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**Measuring The Impact of Transaction Costs on Profitability of Farmers: Empirical Evidence from India**

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# **Measuring The Impact of Transaction Costs on Profitability of Farmers: Empirical Evidence from India**

## **Introduction:**

The modern food retail chains (MFRCs) have recently attracted attention due to the massive increase in the number of stores, expansion of operation from developed countries to developing countries, and increase in the sale of fruits and vegetables (F&Vs) (Reardon et al. 2012). Existing literature has, in essence, captured how the MFRCs benefit the farmers by increasing their income. The studies have incorporated the impact of farmers' characteristics, farm size, irrigation facilities, infrastructure access, and credit access from traditional sources on farmers' income, productivity, employment, and welfare (Schipmann & Qaim 2011; Mishra et al., 2018). The Institutional framework is responsible for creating an atmosphere for the emergence of MFRCs in India. The Institutional economics framework provides a way in which MFRCs contracting overcomes particular types of market failures (i.e., Uncertainty, risk sharing, coordination failure) (Grosh,1994). However, the existing studies neglected to capture the variation in contracting practices and their impact on farmers' income (which leads to incurring TCs by farmers). This is unfortunate since the consequence for the farmer for their integration into MFRC is bound to be affected by the nature of the contract, which will influence income, the type and the amount of risk they bear, self-sufficiency, etc. (Grosh, 1994). Very few existing studies reveal that MFRCs tend to behave opportunistically towards farmers (Allen, 2017; Escobal & Caverro, 2012). The new institutional arrangement exposes farmers to contracts when the buyers are either monopsonists or oligopolists (Sivramkrishna and Jyotishi 2008).

***Key Words: Bounded Rationality, Contracts, Vertical Coordination, and opportunistic behavior***

The risk of an incomplete agreement, lack of enforcement, and asymmetric information create an environment for opportunistic behavior (Hobbs 1997). Lack of enforcement and asymmetric information in the context of quantity, quality, and price may result in high transaction costs (TCs). High TCs may make contracts expensive and infeasible for poor and marginal farmers. This may affect the adoption of contracts under MFRCs and explain the slow adoption rates, particularly for emerging economies. The NIE provides tools that can be useful for reducing the variation in contracting practices by regulating the terms of contracts, defining the rule of agreement, enforcing the terms of the contract, etc.

Due to difficulty quantifying the transaction costs, very few attempts are made in the literature to measure the TCs incurred by farmers due to changes in the contract terms. Williamson (2000) has also argued that the theoretical development has not been accompanied by successful measurement of TCs, which are not easy to quantify. We have attempted to see how the reduction in opportunistic behavior and the absence of asymmetric information leads to an increase in farmers' income or a decrease in transaction costs. However, there exists a gap in the literature in this context. This study estimates the TCs incurred by farmers across a different institutional arrangement of MFRCs. We consider farmers adopting production contracts (PC), marketing contracts (MC), and farmers under the traditional marketing channel (TMC) or independent farmers in this study. These contracts are different from each other. PCs have pre-fixed price and input supply provision, whereas MC provides technical guidance on chemicals and fertilizers and higher price than the traditional market. However, TMC provides just a platform for sale. Moreover, it determines the impact of TCs on the adoption of contracts under MFRC. Second, this study offers meant direction in designing arrangements to minimize TCs.

