MANAGING RISKS IN AGRICULTURAL SUPPLY CHAIN IN INDIA

ABSTRACT

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BY

TRIBHUVAN NATH

UNDER SUPERVISION OF
PROFESSOR (DR.) SHAMIM AHMAD
Aligarh Muslim University, Aligarh

PROFESSOR (DR.) JABIR ALI
Indian Institute of Management Lucknow
(Co-supervisor)

DEPARTMENT OF AGRICULTURAL ECONOMICS & BUSINESS MANAGEMENT
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ABSTRACT

Historically, agriculture has been the backbone of Indian economy. The performance of agriculture in India is important as the sector not only contributes to overall growth of the economy but also ensures national food security and provides employment and livelihood to majority of population in the country. Studies have revealed that, over a period of time (particularly in 21st century), agricultural performance in India has been quite volatile, competitive, knowledge-led and market-oriented. The economic contribution of agriculture sector to India’s Gross Domestic Product (GDP) has fallen from 55 percent in 1950-51 to about 14 percent in 2011-12. Slowdown in agricultural growth has been one of the major concerns facing policymakers and the scholars having interest in the sector. Declining performance of the agriculture sector can largely be attributed to a variety of risk factors such as declining public investment, degradation of natural resources, declining productivity, failure to carry out essential reforms to conserve water and soil, shrinking farm size, weak rural infrastructure, market inefficiencies, adverse impact of trade liberalization, disease outbreaks, limited extension and financial services, unabated and weakened support system and climate change.

Over the past few decades, Indian agriculture is undergoing a major transformation with a shift in production, consumption and trade from food grains towards high-value agricultural commodities. The relative importance of grains and staple foods is declining while that of high value agriculture such as fruits, vegetables, milk, meat and eggs are significantly increasing as a share in agricultural output. The growth of high value agriculture presents both opportunities and challenges to various stakeholders in agricultural system. On a brighter side, new opportunities are unfolding in the form of increasing demand for high-value commodities in the domestic and global markets, which is pointing out towards the potential prosperity that can be brought into the farm sector. The entry of corporate sector and MNCs in developing countries with innovative business strategies of market-driven technologies, contract farming, processing of agro-products, developing organized retailing and exploring markets for exports is providing a new dimension to the Indian agriculture. At the same time, these changes are posing serious challenges,
particularly to small-scale farmers (<2 hectare) who constitute more than 70 percent of rural households in the country, on how to involve them in the capitalizing markets and integrate into high value agricultural supply chain and also ensuring the share of benefits arising from the new opportunities.

High-value agricultural commodities often characterized by perishable in nature, high income elasticity, price sensitivity to quality & safety, and their market prices are highly volatile therefore they are considered riskier as compared to staples and other low value commodities. It requires greater coordination in the way the high value food is produced, processed, marketed and consumed. Horticulture is fast emerging as a major commercial venture and high value driver in emerging agricultural landscape in India. Vegetables are significant contributor and dominated in Indian horticulture segment. Vegetable crops, due to production and marketing of short-gestation period are recognized as appropriate to small-scale producers and are much exposed to risk than other crops. The small-scale producers generally feed the local markets that are usually thin and fragmented. Marketable surplus of an individual small-scale producer is too small to be bargained and traded remuneratively in distant markets due to high marketing costs. All these factors escalate the transaction costs and increase risks in production and marketing considerably that may again discourage the smallholders. The main challenges towards the majority of country farmers in the process of moving towards high value agriculture are high cost of production, insufficient technical knowledge of cultivation and plant protection, inadequate access to financial and extension services, declining productivity, improper post-harvest practice and poor handling, inadequate infrastructure and lack of storage and cold chain facilities, low bargaining power, problems of aggregation and transport costs, growing marketing inefficiencies and lack of market information, environmental constraints including those arising out of climate change. The major risks and challenges towards agricultural supply chain of high value commodities are at the front of productivity, production, post-harvest and marketing. Therefore, management of agricultural risks is crucial for agricultural performance and development of farm/rural community.
To address the risks and challenges, arrays of formal and informal risk management/coping mechanisms were developed by the farming community and Government in the forms of direct and indirect interventions including market based approaches. However, these initiatives are often neither efficient nor sufficient and have not changed agricultural risk environment in the country. Also, the traditional risk management process (both Ex-ante and Ex-post) is highly fragmented, ad-hoc, non-continuous and narrow focused which does not integrate small-scale farmers in the supply chain. There is lack of integrated and systematic approach to manage the risks across agricultural supply chain. This research gap necessitates to undertake this study.

