements which are more appropriate for specific value chain and market contexts.

3. Risk assessment: layers and the value chain

Assessing risks requires the identification of possible risk-generating events, and the quantification of their possible impact. Financial losses are the most straightforward way to quantify impacts, as probability values can be associated to each of them. Even though an accurate quantification of both extent of losses and probability of occurring is virtually impossible, it is useful to have at least a rough idea of their range, in order to be able to define risk management tools and strategies.

A common practice in financial risk management is the so called risk layering, which is the identification of different areas in a probability distribution of potential losses. Three “layers” of risk can be identified: a “retention layer” including financial losses that are

entailed by normal business activity, and are normally retained by entrepreneurs; the "insurance market layer", which includes losses that are large enough to disrupt normal business practices, but can be pooled in an insurance product that can be sold in the market and the "tail risks" implying catastrophic events that insurers are unwilling to cover, and for which ex-post public is usually the only way to deal with (World Bank, 2005; Cafiero, 2008).

Losses in the retention layer are highly frequent, but of a limited size, and this is why they are normally addressed through simple strategies, such as income diversification and consumption smoothing. Other frequent strategies that are adopted to deal with expected variability include crop and plot diversification, engagement in off-farm activities, savings and other financial assets. Access to the credit market is another key element allowing entrepreneurs to manage losses falling within the retention layer. For farmers, credit may be required even to simply bridge the time gap between sowings and harvests, given that revenues are usually collected at the end of the production cycle; and financial arrangements are important to allow purchasing inputs, even in absence of unexpected price variability. Access to the credit market is, therefore, a key element shaping the size of the retention layer. In fact, for vulnerable population groups and subsistence farmers the risk retention layer can be extremely small in size. The integration into more complex value chains could be used as an occasion to introduce more risk management tools, and enhance the capacity to manage retainable losses.

Insurable risks require the presence of a functioning insurance market. On the demand side, the willingness to purchase insurance products will depend both on the likelihood of extreme variability in prices and production, and on the ability to retain risks individually. In some OECD countries, for instance, the presence of generous support policies reduces risks directly faced by individual farmers; in turn, this reduces the willingness to purchase insurances, and hence the size of the insurance layer. Extremely poor farmers, at the other extreme, may have high rates of discount on the future, and consequently a reduced willingness to pay for insuring against uncertain events. Under these conditions, the insurance market layer is very small. On the supply side, insurance companies need to be able to develop portfolios which suit the requirements of farmers, and to be in a position to pool risks and re-insure in order to make viable profits. Hence where the size of the insurance market layer is very small, also the supply of insurance products is likely to be limited, or incomplete.

Tail risks are included in the so-called "market failure" layer. It includes risks that, if not adequately pooled, cannot be transferred to insurance companies, given their highly covariate nature and the magnitude of associated losses. Tail risks management opportunities may be obtained through the establishment of public-private partnerships; Linneroth-Bayer and Mechler (2007) examine three examples of extended partnerships: the Turkish Catastrophe Insurance Pool; the Andhra Pradesh micro insurance program and an index-based weather derivative for farmers facing drought in Malawi. The Caribbean Catastrophic Risk Insurance Facility (CCRIF), co-financed by the World Bank, is an example of a country level scheme providing relief after extreme events.

Risk layering is rarely emphasized in agriculture, probably due to the difficulty of quantifying the losses and probabilities associated with risky events, and to the limited diffusion of commercial insurance. Despite these difficulties, layering can still assist in identifying cost/benefit ratios associated with transferring risk. In principle, any risk could be transferred, no matter how frequent; but this would result in very high insurance cost. On the other hand, because of time and resources constraints, it is not always possible to conduct a detailed risk layering, especially when dealing with a whole value chain. The process should be conducted separately for each type of stakeholder, and interactions between risks along the chain should be considered.

Rather than attempting such a detailed assessment, in the research reported in this paper we have conducted a more general survey, taking the broad approach proposed by the CRMG (2007). We focus on specific value chains; and given their importance in shaping risks faced by stakeholders along the value chain, we also enquire on credit, finance and participation in producer's organizations as well as on insurances.

4. The survey and the methods for analysing results

The more general motivation of this work is the possibility of enhancing income opportunities from fruits, vegetables and spices production, in SIDS belonging to the ACP country group. The assumption is that better risk management can foster value chains development and enhance stakeholders' participation.

Within this framework, the survey aimed at identifying (i) the type of risk that is most important to each stakeholder in the value chain; (ii) the nature and quality of the risk management mechanisms; and (iii) the possibility of enhancing them in view of enhancing the functioning of the value chains and/or the possibility of introducing new mechanisms for risk mitigation. A questionnaire was administered to a number of different stakeholders, including agricultural input providers, farmers, processors, traders, retailers and representatives of stakeholder associations.

A full risks and risk management characterizations for each accessible stakeholder was out of reach, given resource constraints. Moreover, the importance of the many elements that shape the ability to retain risks – mentioned in the previous section – suggests collecting wider information than just risks and risk management. Hence the preferred strategy was to collect a broader array of information, while giving up an accurate measurement of risks. The questionnaire adopted collects information in the following four areas[4].

- Role of the respondent in the value chain and participation in producers' associations.
- Perceived sources of risk, and ways to react to them.
- Existing risk management mechanisms and suggestions for their improvement.

4 The entire questionnaire is reproduced here as appendix I

- Use of contracts along the value chain, use of credit, and of insurances.

The questionnaire was administered in Grenada, Jamaica, Fiji and Vanuatu to a total of 82 respondents involved in production, processing, retailing and trading of fruits and vegetables, and spices; some Government official and extension agents working on the same sectors were also interviewed. Respondents were approached during meetings organized within the AAACP programme, in the framework of an exercise of participatory sector strategy development, led by the United Nation International Trade Centre. While the respondents do not constitute a statistically designed sample, they can be considered largely representative of the key local vested interests in the mentioned products chains.

Results were firstly analyzed qualitatively, by exploring for regularities in the responses in each of the four countries. The questionnaire is structured in a way that does not allow discriminating replies by making reference to any single variable. For instance, being a farmer presumably affects the type of risk management mechanisms that the respondent considers to be more effective. But even among farmers, replies may change according to the size of the farm, or due to the fact that some farmers are also involved in processing or in trade.

To further explore the data collected a Principal Component Analysis (PCA) was conducted which allowed identifying some more formal associations among responses. The PCA reduces the number of dimensions in the data while minimizing information losses, and helps identifying patterns in large datasets. Information losses are minimized by computing linear combinations of variables in the dataset (the "principal components") and retaining a number of such components sufficient to account for the majority of the variance in the original data. An advantage of the PCA in this case is that it can be applied regardless of the – discrete or continuous – nature of variables [5] (Gower, 1966; Joliffe, 1991). Results can be interpreted by considering the weights with which variables enter into the principal components, that is, the linear combinations. The coefficient of each variable in a component, called "loading", synthesizes the strengths of the effect of that variable and the association with other variables in the component. In a typical analysis involving m highly correlated variables, components are ranked in terms of the share of the total variance that they account for, and the first n are retained within $n<m$.

In addition to the PCA, and in order to explore the possible association between responses to variables of interest, we used cross tabulation. This is a technique that reports on a double entry table, in which rows and columns refer to the various questions, the number of cases in which responses to the questions corresponding to the row and column labels are positive and homogeneous. The results are reported in a table where

5 The PCA was applied to the covariance matrix, of the original 53 variables, to yield seven components. Data was rotated with the orthogonal varimax criterion. This criterion allows maximizing the sum of the variance of the loading vectors. This simplifies the interpretation because, after a varimax rotation, each original variable tends to be associated with one (or a small number) of factors, and each factor represents only a small number of variables (Jolliffe, 2002)

entries on the diagonal measure the number of responses to each particular variable which where positive.

5. The results of the survey

5.1 Main regularities

Detailed results by country are reported in boxes 1 to 4. Altogether, they can be summarized in four points. First, on the characterization of the value chains, several respondents declared a tendency to diversify across production stages, rather than across products. This is common among larger-size farmers, who declared to be also traders, processors, retailers, and input suppliers[6]. They are likely to achieve efficient allocation of resources, by undertaking more than one activity within the small business environment of the SIDS (IFC, 2009). Small farmers, on the contrary, seem to operate mostly on an individual basis, with erratic relations both with other producers (horizontal) as well as with other stakeholders along the value chain (vertical). Most of their responses do not point to any institution capable of informing on market opportunities, managing supply, or facilitating access to financial resources. Farmers associations seem to focus mostly on extension services. A difference arises, in this respect, between the Caribbean and the Pacific: farmers associations in Jamaica and (even more) in Grenada appear to be more structured in terms of the services they supply; whereas this is less the case in Fiji, where only few associations provide intermediation services. In Vanuatu, however, they are virtually absent.

