Index based Assessment of Factors Affecting Farm Diversification in Haryana
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ABSTRACT
The study aimed to assess the factors affecting farm diversification was conducted in Kaithal, Hisar, and Bhiwani districts of Haryana in 2021 by selecting 180 farmers and 60 experts. The factors influencing farm diversification were assessed through the index method, Garret ranking, and RBQ method. The proximity of the National Capital Region (NCR), increased road density, and improved access to market information were found to favour the diversification of farm enterprises whereas, market uncertainties and climate induced factors were perceived to hinder it. Farmers did not show interest in kharif crops such as maize, sorghum, pearl millet, and cotton in the study area, mainly because of non-availability of labour at an affordable rate for manual harvesting. The findings act as supporting evidence of the factors that are beneficial for achieving sustainability in the future farming sector of Haryana.

INTRODUCTION
Agriculture provides the basic ingredients for the existence of humankind. About 68 per cent of India’s population lives in rural areas where agriculture is the main occupation (Census, 2011). Indian agriculture is characterized by small farms. The average farm size is 1.15 hectares. About 86 per cent of farmers possess land size less than 2 ha, on which almost 44 per cent of the arable land is cultivated. On the other hand, only 14 per cent of the farmers have above 2 ha operational land holdings, however utilizing 56 per cent of the total cultivated land (Agricultural research data book, ICAR, 2020). In the late 1960s, the Green Revolution, which was successfully implemented in the states of Haryana, Punjab, and Western Uttar Pradesh, enabled India in overcoming a severe food shortage and achieving food grain self-sufficiency, particularly in the case of wheat and paddy. But on the other hand the sustainability of the future agricultural production system in terms of soil, water and climate characteristics is threatened by continuous mono cropping and the rice-wheat cropping system. Therefore, special efforts are needed to support diversified farming systems to improve the ground water table, handle issues with procuring and storing farm products, and address changes in food consumption patterns, particularly among middle-class and high-income groups (CRRID, 2017).

The current pace of progress of Indian agriculture needs to be ramped up to the demand of growing population and various targets set forth by national and international organizations. The importance of integration of other enterprises was always felt in Indian agriculture system to promote efficient use of available resources and convert them into a possible means of profitability by changing the focus of research from cropping systems towards farming systems. In this context present study has been undertaken to assess the factors affecting farm diversification in Haryana, which aimed to prioritize the factors which can accelerate diversification options in the state.

METHODOLOGY
The study was undertaken purposely in three agro ecological zones of the state (HKA, 2017). One district from each Agro-Ecological Zone (AEZ) was chosen randomly (Kaithal from AEZ1, Hisar from AEZ2 and Bhiwani from AEZ3). Two blocks namely Kaithal and Siwan blocks from Kaithal district, Hisar I and Hisar II from Hisar district and Bhiwani and Bawanikhera blocks from...
Bhiwani district were selected for the study. A total of twelve villages were selected randomly for the study by selecting two villages from each block. With the help of expert opinion and progressive farmers, fifteen farmers from each village is selected constituting 60 farmers from each district. In addition, 20 extension functionaries from each district were also contacted for the study. Thus a total sample size of present study was 240 comprising 180 farmers and 60 extension functionaries. The primary data were collected from the respondents by interview and focus group discussion. In this study, factors affecting farm diversification is assessed through three different measures based on the set criteria. Index values calculated for assessing importance of different factors affecting farm diversification at macro level. Garret ranking was used for identification of factors affecting diversification at micro level. For assessing the importance of factors disfavouring from paddy to alternate crops, RBQ method was followed.

Factors affecting farm diversification were listed with the help of review of literature and expert consultation. The respondents were provided with a list of factors and were asked to indicate score for each item. Then, score assigned by respondents were converted into index by applying the following formula. Factors were measured with help of Likert’s three point scale

\[
\text{Index} = \frac{\text{Obtained score}}{\text{Maximum obtainable score}} \times 100
\]

Garrett’s ranking technique (Garret & Woodworth, 1973) was used to rank the major factors of diversification which are prevalent in the study area. The respondents were provided with a list of parameters and were asked to indicate their rank for each item. Then, ranks assigned by respondents were converted into per cent position by applying the standard formula.