This study aims at providing a generic and integrated framework for the systematic management of potential risks in the agricultural supply chain with special reference to upstream vegetable supply chain. The overarching objective of this study is to investigate the clustering approach of managing risks in upstream vegetable supply chain in India. Additionally, this study examines factors that affect the identification and treatment of potential/critical supply chain risks. The underlying premise of the study is that agricultural growth in India can be achieved by managing potential risks of high value agriculture across the supply chain through an integrated approach of risk management which integrate farmers (particularly small-scale producers) in the supply chain and also promote adoption of effective risk control measures. Based on insights from rigorous literature review and observations, this study developed an integrated framework for supply chain risk management in agriculture with special reference to vegetable supply chain. It also discusses hypotheses predicting the relationship and effect of clustering approach and socio-economic factors on managing potential/critical risks.

For realizing the present study objectives, a synthesis of secondary and primary data were used. The secondary data used for the analysis included reputed and relevant sources such as Central Statistics Organization (CSO), National Sample Survey Organization (NSSO), Agricultural Census of India, Ministry of Agriculture (Govt. of India), the Food and Agriculture Organization of the United Nations (FAO), journals, books, policy papers, and online agricultural databases. To supplement the
secondary data and fill up the gap of earlier researches, the primary data and information were also collected from the field survey using a structured questionnaire. Keeping in view the objectives of the study, two districts in the state of Uttar Pradesh were purposively selected considering the execution of agricultural risk management projects which has been implemented by Agricultural Risk Management Pvt. Ltd. in partnership with local NGOs, CBOs, Rural Banks, Horticulture Department, agribusiness firms and other private agencies. A clustered approach was followed by them for effective risk management in vegetables’ supply chain in the selected districts. A multi-stage stratified random sampling technique was used for the selection of sampled farmers both from cluster and non-cluster groups, in the project areas. The study covered a total of 329 vegetable growers (171 cluster & 158 non-cluster farmers) from 30 villages in the two selected districts. Risk perception of the sample farmers on various pre-defined parameters (sources of risk) were recorded both in pre-intervention (pre-clustering) and post-intervention (post-clustering) segments.

Failure Modes and Effects Analysis (FMEA) is a method that uses Risk Priority Number (RPN) to assess risk by ranking of the severity (S), frequency of occurrence (O) and detection probabilities (D), was adopted under the study. To describe these three risk variables, the assessment number were ranged from 1 (least / almost certain in case of risk detection) to 10 (extreme / absolute uncertainty of detection). Then, RPN was calculated by multiplying the values of O, S and D. A high value of RPN indicates high level of risk. Pareto Analysis was also attempted and it was found to be better alternative of Risk Matrix to prioritize the potential/ critical risks. The Ishikawa diagram was used to structure the risk analysis process and represent the potential risk ranges at various stages of the supply chain. All the data analysis was carried out using SPSS (ver 20.0).

Findings suggested that the clustering as an integrated approach to risk management in upstream vegetable chain was very effective as it facilitated active participation of all the stakeholders (particularly smallholders), promotes learning and social networks, offers institutional and credit support, optimum use of limited
resources, promotes quality improvements, increases returns to scale/ economies of scale, high returns on investment, promotes innovation and continuous improvements. Analysis results indicated that the cluster farmers were significantly and effectively managing the potential/ critical risks at all the stages of the vegetable supply chain as compared to non-cluster. Importantly, the risk management strategies adopted by cluster farmers for critical risk management have also added to minimize/ decrease the non-critical risks. In contrast, the non-cluster farmers through traditional risk management approach and control strategies were not effective to manage both critical and non-critical risks in the supply chain. The results generated from findings also indicated that some socio-economic factors play significant role in the management of critical risks across the supply chain.

In summary of conclusions, the research study has been successful in achieving its objectives. The presented framework of risk management in agricultural supply chain has been researched and found to be an effective, integrated, continuous, and broadly focused approach of risk management. This study has great managerial and policy implications to integrate small-scale farmers into emerging high value chain, enabling the farmers to remain competitive, synergic institutional arrangements of Public – Private – NGOs - CBOs partnership for agricultural growth, optimum use of limited resources, economies of scale, and linking farmers with global retail chains.