Secondly, all respondents indicated output prices variability, on the output markets, as one of the major sources of risks, along with changes in exchange rates, in the conditions of finance and in the operation of domestic and foreign markets. Institutional risks arising from changes in Government policies, are more of a concern in Jamaica and Fiji; together with risks arising from natural hazards, such as pests and diseases, while weather events are seen as a less relevant source of risk. Respondents would not indicate a clear ranking of these possible sources of risks, neither in terms of frequency nor of importance in their day-to day operation. The fact that the main sources of risk indicated by stakeholders, with the exception of pests and diseases, are linked to the market -- price variability and long term decline in output prices; changes in the conditions of finance; changes in the conditions of domestic and foreign markets; changes in exchange rates -- indicates a lack of integration in value chains, which makes stakeholders vulnerable even to small changes, let alone large shocks. Natural phenomena are not even considered as a main source of risk: due to their low frequency, the attitude toward such "tail events" seems to be of underestimation, despite their high damage potential; or it could be lack of confidence in any form of insurance against them. The wide range of risks indicated by stakeholders suggests that they are virtually unable to retain any risk, given that no distinction is made between "normal" price variability -- which should be possible to handle with individual mitigation strategies, such as saving, credit or consumption

6 In principle, the presence of respondent operating simultaneously at different stages of the production chain may have biased the responses on the sources of risk and on the risk mitigation mechanisms; however, it is impossible to quantify the extent to which responses may have been affected

smoothing - and the occurrence of events such as pests and diseases, or thefts in some country, which could be insurable risks. The likely small size of a retention layer is consistent with the qualitative indication that, especially for small farmers, fruits and vegetables are not considered as an agri-business, but rather as a backyard activity, that may provide at best an erratic income. In turn, this could be the consequence of the long-standing trade preference regime, under which the main sources of income in agriculture were derived by the few traditional products such as sugar and bananas.

Thirdly, on the risk mitigation mechanisms, most respondents agreed that those based on market transactions, such as production contracts, and assistance from banks, are the most effective. It is interesting to notice that while these are considered effective instruments to deal with risks, very few respondents are in fact using them: only 24 respondents out of 82 have declared use of formal credit; and only 16 are engaged in production contracts. Insurance is not deemed effective, like production contracts and credit, it is often regarded as being expensive, and not transparent. High transaction costs, high interest rates for credit, and the lack of customized products both in the credit and the insurance markets are quoted as major obstacle to a wider use of these services. High probability of default is also identified as an obstacle in accessing credit, as well as complication for insurance contracts. Diversification of production, which is the rule among respondents, is considered an effective risk mitigation mechanism, as well as technical change, particularly where pests and diseases are prominent risks. Government policies are not considered effective; rather, their change was identified as a source of risk, especially in the Caribbean. In general, responses on risk mitigation appear to be coherent with those on risk sources: market based mechanisms are seldom used, due to both supply and demand limitations. High costs and transaction costs are limiting demand, so that banks and insurances lack incentive to supply customized products. Hence diversification, across products and production stages along the value chain, is the main mitigation strategy in use. As mentioned, this is partly the consequence of a small business environment, which is typical of the SIDS, but also of a lack of organization and articulation along value chains. In fact, an officer from the only commercial bank which responded to the questionnaire indicated the lack of collaterals and transparency in doing business as the major reasons why their potential clients in the fruits and vegetable value chains are considered unreliable.

Finally, as a fourth point, it is worth highlighting some peculiarities of the countries in which the questionnaire was administered. In Grenada, Government officials and traders appear more concerned than farmers about the effect of hurricanes. The fact that farmers are not so concerned despite these are relatively frequent is probably due to some expectation that the Government, as well as the Grenada Co-operative Nutmeg Association (GCNA) – which has ensured a strong institutional support to their members – would be able to cover for such high covariate risk. In Jamaica, the organization of fruits and vegetable production appears to be polarized. Small-scale traders – called *higglers* – deal with most fruits and vegetables on behalf of small farmers who don't have direct access to markets; and some *higglers* are small farmers themselves. Credit, contracts and insurances are only used by larger-scale farmers and traders, who appear to be far less concerned about both production and financial risks. Also in Fiji, there appear to be a clear distinction between small farmers on the one hand, who are concerned

mainly with price changes, and large-size farmers and other stakeholders on the other hand, who are more concerned with financial conditions.

5.2 Results of the Principal Component Analysis

Variables included in the PCA are a reduced set compared to those included in the questionnaire. Particularly: (i) responses of banks and insurance companies were dropped, as they were very few in number; (ii) very general responses, such as opinions on business stability in the future, have been omitted; and (iii) details, such as those about the type of credit, insurance or contracts adopted, were also dropped. The resulting data set includes 53 variables, all discrete, and 82 observations. Variables are listed in Table 1.

The first seven components capture about 68 percent of total variance, with the first explaining about 38 percent, the second explaining 9 percent, the third explaining 6 percent; and the others capturing from 6 percent to 3 percent of total variance. Hence the first component is by far the most important. To ease the reading of the results, loadings smaller than .10 have been omitted in Table 2.

The first component includes high loading variables describing the mitigation strategies and their effectiveness, and the percentage of variance explained by it witnesses the relevance that mitigation strategies have in discriminating among the respondents to our questionnaire. Association occurs particularly among responses on the use of commodity exchanges, credit and finance, savings, policies, and production contracts; as well as on the identification of changes in demand, input prices and the exchange rate as major sources of risk (Table 2). This indicates that respondents who are concerned by price risks look mainly at those listed above as tools to address this risk. Those tools are, in fact: (a) services that all entrepreneurs use to increase the amount of risk that they can retain individually, and (b) contracts, which are vertical co-ordination arrangement aimed at reducing transaction costs.[7]

The second component includes the responses to the questions concerning sources of risks. The discrimination between respondents is mainly influenced by changes in input and output prices, and especially in oil prices, which appear with high loadings, in association with the absence of credit use – loading appear with negative sign – with market risk sources, such as demand and output prices, and the exchange rate (Table 2). This reflects a concern of many respondents, probably due to the high level that the oil price had reached in the period when the questionnaire was administered. At the same time, the implied negative correlation with the use of credit indicates that the concern for changing market conditions are relatively more prominent in respondents who do not make use of this service, and hence have few possibilities of smoothing consumption.

The two most important variables in the third component are the ones recording the answer to the question of whether the respondent is a farmer, and the size of the farm,

[7] The only "outlier" with respect to this point, is the presence in the component of a high coefficient for the "sale of assets'. This is an ex-post coping strategy, to which stakeholders resort under extreme conditions. It is interesting, however, that insurances do not appear.

which appear with the highest loadings; in association with concern on the exchange rate as a source of risk, and a negative association with policies as a source of risk (Table 2). Altogether, this indicates that large farmers are concerned with exchange rate's risk, and don't see change in policies as a source of risk, but rather as something that may mitigate such risk.

The fourth component is characterized by changes in consumer demand and the exchange rate, which appear in association with the use of contracts and especially credit. Loadings in this component indicate that stakeholders concerned about change in consumers tastes, who are also looking at foreign markets, do make use of contracts and credit as mitigation strategies, and believe that insurances may be useful.

The fifth component is also dominated by risk sources, especially those related to output prices and transports and distribution failures. In these components, risks appear associated with participation in producers associations, though the latter enters with a small loading.

Finally, the loadings of the variables entering the 6th and the 7th components, which explain a minimal share of the variance, show association of risk sources and risk mitigation mechanisms with production contracts, which appear once more with a negative sign. The absence of contracts is associated with certain risks also in this component, and particularly those arising from price variability, on both the input and the output markets. Finally, in the 7th component it is worth mentioning the association of insurance being considered as an effective risk mitigation tool, with the importance attributed to weather as a source of risk.

Based on the results of the PCA, an aspect which we deemed worth exploring further is the pattern of associations between variables expressing the opinions of the respondents on the effectiveness of various mitigation mechanisms, and the condition of being a farmer, especially of small scale. For this purpose, we performed a cross tabulation of the responses: a two-way table was built, highlighting the number of instances in which replies to the various questions included in the questionnaire appear in association, and the number of instances in which one reply excludes the others. Table 3 reports the number of cases in which the respondent was a farmer, and the different mitigation mechanisms that he or she considered effective to reduce risks.

From this perspective, it appears that farmers look primarily at crop diversification and the availability of new equipment as means to reduce risks, followed, in order, by the presence of infrastructures, the availability of savings, assistance from banks, and conditions specified in production contracts. Strong associations in the replies appear also among diversification, improvements in equipment and infrastructures, and the use of formal and informal credit. The high prevalence of diversification stems in part from the type of farmers interviewed: fruit and vegetable producers in the countries in which the questionnaire was administered usually diversify by planting different crops during the year, and are hardly specialised. However, the importance attached to equipment and infrastructure, in association with the importance attached to savings, formal and informal credit and finance, may also signal a condition of substantive under investment,

given the low use of credit. A very similar pattern applies to small scale farmers, cultivating less than 10 acres.

6. Concluding remarks and policy perspectives

Results depict a complex situation, which appears to be mostly a consequence of the economic features of SIDS, combined with those of agriculture in the ACP countries and those of fruits, vegetables and spices production in general. The small size of the economy and its remoteness determines a strong search for business diversification, which takes place both across products, and across the value chains, given that several respondents, and especially large scale farmers play different roles in it. Coherently, product diversification is regarded as the primary and most effective strategy to mitigate risks.

