Primary Processing: First Step in the Value Chain

K. Narendran

Faculty, Indian Institute of Plantation Management

Abstract: India is the major producer of food grains in the world. Food grains are harvested and transported directly to the market which leads to quality detorioration and wastage of food grains. AGMARK grading certification programme has framed standards for grains based on their intrinsic quality and physical characteristics that include moisture content, foreign matter, admixture, extent of damage, extent of immature produce, pest infestation, weevil attack, and extent of shrivelled produce. It is generally found in the field that the grains produced possessed higher impurities than the permissible limits. Therefore, Karnataka State Marketing Department has taken initiative to establish cleaning, grading and packaging units in different regulated markets (APMC) to help farmers for better price realisation and promote primary processing. Similar efforts shall be made by other regions to prepare the farmers to claim the first ladder of value chain successfully.

1. Introduction

India is the world's second largest producer of food and has the potential of being the largest with the food and agricultural sector. Value addition to food products has assumed vital importance in our country due to diversity in socio-economic conditions, industrial growth, urbanization and globalization. It is not merely to satisfy producers and processors by way of higher monitory return but also with better taste and nutrition. Agricultural processing may be defined as an activity, which is performed to maintain or improve the quality or to change the form or characteristics of the agricultural product. Processing operations are undertaken to add value to agricultural materials after their production. The main purpose of agricultural processing is to minimize the qualitative and quantitative deterioration of the material after harvest and cleaning of raw materials by removing foreign matter, immature grain and then making the suitable for secondary processing.

Primary food processing is an economic activity within the food supply chain, which focuses on first stage processing of agricultural raw materials. Primary processing is a very important phase of the value chain generally involves transformation of or extraction of different components from the raw material, preventing in certain cases its deterioration, for use as ingredients for food, feed or bio-based products. During secondary processing, the outputs of the primary food processing industry are further processed into a wide range of processed foods and other products. The value chain process strengthen the mutually beneficial linkages to work together to take advantage of market opportunities. Upgrading value chains refers to moving value chains in a new direction, such as towards new customers, improving operations, or increasing efficiency. Primary processing has become an important metric for the marketing of agricultural commodity and higher price realization. Primary processing ensures grading and standardization which would protect the farmers from exploitation by middle men and improving farmers bargaining power.

Markets play a major role in selling of agricultural commodities. Most of the agricultural produce is marketed without proper cleaning and grading. The farmers need to clean and grade their produce for a better price and profit. Henceforth, there is a necessity to establish cleaning and grading units in the production area. The unit with grading, sorting, cleaning and packaging facilities can be established based on the quantity and quality of the grains produced. Cleaning and grading brings value to the agricultural commodities, improves the supply chain and saves time and energy of both the seller and buyer in the process of marketing.

2. Grading and Standardization

Grading and Standardization plays a vital role in orderly marketing of agricultural produce which is the only tool in safeguarding the consumer interest as well as providing remunerative price to the farmers commensurate with the quality. The Govt. of India have launched AGMARK grading certification programme for certain essential commodities and provided grading laboratory facilities for the purpose for smooth operation of this quality control programme for the benefit of the consumers to provide them with quality produce under the seal of AGMARK. Quality standards for agricultural commodities are framed based on their intrinsic quality and physical characteristics that include moisture content, foreign matter, and admixture, extent of damage, extent of immature produce, pest infestation, weevil attack, and extent of shrivelled produce. An example of AGMARK standards for paddy is given below.

A) General Characteristics

Paddy shall:
a) Be the dried mature grains (with husk) of *Oryza sativa L.*
b) Have uniform size, shape and colour.
c) Be hard, clean, wholesome and free from moulds, weevils, obnoxious smell, discolouration, admixture of deleterious substances and all other impurities except to the extent indicated in the under special characteristics.
d) Not have moisture exceeding 14 percent.

B) Special Characteristics

Grade Designation	Maximum Limit of Tolerance (% by weight)		
	Foreign Matter	Admixture	Damaged, immature, weevilled
I	1.0	5.0	1.0
II	2.0	10.0	2.0
III	4.0	15.0	5.0
IV	7.0	30.0	10.0

C) Definitions

1) <u>Foreign</u> : It includes dust, stone, lumps of earth, chaff, stem or straw and any other matter impurities. In case of admixture of other food grains in paddy, 0.5 percent of other food grains shall be treated as free tolerance and anything above 0.5 percent shall be treated as foreign matter.
2) <u>Admixture</u> : Presence of inferior varieties shall be considered as admixture.
3) <u>Damaged</u> : Grains that are internally damaged or discoloured, damage and discolouration materially affecting the quality. The proportion of damaged grains shall not exceed 5.0 percent for grade IV.
4) <u>Immature</u> : Grains that are not properly developed.
5) <u>Weevilled</u> : Grains that are partially or wholly bored or eaten by weevil or other grain insects.

