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# Break-even analysis of paddy and wheat production in the Gwalior district (Madhya Pradesh)

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**Abstract**
A study has been carried out to evaluate break- even point under paddy and wheat production in the Dabra block, Gwalior district Madhya Pradesh. Multistage random sampling method was used to acquire sample farmer. 20 paddy and wheat growing villages were selected randomly from the Dabra block thereafter, a list of paddy and wheat farmers from each selected villages were prepared then classified into five major categories on the basis of their land holding i.e. marginal, small, semi medium, medium, and large. Then a sample of 30 farmers were selected in each category by simple random sampling technique under proportionate allocation from 20 villages treated as strata thus, 150 paddy and 150 wheat farmers were selected. The breakeven point was observed 10.24 and 8.08 quintals/ ha in paddy and wheat respectively which indicated that a paddy farmer should produce a minimum of 10.24 quintal of paddy /ha and wheat farmer produce a minimum of 8.08 quintal of wheat /ha so as to not incurred any losses. But in study area actual production was grater as compared to break even in both the crop indicated that paddy and wheat production is profitable in the study area.

**Keywords:** Break-even point, paddy, wheat, production, variable cost

## 1. Introduction
Paddy and wheat is the India's prominent stable and most essential food grain crop. The production of paddy and wheat is an important part of the national economy because paddy and wheat together feed more than half of the country's population. India is the second largest producer of paddy and wheat in the world after china. Paddy is one of the oldest cultivate crop and has been cultivated in India for several thousand years. In India paddy is cultivated under 43.79 million hectare with the production of 112 million tones and productivity 2578 Kg/ha (Directorate of economics and agri. Statistics, 2017-2018). The considerable amount of paddy is getting cultivated in states like west Bengal, Punjab, Uttar Pradesh, Bihar and Madhya Pradesh. In Madhya Pradesh, paddy is grown mainly as a kharif crop on 2.04 million hectare with the production of 4.12 million tones and productivity 2026 kg/ha. (Anonymous, 2018) [2]. In Gwalior district paddy and wheat is an important cereal crop and occupies area under cultivation 44.56 thousand ha & 113.22 thousand ha respectively (DDA office Gwalior 2018-19) and play chief role in state's total cereal production. Dabra block of Gwalior district has a remarkable position in cultivation of paddy and wheat crops with the area of 32642 hectares & 46315 hectares respectively due to adequate availability of the resources for the cultivation of these crops. Keeping the above fact a study was conducted to investigate breakeven point in the study area. (Kumar *et al.* 2021) [4].

## 2. Research methodology
The present study was confined to Gwalior district of Madhya Pradesh. Gwalior district was selected purposively because, this district occupies maximum area and production of paddy and second position under wheat crop in the gird zone, and also for the convenience of the researcher to get more accurate information. The multistage random sampling was used to acquire sample farmers for the present study. Gwalior district has four blocks namely Bhitarwar, Dabra, Morar and Ghatigaon. At the first stage of sampling, Dabra Block was selected purposively, due to comprise maximum area under paddy and wheat cultivation. At the second stage of sampling, a list of the paddy and wheat growing villages were prepared from selected block (Dabra) then 20 villages were selected randomly. At the third stage of sampling, a list of paddy and wheat growing farmers from each selected village was prepared then classified into five major categories on the basis of their land holding i.e. marginal (less than 1ha), small (1-2 ha), semi medium (2-4 ha), medium (4-10 ha) and large (10 ha or above). Then a sample of 30 farmers was selected in each category by simple random sampling

technique under proportionate allocation from twenty villages treated as strata. Thus, in all 300 farmers (150 paddy growers and 150 wheat growers) were selected with the help of simple random sampling method. The primary data (agriculture year 2019-20 kharif and rabi) regarding land holding, quantity of input used with their price, yield, gross income etc. were collected through pre-tested interview schedule by survey method. Each selected respondent were approached personally for collecting the relevant data.

### 2.1 Break-even point

BEP is a situation where farmer neither loss money nor makes profit, algebraically BEP was estimated by using the formula. (Reddy *et al.*, 2018, Pravallik 2017) [6, 5]

$$\textbf{BEP} = \frac{F}{P-V}$$

Where,
BEP = Break -Even point
F = Fixed cost in ₹ /ha
P = Price ₹ / quintal
V = variable cost in ₹ per quintal