As in every country, the technical characteristics of fruits, vegetables and – to some extent – spice production, push towards vertical integration, especially if they are exported. However, in the countries where the survey was carried out, vertical integration seems to be limited to farmers operating also as (small) processors or traders. The more typical tools for lowering transaction costs in fruits and vegetables, which are business contracts between farmers and processors or traders, are used only by very few of the respondents. The emphasis on equipment and infrastructures as mitigation strategies indicates a condition of underinvestment, which may in turn be associated with increased risks from such things as pest and disease outbreaks, and which makes fresh products more perishable and less safe. The small size of the SIDS and the reliance on few export products that characterised the agricultural economy in the ACP until recently, seems to have prevented, to date, a wider formation of large integrated agri-business operations, at least in the counties in which the survey was administered.

Responses on the relevance of various risk sources indicate that all of them are important; a result that indicates a limited ability to cope with market prices variability or, in other words, with too small a “retention layer” in the density function of potential damages. This is confirmed by the high importance attached to business contracts, savings and access to credit as key mitigation mechanisms, which are used by few respondents. In fact, even handling “normal” or expected variability in the flow of income seems to be a problem, especially for small farmers. Larger farmers, as well as other stakeholders which are more connected to the export market, still face uncertainty, but seem to value more market-based mitigation strategies, including insurances. Also this pattern appears to be mainly the outcome of the ACP trade regime and the related concentration on few products, coupled with the SIDS features.

Under such conditions, the revealed limited use of insurances appears to be an obvious consequence: especially for weaker stakeholders, demand for products that shield from disruptive events is limited by more pressing issues: if the problem is obtaining credit for purchasing inputs at the beginning of the season, it is difficult to allocate money in an insurance. Together with the small size of the market and the high covariate nature of risks, this prevents, or limits, the supply of customized insurance products.

These results indicate that actions to improve risk management and the functioning of value chains may be taken in several different areas, and mainly in three directions. First, strengthening and stabilizing linkages along the value chains, among domestic and foreign stakeholders, seems to be a key preliminary requirement for accessing the benefits of potential comparative advantages in products like fruits and vegetables and spices. "Light" forms of vertical integration, such as formal or informal production contracts can play a key role in income stabilization. Forward contracts might be complex agreements, through which farmers can reduce the uncertainty on sales prices and market outlets, while receiving inputs and technical assistance by agribusiness firms. Usually farmers receive from buyers the required inputs in exchange for a commitment to deliver products by a given date at a given price. In order to promote these types of arrangement, efforts would be required in terms of the definition of incentive-compatible frameworks, and in terms of the legal basis for ensuring enforcement.

A second area in which efforts could be devoted is that of credit and finance. Promoting improved access to such services appears to be an important requirement for setting up credible business, and also to promote more coherence and vertical integration. On the supply side, diversifying credit products could be part of a strategy aimed at increasing access, by designing customized products that take into account the specific needs of farmers and other entrepreneurs operating along the value chain. As seen from the survey, collateralization is also a major issue, which may be addressed by widening the range of goods and titles accepted by banks. In some countries land property titles are not well defined, or their definition is outdated; and this can be a major problem for accessing credit and finance for investment.

Especially for small farmers, two different avenues should be explored. On the one hand, horizontal organizations, such as producers groups, may be willing to subscribe collective commitments with financial institutions, a feature that has proven effective in the micro-credit experience. A necessary condition for this approach to work, however, is the existence of mutual trust, reinforced by repeated transactions, which is not always the case in the reality we surveyed. Another possibility is to exploit vertical relations along the value chain: contracts between farmers and processors, for instance, could be considered as collaterals. There are examples of similar arrangements around the world, which have been successful. Vegetables production in Uganda offers an example of this kind of vertical coordination (Henson, 2004) as well as the Federation of Agricultural Cooperatives (FECOAGRO) of San Juan, Argentina (Santacoloma et al, 2005).

Third, efforts may be devoted to developing the insurance market. Once value chains become more organized, integrated and technically equipped, so that participants would be in a better position to handle higher degrees of variability in prices and incomes, and to use finance and credit to invest and smooth consumption patterns, they would probably also be able to demand more insurance. Today, as seen from the analysis of the responses to our questionnaire, this market is fairly incomplete, due to lack of both demand and supplies. For insurance too there are examples worldwide of vertical relations and linkages with credit, which have been utilised to ease access and develop market. In Malawi, for instance, groundnut producers receive loans to purchase hybrid seed along with an index-based insurance against drought. If drought triggers indemnities, part of the

funds are directly channelled to banks, in order to settle the loans (Alderman and Haque, 2007). Also collective insurance schemes are not infrequent, as in the cases of organic bananas in Peru and organic cocoa and bananas in Costa Rica, where farmers associations purchased collective insurances against natural disasters and the risk of default from the buyers (Slingerland et al., 2006).

Finally, it is worth highlighting that most of the possible arrangements we mentioned will require a great deal of partnership between public institutions and the private sector. The exact nature of such a partnership is highly dependent upon the specific context at hand. In principle, the respective roles are not difficult to identify: while incentives for developing a value chain need necessarily to be coming from private stakeholders, Governments have to ensure supplies of the many public goods required for markets to function, such as the legal basis for contracts enforcement, land titles, standards, and non-appropriable research. However, based on the results of the survey, there seems to be scope for even wider interventions of the public sector, aimed at starting-up the development of value chains such as those of fruits and vegetables. Public institutions could in fact promote improved co-ordination among producer groups along the value chains and their ability of dealing with the market, also by supplying training, information, extension services, co-ordination among banks, insurance companies and stakeholders groups and the identification of business opportunities.

References

Alderman H. and Haque T. "Insurance Against Covariate Shocks The Role of Index-Based Insurance in Social Protection in Low-Income Countries of Africa. World Bank Working Paper n. 95, 2007

Angelucci, F. "Weather indexes in agriculture: a review of theoretical literature and developing countries' experiences" mimeo, FAO EST, May 2008

Brace, I. (2004). Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market Research. London: Market Research in Practice Series.

Cafiero C. (2008) Agricultural producer risk management in a value chain context: Implications for Developing Countries' agriculture, AAACP Paper Series n. Trade and Markets Division, FAO, Rome

Commodity Risk Management Group (CRMG) "Assessing agri-food supply chain risk and risk management. Conceptual framework and Guidelines for application" World Bank, Washington DC, November 2007

Creech, S. (2007). "Sample Size" available at www.statisticallysignificantconsulting.com

da Silva, Carlos A. B. "The growing role of contract farming in agri-food systems developments: drivers, Theory and Practise. Agricultural Management, Marketing and Finance Service FAO, Rome, July 2005

de Janvry A., Sadoulet E., McIntosh C., Wydick B., Luoto J. "Credit Bureaus and the Rural Microfinance Sector: Peru, Guatemala, and Bolivia A joint project between The University of California at Berkeley and The FAO Office for Latin America December 8, 2003

Eeckhoudt L., Gollier C., & Schlesinger H. "Economic and Financial Decisions under Risk", Princeton University Press, 1992.

European Commission – Agriculture Directorate-General. Directorate A. Economic analyses, forward studies, evaluation. Working Document. "Risk Management Tools for EU Agriculture, with a Special Focus on Insurance". January 2001

FAO (2005) Small island developing states. Agricultural production and trade, preferences and policy. FAO Commodities and Trade Technical Paper No. 7, FAO Commodities and Trade Division, Rome

Glover, D., 1990. "Contract farming and outgrower schemes in East and Southern Africa". Journal of Agricultural Economics, 41 (3), 303-315.

Glover, D.; 1994 "Contract Farming and Commercialization of Agriculture in Developing Countries. In: von Braun, J. and Kennedy, E. (Eds.). Agricultural Commercialization, Economic Development and Nutrition. Johns Hopkins, pp. 166-175.

Gower J C. Some distance properties of latent root and vector methods used in multivariate analysis. Biometrika 53:325-38, 1966

Hardaker J. B., Huirne R. B. M., Anderson J. R., and Lien G. Coping with Risk in Agriculture (Cabi Publishing) Jun 17, 2004

Henson S., and Jaffee S. "Understanding Developing Country Strategic Responses to the Enhancement of Food Safety Standards, University of Guelph, Canada, The World Bank, Washington, DC, 2007.

IFC, 2009 Doing business in Small Islands Developing States, available at http://www.doingbusiness.org/documents/subnational/DB2009_Small_Island_developing_states.pdf

Jolliffe, I. T., Discarding Variables in a Principal Component Analysis. I: Artificial Data and II: Real Data. Applied Statistics, 1991

Jolliffe, I.T. Principal component analysis. Springer Series in Statistics, 2002, Second Edition

Kang M. G. “Innovative agricultural insurance products and schemes”FAO, Rome, 2007

Khan, O., B. Burnes. «Risk and supply chain management: creating a research agenda. » The International Journal of Logistics Management 18, no. 2 (2007): 197-216.