To review studies capturing different MFRC available for farmers to sell their F&Vs, an attempt has been made here. As explained earlier, MFRC is expanding in India, and an emerging body of literature analyses the effect of MFRC on the agrifood system. While the first strand of research focuses on consumer-related aspects like changes in purchase and dietary patterns from various perspectives (Mergenthaler, Weinberger, & Qaim, 2009; Pingali 2006; Stringer et al.2009), the second relates to their implications on the traditional retail sector (Faiguenbaum et al. 2002; Natawidjaja et al. 2007; Reardon & Barret; 2009). The other, slightly less researched area, relates to the quality-related attributes. A few studies highlight the demand for high product quality aspects from different MFRC, including freshness, size, and colour of F&Vs (Singh, 2010; Mangala & Chengappa, 2008). These studies observed that MFRC focused more on quality products in large volumes while purchasing F&Vs from farmers. The literature on price differences proposes that modern retailers gradually become price competitive in fresh food in a few circumstances, e.g., for key fresh produce items in Hong Kong and Madagascar, and South Africa (Minten and Reardon 2008; Minten et al. 2009). Other studies have found that MFRC introduces new quality principles that separate their F&VS sales (Balsevich & Julio, 2006; Henson & Reardon, 2005). Some studies focused on the strategy of MFRC in terms of expanding their F&Vs sales. In this regard, this study's particular interest is to understand the strategy of MFRC in terms of expanding their F&Vs sales.

To increase product quality and reliability and differentiate their product from traditional retailers, the emerging domestics and international supermarkets in India are imposing private quality standards on their fruits and vegetable (F&Vs) suppliers (Berdegue et al. 2005). Supermarket retail chains are selecting those suppliers who can supply better quality and fulfill the private standards. (Minten, et al., 2010). Hence, such quality requirement presents significant challenges for marginal

and small farmers. They often find themselves in unfavorable bargaining positions with supermarket chains if they are considered part of their supply chains. As compared with other developed countries, little has been studied in the Indian context about methods used by the supermarkets to select the farmers.

**Research Question:**

How to quantify the TCs incurred by the farmers for the different institutional arrangements of contract farming? To what extent has the TCs impacted the farmers' profitability and yield? How can we reduce the transaction cost and increase the small and marginal farmers' participation in developing countries like India?

**Objective:**

This study empirically measures the TCs incurred by the farmers for PCs and MCs compared with independent farmers. Further, this study has captured the impact of TCs on the farmers' profitability for PCs and MCs compared with independent farmers. The present study contributes to the existing literature: quantifying the impact of TCs cost on the profitability of farmers and analyzing the role of various institutional arrangements in reducing transaction costs.

**Empirical Framework, Method:**

We use a utility maximization framework for growers involved in Chili farming. Expected utility depends upon the profits from choosing the two different types of MFRC (PC and MC) and TMC. Hotelling's Lemma is used for deriving transaction costs. Transaction costs are classified as information costs (ICs), Bargaining costs (BCs), and monitoring costs (MCs) incurred by farmers

with PC, MC, and TMC. TCS is influenced by many factors such as participation in MFRC, price uncertainty, price discovery costs, product quality uncertainty, rejection rate, frequency of sale, lack of information on the reliability of various forms of contracts, as well as farm and household characteristics. The outcome selection bias variables (ICs, BCs, MCs, TCs, and Net Profits) were estimated using Propensity Score Matching (PCM).

PCM compares outcomes variables between two groups of farmers: either PC or MC ("Treated") with TMC ("Control") that are similar in terms of other observable characteristics (i.e., education, age), therefore, reducing the selection bias (Rao et al. 2010). The study applies the NNM matching estimator, a commonly used method. The NNM method picks each treated unit (MFRC farmers) and searches for the control unit (TMC farmers) with the closest propensity matching score. The main attractive feature of NNM is that all the treated teams find a match (Mishra et al., 2016).

#### **Data collection:**

The primary survey was conducted in 2017 in the Kolar Districts of Karnataka. Kolar is known for being the highest producer of chili. We interviewed 300 chili households with 100 each under MFRC with PC, MFRC with MC, and TMC, respectively. Chili farmers were sampled using stratified sampling. The questionnaires were designed to obtain socio-economic variables, input variables, and questions needed to calculate transaction costs, such as opportunistic behavior, asymmetric information, asset specificity, and price and grading standards uncertainty.