3. Cleaning and Grading

Generally, grains have contaminants of various kinds when it comes to the marketing unit, especially if it has been harvested threshed or dried directly on the ground. Cleaning can be done because seeds differ in length, width, thickness, density, shape, surface texture, colour etc. Cleaning increases the grain quality by removing impurities and foreign matter.

Grain quality expresses an aspect which links grain individual characteristics and behaviour when subjected to processing and various environments. According to (Shipman et al., 2004), the quality attribute of grains entails two aspects: soundness and purity. The former pertains to the general condition of grains in the sense of its density, moisture content, colour, broken or cracked kernel, mouldiness (odour), insect infestation and kernel deterioration; while the later pertains to the inclusion of substances other than the natural kernel such as husks, stems and weed seeds. Fig.1. illustrates the cleaning and grading process.
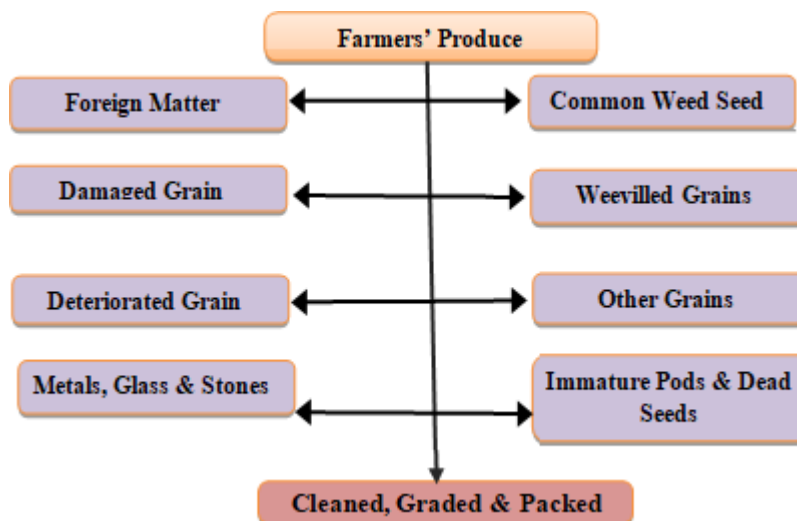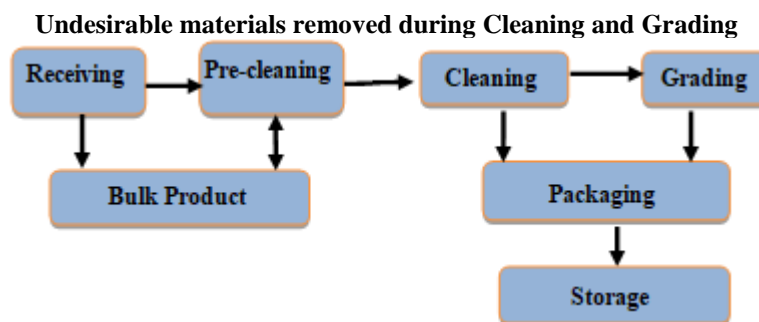

Figure 1: Basic flow and steps in cleaning and grading

Undesirable materials removed during Cleaning and Grading

4. Business Plan and Feasibility Analysis

The business plan is generally prepared based on secondary and primary data. The secondary information on documentation details was collected from agricultural and marketing department etc. Primary data was collected from farmers, traders, exporters and other stakeholders

A feasibility study is an analysis of the viability of an idea through a disciplined and documented process of thinking through the idea from its logical beginning to its logical end. Based on the information collected, a detailed feasibility analysis of establishment of cleaning and grading centre can be undertaken to identify the factors for viability in terms of technical, operational, economical and financial aspects.

Feasibility study can be conducted with respect to the following aspects:

- Technology and System Feasibility
- Economic Feasibility
- Operational Feasibility
- Schedule Feasibility

The unit with grading, sorting, cleaning and packaging facilities can be established based on the quantity and quality of the grains produced. Cleaning and grading brings value to the agricultural commodities, improves the supply chain and saves time and energy of both the seller and buyer in the process of marketing.

Volume of commodities available for cleaning and grading

Off Season
Season
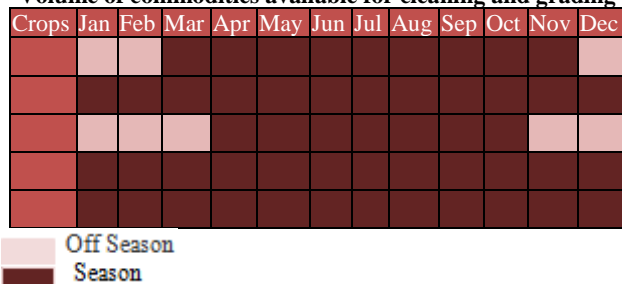
4.1 The Project

The major component of a cleaning and grading centre are land, building and civil works. Selection of plant and machinery is the most important decision for setting up a cleaning and grading centre. All machinery and equipments used in the processing line should have proper efficiency. The estimated cost of plant and machinery for different capacities varies i.e. 1TPH, 5TPH and 10 TPH

Cleaning and Grading Machinery

S.N	Particulars	
1.	Grader capacity 1	
2.	Gravity separator capacity	
3.	De-stoner capacity	
4.	Bucket elevators	
5.	Screens	
6.	Packing unit (semi-automation)	
7.	Transport equipment inside godown (Fork lifters & other trolleys)	
8.	Accessories (as per pirators platform, Hoppers divider etc.)	