Lacroix R. and Varangis P. “Using Warehouse Receipts in Developing and Transition Economies” Finance & Development / September 1996

Linnerooth-Bayer, J., Mechler, R. (2007). Disaster safety nets for developingcountries: Extending public-private partnerships. Environmental Hazards 7(1):54-61

Minten, B., Randrianarison, L. and Swinnen, J.F.M. 2006. Global Retail Chains and Poor Farmers: Evidence from Madagascar. LICOS Discussion Paper 164, Leuven.

Santacoloma P., Suarez R., Riveros H. “Strengthening agribusiness linkages with small-scale farmers. Case studies in Latin America and the Caribbean. AGSF Occasional Paper 4, FAO 2005

Slingerland M. Ruben R., Nijhoff H., Zuurbier J.P.P. “Food Chains and Networks for Development. Lessons and outlook. Wageningen University and Research Centre, 2004

Winters A. and P. Martins (2004) “When Comparative Advantages Is Not Enough: Business Costs in Small Remote Economies” mimeo, Centre for Economic Policy research, London

World Bank 2005. “Managing Agricultural Production Risk. Innovations in Developing Countries”. Washington D.C.

Table 1. Variables in the PCA

jam	=	Jamaica	distr_freq	=	Distribution failures
gre	=	Grenada	gov_freq	=	Changes in Government policies
fji	=	Fiji	for_mkt_freq	=	Changes in foreign market conditions
van	=	Vanuatu	cons_freq	=	Changes in consumer demand
far	=	Farmer	exch_freq	=	Changes of exchange rate
sp	=	Specialised	oil_freq	=	Changes in oil prices
fv	=	Fruit & Vegetable (F&V)	gov_eff	=	Effectivness of Government policies
fv_other	=	F&V and other crops	div_eff	=	Effectiveness of crop diversification
fv_cattle	=	F&V and cattle	pro_cond_eff	=	Effectiveness of production contracts
fv_spices	=	F&V and spices	inf_eff	=	Effectiveness of infrastructure
farm size	=	Farm size (<3ha; 3-10ha; >10ha)	eq_eff	=	Effectiveness of new equipement
pro	=	Processor	crins_eff	=	Effectiveness of informal credit and insurance
tra	=	Trader	fins_eff	=	Effectiveness of formal credit and insurance
ret	=	Retailer	bank_eff	=	Effectiveness of assistance from banks
ban	=	Bank	save_eff	=	Effectiveness of savings
ins	=	Insurer	sale_eff	=	Effectiveness of sale of assets
inp	=	Input provider	cex_eff	=	Effectiveness of commodity exchanges
gov	=	Government official	opn_coll	=	Opinion on collateral substitutes
asc_ys	=	Association membership	opn_gov_pol	=	Opinion on Government policies
opr_freq	=	Changes in output prices	opn_tech_ast	=	Opinion on technical assistance
ipr_freq	=	Changes in input prices	opn_frm_assc	=	Opinion on farmer association
out_dec_freq	=	Decline in output prices	contr_ys	=	Use of production contracts
inp_pro_freq	=	Changes in the operation of input provide	ins_ys	=	Use of insurance
dom_mkt_freq	=	Changes in domestic markets	credit_use_ys	=	Use of credit
wea_freq	=	Adverse weather events	opn_ins_us_ys	=	Opinion on insurance usefulness
pd_freq	=	Pests & diseases	opn_sscale_imp	=	Small farm size influences supply of insurance
transp_freq	=	Transports failure			

Table 2. Loadings of the first seven components*

	Comp 1	Comp 2	Comp 3	Comp 4	Comp 5	Comp 6	Comp 7
jam							0.2349
gre		-0.1614		0.1328	0.1551		
fji							-0.1699
van		0.1014			-0.1682		
far			0.3146				
sp							
fv							
fv_other							
fv_cattle							0.1025
fv_spices							
farm size			0.8699				
pro							
tra							
ret							
ban							
ins							
inp							
gov			-0.1230				
asc_ys		-0.1237			0.1544		
opr_freq		0.2326			0.2729		0.2639
ipr_freq		0.2033				0.3069	0.1302
out_dec_freq		0.1790			0.3515	0.2762	
inp_pro_freq	0.1034	0.4072					
dom_mkt_freq	0.1317	0.2461				-0.3034	
wea_freq							0.5371
pd_freq	0.1113	0.1863			0.1092		
transp_freq					0.5030	-0.1223	
distr_freq		-0.1122			0.5870		
gov_freq	0.1695	0.1210		0.1650			-0.2090
for_mkt_freq				0.2294		-0.3738	
cons_freq				0.6117			
exch_freq	0.1351	0.2413	0.1342	0.3004			-0.3573
oil_freq		-0.2180					
gov_eff	0.2787		0.1734			0.1788	
div_eff	0.1572					0.1516	-0.1917
pro_cond_eff	0.2601					0.1198	0.1375
inf_eff	0.1393					0.2786	
eq_eff	0.1854					0.2350	
crins_eff	0.2529					0.1337	
fins_eff	0.3113						0.1007
bank_eff	0.2983			-0.1398			
save_eff	0.2780	0.1607				-0.2597	0.2743
sale_eff	0.4178					-0.1316	
cex_eff	0.3351				0.1212	-0.1306	
opn_coll							
opn_gov_pol		0.1102					
opn_tech_ast							
opn_frm_assc							
contr_ys				0.1200		-0.4045	
ins_ys							
credit_use_ys		-0.1672		0.4595	-0.1278		0.2035
opn_ins_us_ys		-0.1037		0.2082			0.2875
opn_sscale_imp				-0.1943			

* = blanks are loadings whose absolute value is smaller than .10

Source: author's calculation

Table 3. Cross tabulation

	gov_ eff	div_ eff	pro_cond _eff	inf_ eff	eq_ eff	crins_ eff	fins_ eff	bank_ eff	save_ eff	sale_ eff	cex_ eff	far	farm size (<10acres)
gov_eff	31	23	22	20	22	20	17	20	16	11	14	13	5
div_eff		43	26	30	34	26	24	29	22	16	18	27	12
pro_cond			34	24	27	23	22	21	22	15	16	20	9
inf_eff				40	34	24	23	26	21	12	16	25	11
eq_eff					43	28	23	28	24	14	17	27	11
crins_eff						35	23	27	21	14	18	22	10
fins_eff							30	25	18	12	18	19	7
bank_eff								37	20	14	18	22	8
save_eff									32	14	16	23	11
sale_eff										20	13	16	6
cex_eff											22	15	7
far												43	21
farm size (<10 acres)													21

Source: author's calculation

APPENDIX 1

Box 1 -- GRENADA

Grenada is classified as an upper-middle-income economy, with GDP per head of US$12,847 in 2005. Following strong growth and falling unemployment in the late 1990s, economic performance has been erratic over the past five years owing to adverse shocks. Agriculture accounts for about 10 percent of GDP. Smallholder farmers produce a wide variety of fruit and vegetable crops, and some livestock products. Nutmeg and mace have traditionally been the major exports crops: Grenada was the world's second-largest producer of these crops after Indonesia, supplying one-quarter of world demand. However, the industry was devastated by Hurricane Ivan (2004), and with replanting placing heavy demands on labour, it is not clear to what extent the industry will recover. The same occurred to the small cocoa industry. Bananas are grown on a small scale, but are no longer exported.

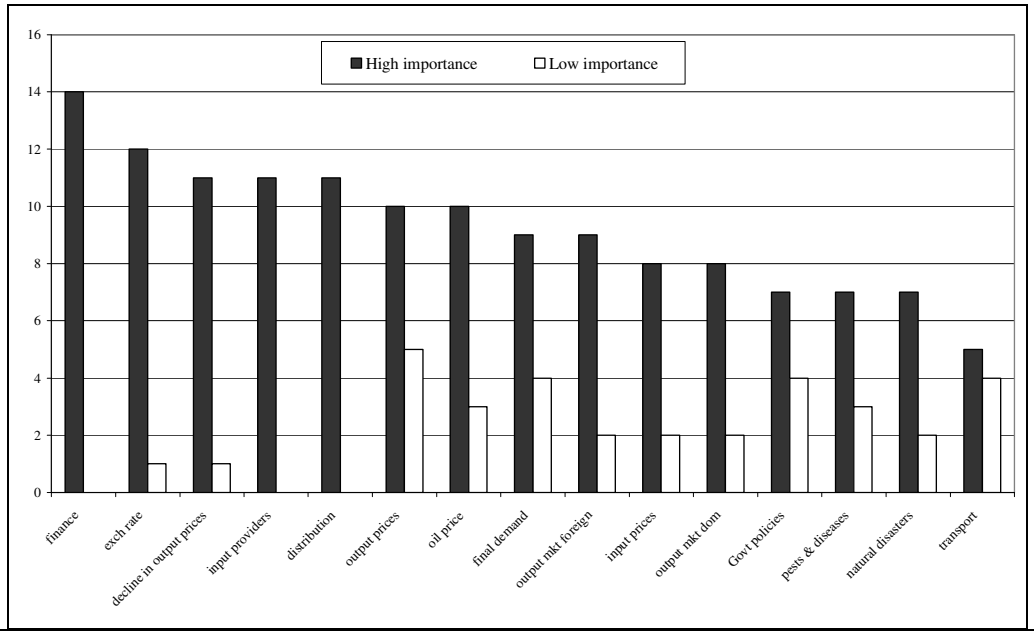
Survey results

Respondents are 21. The majority are farmers producing: cocoa, cinnamon, vegetables, nutmeg, mango, bananas, livestock and flowers with a farm size that ranges from 1.5 to 600 acres. Traders, processors, input suppliers and government officials are also represented, even if almost all traders, processors and input suppliers are also farmers.