#### **Preliminary results:**

The empirical analysis was carried out in two stages. In the first stage, the data were analyzed using the probit model to identify the factors responsible for farmers' participation in each MFRCs

vs. independent farmers (Same as APMC/control group /spot market farmers). In the second stage, data were analysed using PCM to solve the problem of selection bias. A major emphasis was given to transaction cost variables for measuring the impact of participation on the farmers' net income.

Our probit result revealed that in households having higher and medium risk preferences, the prices received from the supermarkets in advance were the statistically significant variables determining farmer participation in PCs supermarket chains. A household with illiterate school education, input market distance, and decision-maker's age were statistically significant variables that impacted negatively on farmers' participation in PCs supermarkets, as expected.

Probit results show that **Hhs with higher risk preference** was statistically significant, suggesting that an increase in households with higher risk preference significantly increases the likelihood of farmers participating in MCs MFRC. This result might imply that more risk lover farmers are more willing to adopt new market channels. Like other studies (such as Reardon et al. 2009), our results revealed that the MCs MFRC pays higher procurement prices. Procurement price from MCs MFRC was positive and statistically significant, indicating that with an increase in procurement price from MFRC, farmers are more likely to participate in MCs. Farmers mostly join MCs MFRC for getting a higher price premium for their chilli product. However, the price is not fixed for MCs' farmers in advance like for PCs farmers. In PCs, supermarket managers tend to design contracts with a pre-fixed price. In MCs, procurement managers design contrast with a flexible price. This variable price option may reduce moral hazard problems by making both parties residual claimants but may drastically increase farmers' price risk exposure. Similarly, the finding has also been observed by Wolf et al.(2001).



Our findings revealed that comparing with independent farmers, farmers with PCs and MCs reported significantly higher yield per acre (at 5 percent of level of significance), higher revenue per acre (at 5 percent of level of significance), and higher cost of cultivation per acre (at 1 percent level of significance) for chili. However, we found that MCs farmers have incurred 71.14 percent higher cost of cultivation, followed by PCs about 60.81 percent higher than independent chili farmers.

Interestingly, our findings revealed that PCs farmers have accounted significant higher **profit** by Rs 57,310 per acre (at 1 percent level of significance), followed by MCs MFRC profit by Rs 40,403 per acre as compared with independent farmers profit by Rs 34,288 per acre for chili. Findings suggested that PCs farmers have accounted for 67.14 percent more profit than the IF. However, the profit was 17.83 percent for MCs farmers than IF.

We found that MFRC farmers incurred the highest TCs cost by Rs 9,118 per acre than independent farmers (statistically significant), followed by Rs 5,394 for MCs MFRC than independent farmers for chili. In another world, TCs for PCs and MCs farmers constitute 14.50% and 9.57%, respectively, share of total production costs. Hence, we argued that proper institutional arrangement could help for increasing the profitability of MFRCs in the range (of 9.57% to 14.50%) for chili crops. Most of the existing studies have neglected to capture the transaction costs and overestimated the benefits of MFRCs.

Further, our findings revealed that monitoring costs constituted the highest share (more than 54% share) followed by bargaining costs (more than 29% share) and IC (less than 17% share) for all the MFRC farmers. Incurring higher monitoring costs was mainly due to opportunistic behavior by the MFRCs during the grading and sorting of the product. This study is intended to highlight

the significance of TCs in the adoption of PC and MC. It wants to guide policymakers to remove the barriers which lead to high information costs, monitoring, and bargaining costs. Eliminating barriers will reduce TCs and enhance marginal and small farmers' incomes.

Our results suggest that opportunistic behavior by the MFRC imposes significant TCs costs on farmers. Further, asymmetric information about price and grading uncertainty has also significantly increased the TC incurred by farmers. This has implications for farmer's participation in MFRC. We suggest that the government needs to introduce the proper institutional setup in the written and oral contract between MFRC and farmers. The institutional setup should focus on controlling opportunistic behavior by MFRC, which is the most effective way to reduce the TCs. Further, we suggest having a strict enforcement mechanism.

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