## 3. Result and discussion

### 3.1 Break even analysis of wheat production

The break-even analysis of wheat production is presented in Table 1. The table reveals that an average total fixed cost of wheat production was found to be ₹10885.89/ha which was increase with the increase in farm size after marginal and small farm hence it is highest on a small farm (₹14124.50 /ha) followed by marginal (₹12909.57/ha) small (₹14124.50), large (₹9382.18), medium (₹9251.22/ha) and semi medium (₹8762/ha) per hectare. The variable cost per quintal indicated that how much cash expenses are incurred on variable inputs for producing one quintal of wheat output. On an average total variable cost (TVC) per quintal was observed ₹759.31 which is highest on large farm size (₹769/qtl) followed by medium (₹764.51/qtl), semi medium (₹761/qtl) small (₹739.5/qtl) and marginal (₹666.00/qtl). At overall level BEP (break-even Point) was observed 10.24 quintals/ ha which indicated that a farmer should produce a minimum of 10.24 quintal of wheat /ha so as to not incurred any losses. Across categories, break-even point was higher in the case of small farmers (13.33 quintal) followed by marginal (11.91 qtl), medium (8.52), semi medium (8.35 qtl), and large (8.30). Contribution margin and margin of safety at overall farms were observed ₹1062.59 and 24.45 qtl/ha respectively it means that overall farmers as well as among categories were under a profitable zone because price received by farmers were high as compared to contribution margin and actual production on the farms were also greater than breakeven production per quintal. (Verma *et al.*. 2016) [7].

**Table 1:** Beak -even analysis of wheat production

| Particulars | Marginal | Small | Semi medium | Medium | Large | Overall |
|---|---|---|---|---|---|---|
| TFC₹/ha | 12909.57 | 14124.50 | 8762.00 | 9251.22 | 9382.18 | 10885.89 |
| TVC₹/unit | 666.00 | 739.55 | 761.22 | 764.51 | 769.07 | 759.31 |
| Price/unit | 1750.12 | 1798.98 | 1810.00 | 1850.41 | 1900.00 | 1821.90 |
| BEP qtl/ha | 11.91 | 13.33 | 8.35 | 8.52 | 8.30 | 10.24 |
| Contribution Margin ₹/ha | 1084.12 | 1059.43 | 1048.78 | 1085.90 | 1130.93 | 1062.59 |
| Margin of safety qtl/ha | 21.07 | 20.90 | 26.65 | 26.73 | 27.70 | 24.45 |

**Source:** Field survey (Primary data 2019-20) note***** qtl represents quintal

### 3.2 The break even analysis of paddy production

Table 2, represent the result of break-even analysis of paddy production which reveals that the average total fixed cost (TFC) of paddy production was found to be ₹10964.05/ha which was highest on a small farm (₹14868.4/ha) followed by marginal (₹13843.86/ha), semi medium (₹8598.98/ha) medium (₹8733.48/ha) and large farm (₹82283/ha). The total variable cost (TVC) per quintal indicated that how much cash expenses were incurred for producing one quintal of paddy output which was computed by dividing gross return per ha from total variable cost per ha. The average total variable cost per quintal observed ₹894.70 which was highest on the semi medium farm (₹941.31) followed by small (₹935.32), marginal (₹895.29) medium (₹876.37) and large farm size (₹829.95). At the overall level, break-even point (BEP) observed 8.08 quintals per hectare which indicates that farmers should produce a minimum of 8.08 quintal paddy per hectare so as to not come about any loss. In the case of categories, break-even output was higher in the case of small farmers (11.68 qtl/ha) followed by marginal (10.44) semi medium (6.57qtl), medium (6.33 qtl) large and large (5.89 qtl/ha). The Contribution margin, and margin of safety at overall was observed ₹1355.65 /qtl and 36.17 qtl /ha. It is evident that none of the farmers was under losses situation in the study area because price received by farmers were high as compared to contribution margin and actual production on the farms were greater than breakeven production per quintal (Abera *et al.* 2019, Kumar *et al.*, 2022) [1, 3].

**Table 2:** Break-even analysis of paddy production at sampled farm

| Particulars | Marginal | Small | Semi medium | Medium | Large | Overall |
|---|---|---|---|---|---|---|
| TFC Per ₹/ha | 13843.86 | 14868.42 | 8598.98 | 8733.48 | 8777.05 | 10964.36 |
| TVC ₹/quintal | 895.29 | 935.32 | 941.31 | 876.37 | 829.95 | 894.70 |
| Price ₹/ quintal | 2220.20 | 2208.15 | 2250.00 | 2255.40 | 2318.00 | 2250.35 |
| BEP qtl /ha | 10.44 | 11.68 | 6.57 | 6.33 | 5.89 | 8.08 |
| Contribution Margin ₹/ quintal | 1324.91 | 1272.83 | 1308.69 | 1379.03 | 1488.05 | 1355.65 |
| Margin of Safety quintal /ha | 35.81 | 31.64 | 35.54 | 37.84 | 39.52 | 36.17 |

## 4. Conclusion

It is concluded after the analysis of breakeven point, both the crop production (paddy and wheat) in the study area was profitable because, there was a huge gap between breakeven point and actual production in the study area at overall level and across in the categories. It indicated that production and

price received by farmers was higher as compared to BEP qtl/ha and contribution margin.

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