A minority of respondents is member of a farmers' association. The services provided by associations are quite advanced and effective compared with the other countries included in this study: supply concentration and marketing; contractual agreements with processors, retailers; information and training; extension and others, such as agronomic advice, policies and incentives.

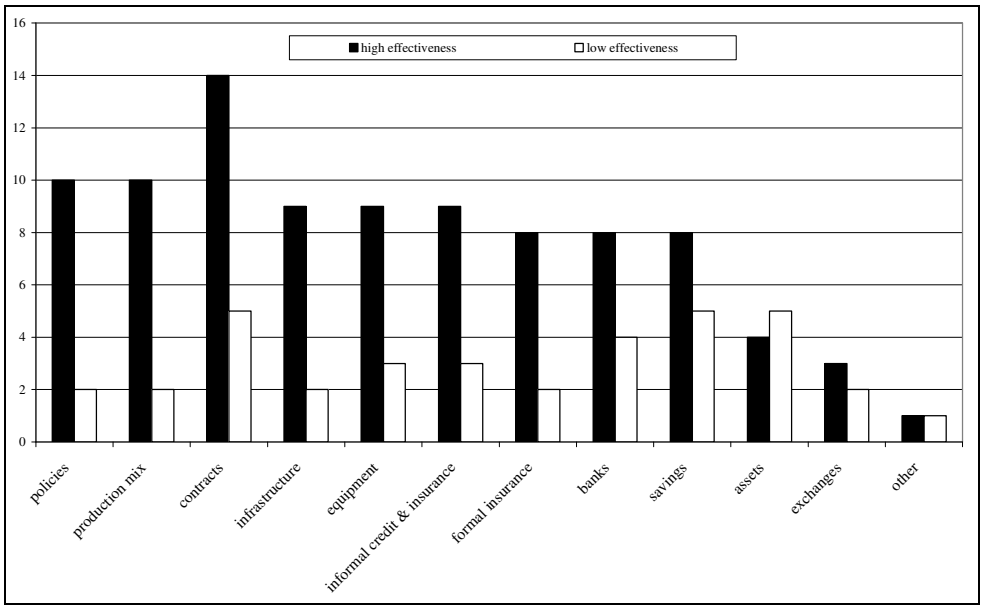
The most important reported risk source is change in the conditions of finance, followed by changes in exchange rate and long term output price decline. Changes in the operation of input providers and distribution failures are also deemed important. On the contrary production risk due to pests and diseases and weather events is not a concern. Changes in policies are considered important only by large farmers producing nutmeg and cocoa, and by public sector representatives. Few farmers consider hurricanes important, while Government officials and processors do. Average to small farmers, traders and input suppliers consider financial conditions to be of high importance.

Figure 1. Grenada. Perceived sources of risk



Respondents indicated contracts -- involving the sale of output and provision/purchase of inputs -- as the most effective risk management tool. Specifically, contracts are considered effective especially by processors and small farmers. Larger producers rely more on new equipment and infrastructural enhancement. The interest of respondents on market based risk management mechanisms is reflected in the suggested topics for training which are: production contracts; insurances; commodity exchanges; market information; disaster mitigation.

Figure 2. Grenada. Risk mitigation tools



Responses on risk management and finance show that respondents consider them effective; especially production contracts – which are used by a minor share of respondents -- are considered useful to reduce risk. Insurance and credit are also considered useful, they are seldom used, due to both high transaction costs and lack of customized products; these are especially the concerns of small scale farmers. High cost of insurances is an issue for small scale farmers and processors, while few farmers highlight the lack of information, the complication of contracts and the lack of appropriate products. Few credit users responded on the type of products they use (overdraft, loans). The major limiting factors in accessing credit (according to respondents from the Government and some farmers) are the high interest rates. Collateralization is not considered an issue by farmers; rather it is considered so by processors. The small scale and the risk of default are important, according to (some, not all) small farmers.

Figure 3. Grenada. Factors limiting access to credit

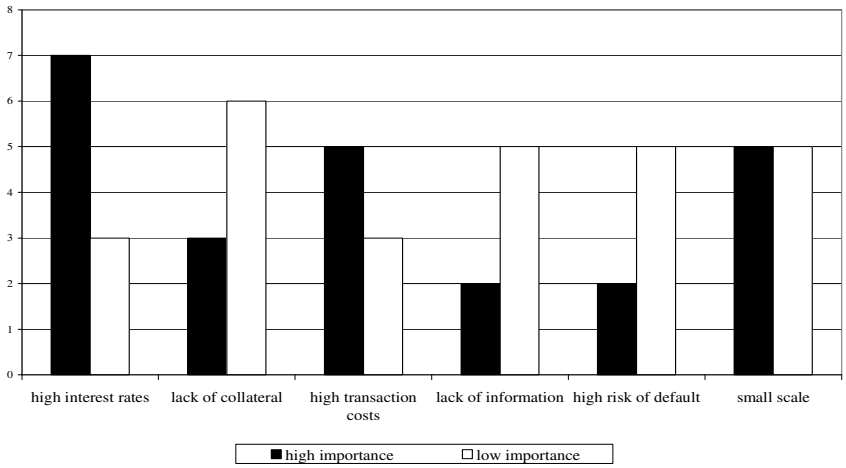
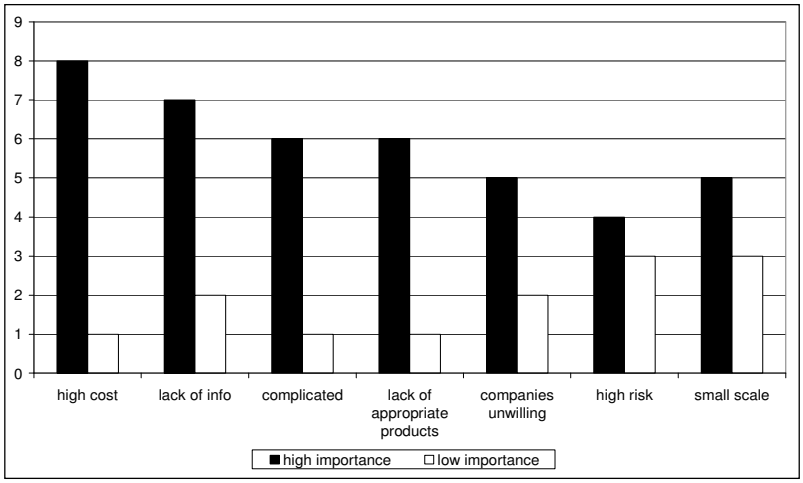


Figure 4. Grenada. Factors limiting access to insurances



Box 2 -- JAMAICA

Jamaica is a small open economy, traditionally based around the production of bauxite, sugar and manufactured goods for export. A decline in manufacturing in the past decade has shifted the economy increasingly towards the provision of services, particularly tourism, with services contributing 67% of GDP in 2006. Manufacturing accounted for 11.9% of GDP in 2006, down from 13.3% in 2001. Agriculture accounted for 5.5% of GDP in the same year. Agriculture, forestry and fishing contribute around 20% of total employment. Since the mid-1990s the sector has been hit by climatic challenges such as hurricanes, floods and drought and a lack of access to credit has limited investment in new crops and technological improvements.