Finding the best alternatives for overcoming limitations and encouraging farm diversification was made possible by the examination of the constraints. Through a participatory approach, the characteristics that make the adoption of non-paddy crops unfavourable were discovered. The respondents were asked to list the constraints that prevented them from adopting non-paddy crops, and this was done using the preferential ranking technique. The major constraints were first identified by literature review and expert opinion. Based on that, in all 4 major Kharif crops (maize, pearl millet, sorghum and cotton) 16 constraints were listed. The intensity of these perceived constraints in the actual field situation was measured to determine the extent to which farmers perceived them as constraints in agricultural production. Farmers were also asked to indicate their opinion for constraints that they perceive as limiting agricultural production. The data collected in this way were tabulated and analyzed statistically to interpret the results. To quantify the data, the constraints were ranked based on the responses obtained from the respondents and then calculated the Rank Based Quotient (RBQ) as advocated by Sabarathnam (1988).

**RESULTS AND DISCUSSION**

Table 1 depicts the proximity of NCR (0.896), increased road density (0.857) and improved access to market information (0.801) were found to have major implicit in favoring diversification in Haryana state. The location of districts bordering Delhi has a major advantage in terms of potential market opportunities, as farmers have an assured disposal of farm produce. Moreover, the well laid - out road facilities smoothen the transport of farm produce in order to reach the destination markets within the shortest possible time period. Further, progressive farmers maintain the well –knit link with middleman in NCR and urban clusters which also hasten opportunities for these diversified farmers for disposal of the produce. Good market and market knowledge can help farmers bypass middlemen when selling crops and thus get more profit. Market uncertainties (0.876) and climate induced factors (0.796) were perceived to hinder the farm diversification. Mostly market risks are related to cost, price, and market uncertainty. It might also encourage farmers to engage in risk-free activities like off-farm ventures. Due to the extreme climate conditions, crop yields are drastically reduced, which may compel farmers to give up farming. Farm related tasks are moving from the non-mechanized sector to well-mechanized and other simpler ways due to rising labour costs and a labour scarcity.

In case of field crops, **delay in the payment** brings about reduced satisfaction as a result the farmer may not show an interest for the next cropping season. The state of Haryana faces heavy losses due to lack of adequate crop specific storage. **Farmers** must be paid for their produce within a short span of time. The harvesting of the crop has been severely hampered by the acute labour shortage (Mohan, 2023). It will particularly impact crop harvests in areas with little or no established mechanization. Farmers are discouraged from undertaking new ventures, due to a lack of information about new techniques and inputs as well as insufficient abilities. Even in the majority of Haryana’s crop-intensive areas, inadequate training is quite prevalent. The importance of receiving training in farm level packing, storage, processing, and value addition has been emphasized to farmers (Rani et al., 2021). Farmers should be motivated and encouraged to employ better farm management techniques, by providing demonstrations (Kumar et al., 2025). In livestock farming, dairy farmers struggle mainly due to the lack of good germplasm in indigenous cattle as purebred high-yielding animals are costlier and lesser in number. Haryana farmers experience difficulty with quality feed and fodder, efficient disease-management techniques and hurdles with milk quality. In addition, they are not receiving milk prices that are commensurate with the cost of production (Arora, 2019). The majority of farmers are still unaware of adequate livestock immunization, which results in a high mortality rate and financial losses for the farmers. Although Haryana is one of the few states that have launched the livestock insurance scheme, the response from farmers has not been positive. Disposal of unproductive animals (0.802), social taboo existing in certain communities regarding the pig farming (0.731) are found to be the major factors, inhibiting diversification in livestock sector.