Annual working cost of Cleaning and Grading Equipment

S. No.	Particulars	Unit	Cost in Rs.
A	Annual fixed cost		
1.	Depreciation @ 15%		
2.	Interest payment @ 10.5 percent		
3.	Sub-total (total fixed cost)		
B	**Labour cost**		
1.	Technical staff - One		
2.	Men labour - Two		
3.	Women labour - Two		
	Sub-total (total fixed cost)		
C	**Operating and maintenance cost**		
1.	Electricity charges per annum		
	Miscellaneous		
	Sub-total (total fixed cost)		
	Total Cost (A+B+C)		

4.2 Cash Flow Analysis

An examination a unit's cash inflows and outflows during a specific period. The cash flow analysis is often used for studying the feasibility perspective.

Years	Out flows (Rs.)	Inflows (Rs.)	Net cash flows (Rs.)	Discount Factor @ 10.5%	Net Present Value at Discount Factor (r) 10.5%
		Total			

Financial feasibility Analysis

Financial feasibility analysis is an assessment of the financial aspects of a project or start up. It considers aspects like start-up capital, expenses, revenues, and investor income and disbursements. A financial feasibility study can focus on one particular project or area, or on a group of projects. This analysis calculates the Net Present Value, Benefit Cost Ratio and Pay Back Period.

Financial Feasibility Analysis of investment on Cleaning, Grading and Packaging Unit

Sl. No	Particulars	Unit	Value
1	Net Present Value @ 10.5%	Rs/unit	
2	Benefit Cost Ratio		
3	Pay Back Period	Years	
4	Internal Rate of Return	Percent	

Net Present Value: To calculate NPV, the estimated cash outflow and inflow for each period must be established, as well as the expected discount rate. Though the exact figures can only be known after completion, fair estimates can be made by looking at the performance of similar projects or investments.

NPV = $\sum$ {Net Period Cash Flow/$(1+R)^T$} - Initial Investment

where R is the rate of return, and T is the number of time periods.

Benefit Cost Ratio: A benefit cost ratio (BCR) attempts to identify the relationship between the cost and benefits of a proposed project.

The BCR is calculated by dividing the total discounted value of the benefits by the total discounted value of the costs. To calculate the discounted values of each, use the net present value (NPV) formula, in which the values are divided by the sum of 1 and the discount rate raised to the number of periods.

Pay Back Period: Payback period is the time in which the initial cash outflow of an investment is expected to be recovered from the cash inflows generated by the investment. It is one of the simplest investment appraisal techniques.

Formula
The formula to calculate payback period of a project depends on whether the cash flow per period from the project is even or uneven. In case they are even, the formula to calculate payback period is:

$$Payback\ Period = \frac{Initial\ Investment}{Cash\ Inflow\ per\ Period}$$

When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for payback period:

$$Payback\ Period = A + \frac{B}{C}$$

In the above formula,
A is the last period with a negative cumulative cash flow;
B is the absolute value of cumulative cash flow at the end of the period A;
C is the total cash flow during the period after A

5. Conclusion

Karnataka State Agricultural Marketing Department has initiated the process of e-trading at the APMC for the benefit of the farmers , develop standards for the products produced at the farmer's level and establishment of cleaning, grading and packaging units at different APMCs in the grains producing regions of the state. These efforts are initiated with the long-term plans to help the farmers for better price realisation and move forward towards the era of agri-business. These initiations will ensure production of better quality and safe products for the consumers and secondary and next level of processing. Other states and regions shall look seriously on the Karnataka initiation for giving immediate importance to primary processing and bringing cleaning and grading component into production area rather limiting to the level of harvesting.

References

[1] *Agmark Standards, Directorate of Marketing and Inspection. New Delhi*
[2] Agricultural Produce (Grading and Marking) Act, 1937 (Act No. 1 of 1937)
[3] Mac Donald, Stephen &Naik, Gopal and Landes,Rip, 2010. "Markets, Institutions, and the Quality of Agricultural Products: Cotton Quality in India,"2010 Annual Meeting, July 25-27, 2010, Denver, Colorado, Agricultural and Applied Economics Association.
[4] Manual on standards of Cereals. *agmarknet.nic.in*
[5] Report, 2010, Fair Average Quality and Agmark standards. Directorate of Marketing and inspection, Ministry Agriculture and cooperation, New Delhi.
[6] Study Report, 2013, Formulation of Grade Specifications for Identified Agricultural commodities in Karnataka. Government of Karnataka, Department of Agricultural Marketing.
[7] WWW.Codexalimentarius.net