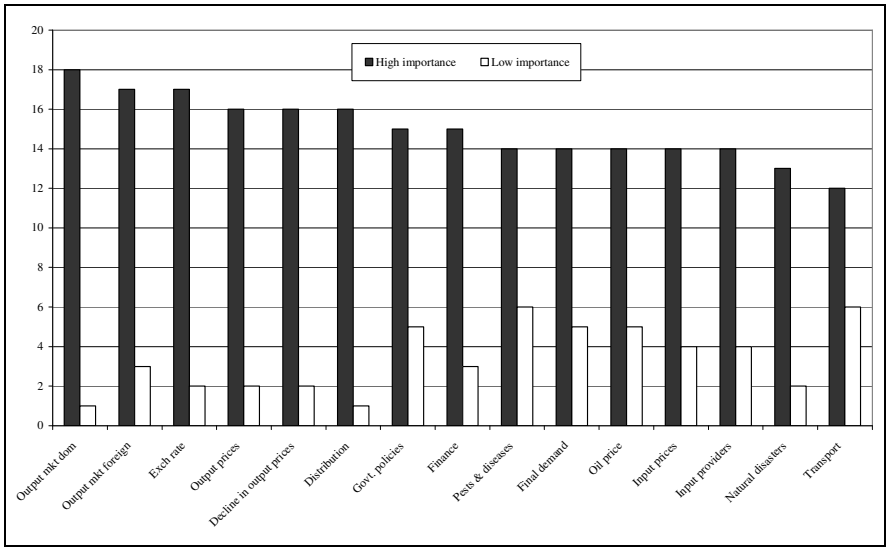
Despite poor weather conditions in recent years and a chronic lack of investment, sugar remains the main agricultural export. Sugar output has fallen sharply in the past decade, from 236,000 tonnes in 1996 to about 140,000 tonnes in 2006, due to declining yield of sugarcane per hectare and of the sugar content of the cane. The sugar sector is estimated to account directly for 40,000 jobs and is the backbone of several large rural communities. In July 2006, changes to the sugar pricing regime proposed by the EU came into effect. However, the impact of price reduction will be fully visible starting from 2007. Banana is another major crop in the country. Since 1997, production has declined steadily, with poor climatic conditions exacerbated by uncertainty over the EU's banana regime and declining world prices. Between 1996 and 2006 banana export volumes dropped by more than 60%, from 87,400 tons to 32,400 tons, and export earnings fell from US$45m to US$13m as a result of the erosion of EU trade preferences. Other traditional export crops, including cocoa and citrus, has been reduced in recent years by the impact of drought in the late 1990s, and floods and hurricanes since 2000. This decline has been exacerbated by low investment because of weak international soft commodity prices. An exception to this trend has been coffee: export earnings increased, owing to the premium prices obtained for the high-quality Blue Mountain coffee. Non-traditional exports, such as yams, papayas, and marine products, grew steadily in the 1990s, but have declined in recent years.

Survey results

Respondents are 21, mostly farmers involved also in other activities such as processing, trading, retailing or input supply. Only six respondents are exclusively farmers, traders or processors. The large majority of farmers are member of an organization. Extension, information and training are the services mentioned by almost all stakeholders while intermediation services such as contractual agreements or aggregation of supply are mentioned by only a few respondents.

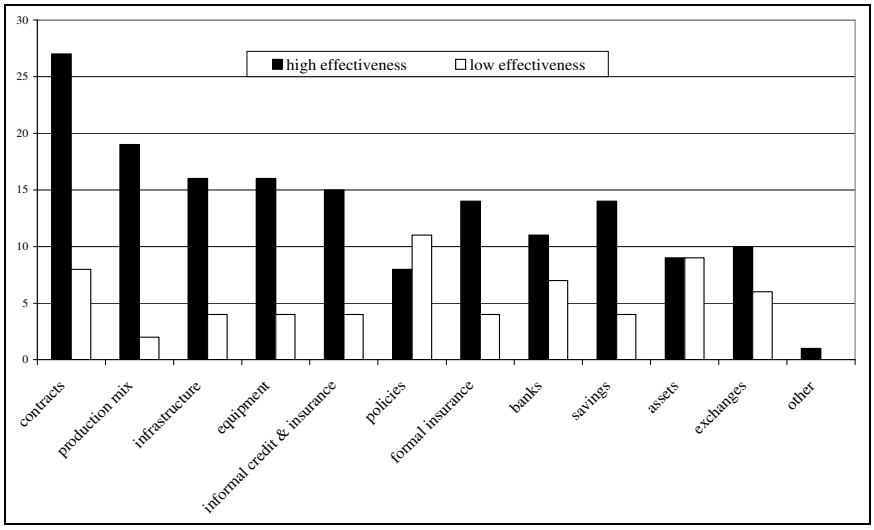
According to the results, changes in output markets play a prominent role among risk sources, both foreign and domestic, together with output prices variability. Changes in policies are considered an important source of risk. Distribution failures, together with pests and diseases, are also considered as important sources of risks, Sugar and coffee farmers are less concerned with pests and diseases and with overall natural disasters than other farmers. Small scale traders, -- called "higglers" -- are also small farmers, and show similar patterns of replies. Traders are less concerned with finance and natural disasters.

Figure 5. Jamaica. Perceived sources of risk



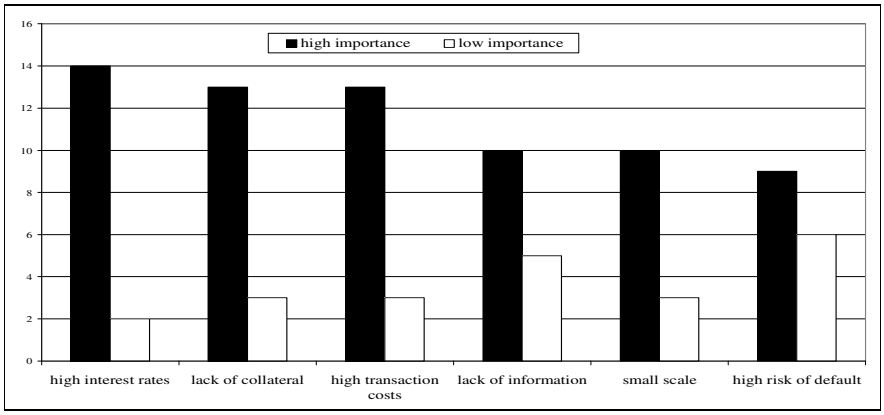
Contracts and diversification are considered the two most effective mechanisms to manage risk, followed by infrastructures and insurances (formal and informal). Contracts are considered effective especially by small farmers with more diversified production mix; policies are considered with skepticisms by more than half of the respondents. Production contracts are used by a few respondents (5 out of 21) None of the respondents reported enforcement problems.

Figure 6. Jamaica. Risk mitigation tools



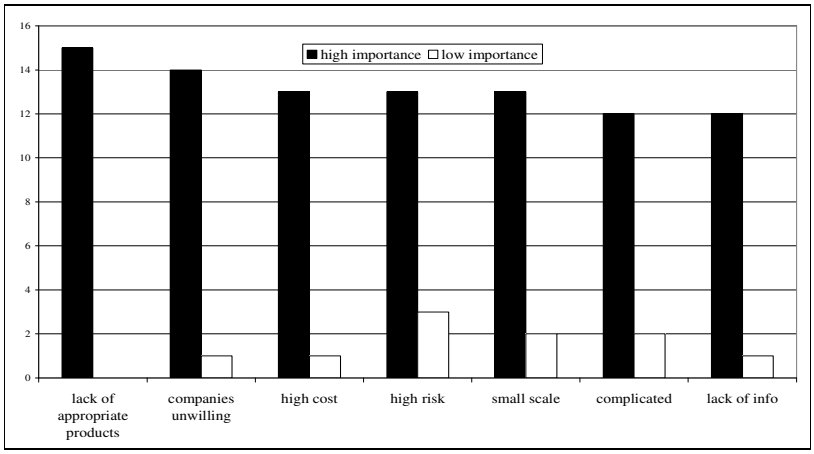
Insurance is deemed important by almost all stakeholders even if it is purchased by only five respondents. Contracts cover: products in warehouse; transportation of goods and contents; loss, theft and damage; product liability. Credit is used only by 9 respondents out of 21; 18 respondents out of 21 indicated credit as a mean to reduce risk in their operation. Small farmers use credit to purchase inputs (feeds, medication, fertilizer, insecticides, and fungicides). Large farmers use loans from commercial banks. High transaction costs or interest rates, lack of customized products are the main reason limiting access to credit.

Figure 7. Jamaica. Factors limiting access to credit



Factors limiting access to insurances are the unwillingness of insurance companies and the consequent lack of appropriate insurance products which is indicated as the main aspect from the side of potential clients.