Wide variations in the sale prices of horticulture products (0.803) and lack of specialized modern mandies for horticulture produce (0.658) were the major factors hindering the horticulture diversification. Due to lack of awareness, poor irrigation infrastructure, inadequate post-harvest infrastructure, price fluctuations, etc., the rate of growth of horticulture in Haryana has
## INDEX BASED ASSESSMENT OF FACTORS

### Table 1. Index values of farm diversification factors in Haryana

<table>
<thead>
<tr>
<th>Factors favoring diversification</th>
<th>Index value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising urbanization (per cent of urban population to total population)</td>
<td>0.548</td>
</tr>
<tr>
<td>Increasing proportion of small and marginal holdings in total farm holdings</td>
<td>0.707</td>
</tr>
<tr>
<td>Increased Road density or Proportion of all-weather road</td>
<td>0.857</td>
</tr>
<tr>
<td>Increased Market density (number of organized market per net sown area)</td>
<td>0.676</td>
</tr>
<tr>
<td>Proximity to National Capital Region/ Proximity to urban clusters</td>
<td>0.896</td>
</tr>
<tr>
<td>Availability of incentives for diversification</td>
<td>0.780</td>
</tr>
<tr>
<td>Improved access to market information</td>
<td>0.801</td>
</tr>
<tr>
<td>Changes in consumption pattern, life style and dietary uptake</td>
<td>0.548</td>
</tr>
<tr>
<td>Climate change effects (Diversification as an adaptive strategy)</td>
<td>0.799</td>
</tr>
<tr>
<td>Increased off-farm income level</td>
<td>0.778</td>
</tr>
</tbody>
</table>

### Factors hindering diversification

#### General factors
- Increased fertilizer consumption rate (kg/ha) | 0.650 |
- Labour unavailability or increasing labour cost | 0.773 |
- Market uncertainties | 0.876 |
- Climate induced factors | 0.796 |
- Hurdles in getting credit for crop and dairy farming | 0.571 |
- Difficulties in insurance coverage and settlement | 0.574 |
- Lack of adequate incentives for critical inputs | 0.744 |
- Improved Irrigation Intensity (Proportion of gross irrigated area to gross cultivated area) | 0.651 |

#### Specific factors (sector wise)

#### Field crops
- Lack of demand from buyers for other crops as like paddy and wheat | 0.722 |
- Lack of crop centric mechanization for all crops | 0.776 |
- Inadequate area wise and crop specific storage/processing units | 0.788 |
- Untimely procurement operations of first crop affecting sowing of second crop | 0.804 |
- Shortage of labour during in peak agricultural operations | 0.870 |
- Lack of adequate knowledge of alternative crops | 0.653 |
- Delayed payment by the procurement agencies | 0.876 |

#### Livestock
- Lack of remunerative price for milk and meat | 0.653 |
- Lack of supply of good quality semen and AI facility in every village | 0.658 |
- Disposal of unproductive animals | 0.802 |
- Non-availability of critical inputs at affordable rates | 0.780 |
- Social taboo preventing pig farming | 0.731 |

#### Horticulture
- Lack of specialized modern mandies for horticulture produce with cold chain and primary processing/packaging facilities | 0.658 |
- Wide fluctuations in sale prices of horticulture produce | 0.803 |
- Lack of market intelligence to avoid seasonal glut and scarcity | 0.656 |
- Inadequate knowledge of hi tech horti production | 0.521 |
- Damage of horticulture crops by wild animals including blue bull | 0.568 |
- Shortage of quality planting materials | 0.630 |
- Less awareness of market interventions of horticulture department | 0.598 |

#### Fisheries
- Lack of knowledge for integration of fish in farming system | 0.556 |
- Poor domestic demand for fish products | 0.732 |
- Input availability and accessibility at affordable rates | 0.793 |
- Rising urbanization (per cent of urban population to total population) | 0.548 |
- Increasing proportion of small and marginal holdings in total farm holdings | 0.707 |
- Increased Road density or Proportion of all-weather road | 0.857 |
- Increased Market density (number of organized market per net sown area) | 0.676 |
- Proximity to National Capital Region/ Proximity to urban clusters | 0.896 |
- Availability of incentives for diversification | 0.780 |
- Improved access to market information | 0.801 |
- Changes in consumption pattern, life style and dietary uptake | 0.548 |
- Climate change effects (Diversification as an adaptive strategy) | 0.799 |
- Increased off-farm income level | 0.778 |
Diversification factors at micro level

The factors affecting farm diversification at micro level throw light on only the major factors which are disclosed by the respondents of the surveyed area. Ranking of these factors helps to identify the most prominent factors that decide the diversification preferences. Factors affecting farm diversification at macro level gives a larger view of the factors affecting the entire state of Haryana, which were revealed by literature and expert opinion, whereas at micro level, the factors pertaining to the respondents’ point of view on diversification at household level, are deliberated.