Figure 8. Jamaica. Factors limiting access to insurances



Box 3 FIJI

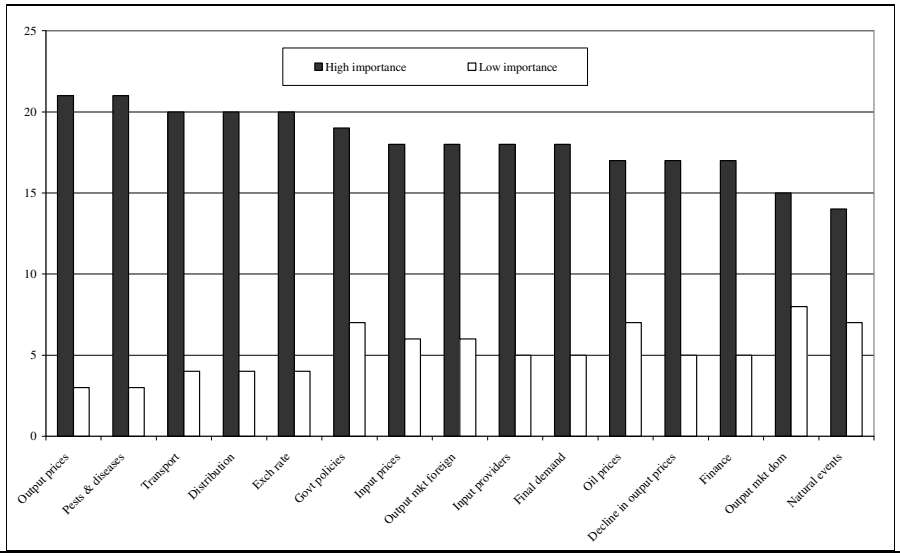
Subsistence farming and sugar cane production dominate the Fijian agricultural sector. Sugar production contributes 6 per cent of GDP, 25 per cent of total domestic exports, and employs around 40,500 people. The major shift in agriculture is the increasing role of cash crops and livestock. This represents a diversification towards more commercial agriculture as some farmers move out of sugar. Profitable opportunities have been identified for exporting certain high value niche products. More significant examples are fresh ginger to North America, mangoes to Japan, taro to New Zealand, eggplant to Canada, coconuts to Australia, organic banana puree to France. However, quality, volume and continuity of supply are seen as marketing problems. Fiji's past experience has shown that high value export markets can not be developed and sustained with small exporters securing supplies from farmers in an informal ad hoc fashion. Finance for farming remains a key constraint. The outreach of rural financial services is limited, because there are insufficient borrowers to make it viable. The uncertainty over Land Leasing Arrangements is an overriding constraint towards a more commercial focus.

Survey results

Respondents are 28 and include farmers producing: papaya, pineapple, eggplant, pumpkin, chilies, tomatoes, okra, cucumber and other vegetables. These products are intercropped with taro, cassava, cattle and sugarcane. Farm size varies from 3 to 234 acres. Some farmers (especially the largest - averaging 52 acres) are also involved in processing, trading, retailing and sale of inputs. Farmers that do not process or trade their products average 15.5 acres. Respondents also encompass: processors, traders, banks and government officials, with a slight prevalence of farmers and Government officials. In Fiji, as other Pacific Islands Countries, farmers associations are not diffused and the few that are operational show a very low level of penetration. Information, training and extension are the services provided. Intermediation services, such as aggregation of supply and contractual agreements are indicated as marginal activities by respondents.

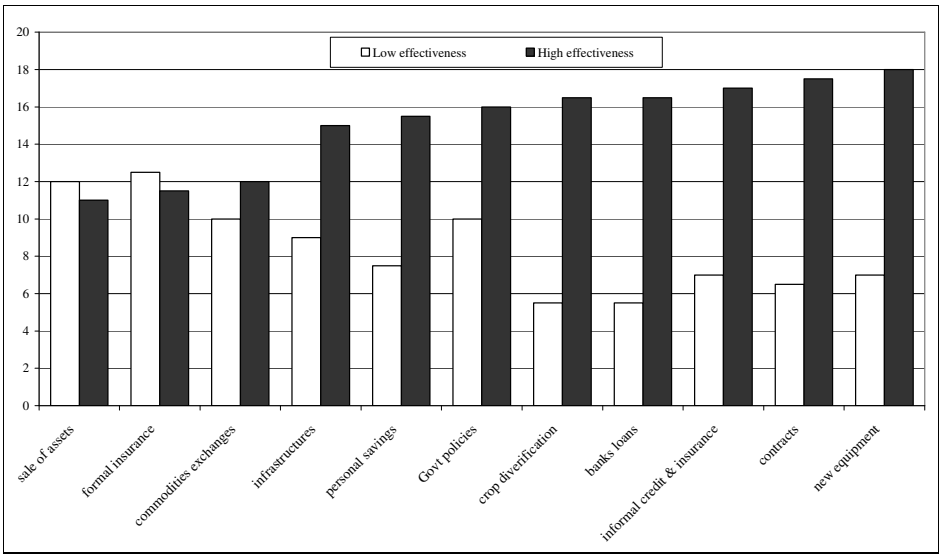
The major concerns expressed by stakeholders in terms of sources of risk are: variability of output prices and pests and diseases. Decline of output prices is a minor concern (if compared with price variability) both for farmers and non-farmers. Some differences in attitude toward risk have emerged according to the type of stakeholder: farmers are particularly concerned with input and output prices even if those who are involved in processing consider price variability as less relevant; changes in the conditions of finance are considered as very important by smaller farmers; changes in the operation of domestic output market are a major concern for all farmers. Traders and retailers are mostly concerned about: transport and distribution failures, changes in input and output price; changes in the final consumer demand and changes in the operation of domestic market.

Figure 9. Fiji. Perceived sources of risk



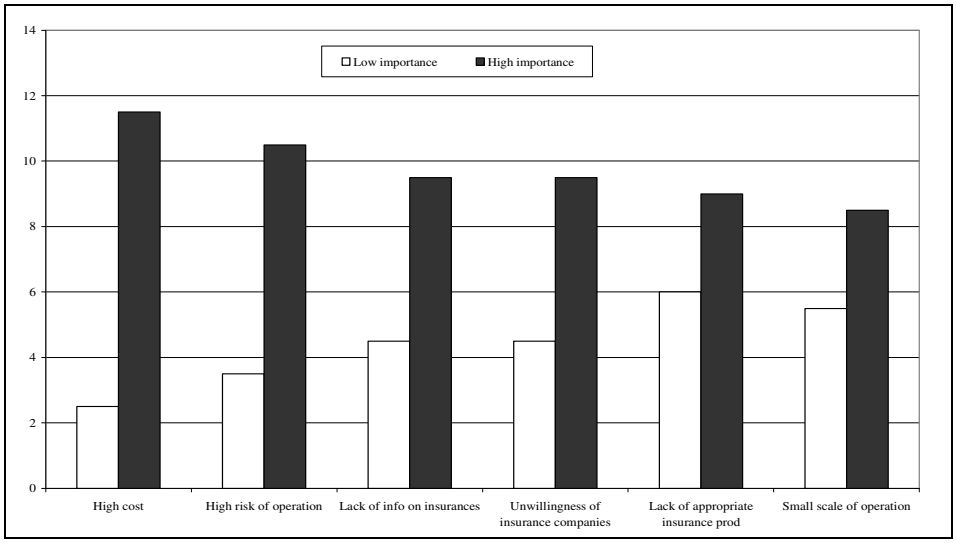
Farmers indicate a mix of formal and informal tools: crop diversification, contracts, new equipment, informal insurance and assistance from banks are the most effective mechanisms to mitigate risk. Larger farmers show a slight preference for formal tools (assistance from banks and new equipment). All processors indicate contracts as the preferred tool to reduce their risks; all traders indicate market based instruments, such as bank loans, commodity exchanges as the major tool to reduce their risk exposure.

Figure 10. Fiji. Risk mitigation tools



Half the respondents believe that insurance could be useful, but only few have subscribed specific contracts; these cover: vehicles (tractors); farm buildings; life insurance. The major limiting factors to access insurance are: high cost especially for farmers. Retailers and farmers claim: lack of information, unwilling companies, high risk and small scale of operation.

Figure 11. Fiji. Factors limiting access to insurances



According to the banks interviewed, credit is delivered mainly to farmers (vegetables production has a higher share if compared to fruit production) and marginally to other stakeholders (processors, retailers and traders); Farmers show the highest probability of default, followed by retailers, traders, input suppliers and processors; Insufficient collateral and lack of transparency in operations are the main reasons why banks are reluctant to provide credit, followed by the lack of customized products.

Box 4 VANUATU

About 82% of population lives in rural areas and their economic livelihood is dependent on agricultural production for survival. Vanuatu's farming systems are a mixture of subsistence gardening (home gardens) and cash cropping. Agriculture including forestry and fisheries, accounts for approximately 18% of GDP and almost all merchandise exports. Agriculture consists of two sub-sectors (a) subsistence smallholder farming which accounts for almost 10% of GDP and (b) large commercial farms and plantations (8 % of GDP). Coconut oil, copra, kava and beef contribute about 20% to total exports.

The production of beef, pork, poultry and goat for local consumption forms an essential part of the rural economy. Vanuatu has one of the most conducive environments in world for raising beef cattle and the livestock sub-sector contribution to GDP and exports is significant [cattle exports (beef and hides) were valued at VT365 million in 2006].

As a small country, Vanuatu suffers from the vagaries of severe price fluctuations, general long term structural decline in commodity prices and global competition for its principal export commodities (copra, cocoa, beef and squash). The country requires flexible coping mechanisms, namely: (a) dramatically improve the levels of production and marketing efficiency to ensure high profitability and returns to labour; (b) develop value adding upstream processing of its export crops (e.g. coconut oil and cream, chocolate and confectioneries for cocoa, pharmaceutical products from kava, processed beef and beef products, and fruit/nuts e.g. *Canarium indicum* and *Terminalia catappa*); and (c) further diversify both the production and marketing systems to provide farmers with greater flexibility to respond to price signals. Reforms in the rural financial market should focus on rural savings mobilisation and linking banks with self-help production and marketing groups as well as on enabling farmers and fisherfolk to have access to new financial instruments and services of financial institutions.

Survey results

Respondents are 12 of which 2 farmers, 1 processor, 3 banks (of which one micro-finance institution, one cooperative that supplies credit to its members and one commercial bank which does not supply credit to the agricultural sector), 1 insurance company and 5 civil servants from the ministry of agriculture, the ministry of commerce, the department of cooperatives, the chamber of commerce. Farmer associations are not present in Vanuatu.

Apart from a few large fruit and vegetable commercial producers (mainly foreigners) that market regularly either to the local market or to hotels and restaurants, small households grow fruit and vegetable mainly for self consumption, as they do for other staples; occasionally they can sell their surpluses in the local markets, to meet temporary cash requirements.

The large commercial producers did not express any concern related to their access to finance or the need for risk management tools but were mostly complaining about the lack of infrastructure, such as, transport or first processing facilities to be able to export fruit and vegetables.

On the contrary, the need to mobilise smallholders' savings in rural and remote areas of the country is an essential condition in order to develop the rural finance sector. Several initiatives by a few International Organisations have been undertaken in this direction.

APPENDIX 2

FAO contribution to the AAACP Agricultural Commodities Programme

An exploratory survey on risk management along the food chains

QUESTIONNAIRE

1.

What is you activity within the value chain?

- farmer □

please list all the main crops and livestock products that you produce, starting from the most important in terms of income

What is the total acreage of your farm?_____

Do you market your products? – part of it □ *which percentage? _____*

- all of it □

- processor □
- trader □
- retailer □
- bank □
- insurer □
- agricultural input supplier (please specify which input(s))_____ □
- other, please specify_____ □

2.

Are you a member of any professional organization or producer association ?

Yes □

No □

If yes, what are the main services this organisation provides ? Please rank them in terms of effectiveness (*1=totally ineffective, 5= very effective*)

- aggregation of supply and commercialisation	□	□	□	□	□
	1	**2**	**3**	**4**	**5**
- contractual arrangements with food processors, retailers, exporters					
	□	□	□	□	□
	1	**2**	**3**	**4**	**5**
- information and training	□	□	□	□	□
	1	**2**	**3**	**4**	**5**
- extension services	□	□	□	□	□
	1	**2**	**3**	**4**	**5**
- other (please specify) _____					
	□	□	□	□	□
	1	**2**	**3**	**4**	**5**

3.

What are the main risks of your operation ?

Please rank them from 1 to 5 according to their importance
1=not important 5= very iomportant

• sudden changes in output price	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• sudden changes in input prices	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• prolonged decline in output prices	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in the operation of input providers	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in the conditions of finance	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in the operation of domestic output markets	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• natural events or disasters, such as hurricanes, floods or others (please specify)_____	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• pests and diseases related risks	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• transport failures	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• distribution failures	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• change in Government policies	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in foreign market conditions	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in the final consumer demand	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in exchange rates	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• changes in oil prices	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
• others, please specify _____	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**

4.

How stable do you think your operation is in terms of future profitability?

very unstable				*very stable*
☐	☐	☐	☐	☐
1	**2**	**3**	**4**	**5**

5.

Would the presence of such risks affect permanently or temporarily your way of doing business? For instance, would you change:

• the markets in which you sell your products	☐ temporarily	☐ permanently	☐ no change
• the suppliers from which you buy your inputs?	☐ temporarily	☐ permanently	☐ no change
• the sources of finance for your business?	☐ temporarily	☐ permanently	☐ no change
• the type of goods that you produce or deal?	☐ temporarily	☐ permanently	☐ no change
• the way in which you decide on the amount or type of goods that you produce or the modes of production you adopt?	☐ temporarily	☐ permanently	☐ no change
• other, please specify_____	☐ temporarily	☐ permanently	☐ no change

6.

What are the mechanisms that help you reducing risk in your operation?

Please rank them from 1 to 5 in terms of effectiveness
(*1=totally ineffective,* *5= very effective*)

•	Government policies	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	wider production mix	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	conditions specified in business contracts in which you are involved, for either buying/selling inputs or buying/selling outputs	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	better infrastructures, such as better roads, utilities, telecommunications, storage facilities	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	investment in new equipment, machinery or more advanced technology	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	informal credit and insurance mechanisms (friends, extended family)	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	formal insurance contract	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	assistance from banks, or other credit institutions	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	personal savings	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	sale of assets	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	production contracts	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	commodities exchanges	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	others (please specify)_____	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**

7.

Please describe briefly how would you improve the mechanisms above that do **not** work effectively

8.

If you think that more information or training could protect your activity against the mentioned risks, please specify the topic(s)

9.

Are you involved in any contractual agreement, for instance for selling/buying products or inputs, or both ?

Yes □ No □

If **yes**, how is this organized? Please describe briefly

_____

10.

Did you ever had problems in enforcing the above-mentioned contracts?

Yes □ No □

If yes, please specify what difficulties

If you are **not** involved in contractual agreements, do you think that such arrangements could be useful to reduce risk in your activity?

Yes □ No □

11.

Do you think that an insurance could contribute to alleviate risks in your activity?

Yes □ No □

12.

Please list the insurances that you use in your operation, if any

13.

What are the major limiting factors in accessing insurance? Please rank them from 1 to 5 in term of importance (*1=least important 5=most important*)

•	high cost	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	lack of information on insurances	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	contract is too complicated	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	lack of appropriate insurance products	□	□	□	□	□

	1	2	3	4	5
• unwillingness of insurance companies to insure my operation	□ 1	□ 2	□ 3	□ 4	□ 5
• high risk in my operation	□ 1	□ 2	□ 3	□ 4	□ 5
• small scale of my operation	□ 1	□ 2	□ 3	□ 4	□ 5

14.

Do you think that credit can contribute/contributes to alleviate risks in your activity?

Yes □ No □

15.

Do you use credit?

Yes □ No □

If Yes, please list the credit products that you more frequently use in your operation

16.

What are the major limiting factors in accessing credit? Please rank them from 1 to 5 in term of importance (*1=least important 5=most important*)

• high interest rates	□ 1	□ 2	□ 3	□ 4	□ 5
• lack of collateral	□ 1	□ 2	□ 3	□ 4	□ 5
• high transaction costs	□ 1	□ 2	□ 3	□ 4	□ 5
• lack of information on credit products	□ 1	□ 2	□ 3	□ 4	□ 5
• high risk of default in my operation	□ 1	□ 2	□ 3	□ 4	□ 5
• small scale of my operation	□ 1	□ 2	□ 3	□ 4	□ 5

17.

What types of collaterals you are requested to provide? Please specify

18. *(for insurance companies only)*

Do you supply any insurance product to the production chain of _____ ?

Yes □ No □

19. *(for insurance companies only)*

To which of the following participants in the value chain of _____do you sell more frequently your insurance products?
(*1=least frequent 5=most frequent*)

•	farmers	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	processors	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	traders	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	retailers	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	other banks/credit institutions	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	insurance companies	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	agricultural input suppliers of (please specify which input(s))_____ _____	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	other, please specify_____	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**

20. *(for insurance companies only)*

What type of insurance do you sell more frequently in the production chain of _____? Please specify the type of insurance product_____

21. *(for insurance companies only)*

If you answer to question n.18 was **no**, or if you would not insure some of the mentioned value chain participants, please indicate the reasons, ranking them in terms of importance
(*1=least important* *5=most important*)

•	lack of demand	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	insufficient confidence in the stability of operation	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	lack of transparency in operation	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	lack of customized insurance products	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	not attractive business	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	lack of infrastructure (e.g. weather stations)	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**

22. *(for banks only)*

Do you supply credit to the production chain of _____ ?

Yes □ No □

23. *(for banks only)*

If **yes,** to which segment of the product chain do you supply credit more frequently
(*1=least frequent 5=most frequent*)

•	farmers	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	processors	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	traders	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	retailers	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	other banks/credit institutions	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	insurance companies	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**
•	agricultural input suppliers of (please specify which input(s))	□ **1**	□ **2**	□ **3**	□ **4**	□ **5**

- other, please specify ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

(for banks only)

What type of participant in the production chain of _____is more likely to default in the repayment of credit?

Please rank them from 1 to 5 in term of probability(*1=least probable 5=most probable*)

- farmers ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- - processors ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- traders ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- retailers ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- other banks/credit institutions ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- insurance companies ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- agricultural input suppliers of (please specify which input(s)) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- other, please specify ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

24. *(for banks only)*

If you answer to question n. 22 was **no**, or if you would not supply credit to some of the mentioned value chain participants, please indicate the reasons, ranking them in terms of importance
(*1=least important 5=most important*)

- lack of confidence ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- insufficient collaterals ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- lack of transparency in operation ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- lack of customized credit products ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- not an attractive business ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

25. *(for banks only)*

What is the probability of your bank accepting as collateral the following items in the supply chain of _____

(*1=least probable* *5=most probable*)

• insurance contracts	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
• forward contracts	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
• warehouse receipts	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
• precautionary savings	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

26. *(for banks only)*

How do you protect your agribusiness loan portfolio risk ? Please specify