Table 2. Ranking of diversification factors at micro level using Garret method

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Diversification factors</th>
<th>Average score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Meeting family requirements</td>
<td>76.30</td>
<td>I</td>
</tr>
<tr>
<td>2.</td>
<td>Enhancing profit from farm</td>
<td>70.17</td>
<td>II</td>
</tr>
<tr>
<td>3.</td>
<td>Reducing risk and uncertainties</td>
<td>63.4</td>
<td>III</td>
</tr>
<tr>
<td>4.</td>
<td>Better resource utilization in farm</td>
<td>56.93</td>
<td>IV</td>
</tr>
<tr>
<td>5.</td>
<td>Motivation from authorities</td>
<td>50.17</td>
<td>V</td>
</tr>
<tr>
<td>6.</td>
<td>Change in consumption pattern</td>
<td>49.83</td>
<td>VI</td>
</tr>
<tr>
<td>7.</td>
<td>Availing subsidy from government</td>
<td>38.93</td>
<td>VII</td>
</tr>
<tr>
<td>8.</td>
<td>Conservation of agro-ecology</td>
<td>34.00</td>
<td>VIII</td>
</tr>
<tr>
<td>9.</td>
<td>Maintaining culture and tradition</td>
<td>23.80</td>
<td>IX</td>
</tr>
</tbody>
</table>

Table 3. Ranking of factors (using RBQ value) which disfavour diversification from paddy to alternate crops

<table>
<thead>
<tr>
<th>Crops</th>
<th>Factors disfavoring diversification from paddy</th>
<th>RBQ value</th>
<th>Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>Non availability of labour for manual harvesting</td>
<td>51.39</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>No assurance to the price of the produce</td>
<td>50.02</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>Crop damages by birds, stray cattle and pest attack</td>
<td>44.44</td>
<td>III</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Non availability of labour for manual harvesting</td>
<td>52.50</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Less productivity (532 kg/ha)</td>
<td>47.22</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>Lack of adequate marketing facilities</td>
<td>40.08</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>Inadequate minimum support price</td>
<td>31.94</td>
<td>IV</td>
</tr>
<tr>
<td>Pearl millet</td>
<td>Non availability of labour for manual harvesting</td>
<td>48.89</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Less productivity (1609 kg/ha)</td>
<td>46.11</td>
<td>II</td>
</tr>
<tr>
<td>Cotton</td>
<td>Non availability of labour for regular picking up of cotton</td>
<td>43.06</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Inability of Bt cotton to withstand in stagnant water due to lack of tap root system</td>
<td>39.58</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>Root rot, fusarium wilt and viral diseases</td>
<td>25.00</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>Storage problems</td>
<td>22.92</td>
<td>IV</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Non availability of labour for periodical plucking</td>
<td>34.81</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Wide price fluctuation</td>
<td>33.33</td>
<td>II</td>
</tr>
</tbody>
</table>
leading to the non-adoption of crops such as sorghum and maize. Paddy cultivation is fully mechanized from sowing to harvesting. But the mechanization facilities are lacking in every stages of other suggested alternate crops. Owing to this people shows reduced interest in cultivating these kharif crops. Strict government policies related to the procurement of produce at MSP in maize and sorghum can further promote adoption of these crops. The areas that are suited for cotton cultivation should get promotion through adequate pest management measures. A study related to cotton cultivation in Haryana indicates that the usage of drip irrigation technology has proved to be major reason of change in the status of the farmers in Haryana (Kumari et al., 2022).

CONCLUSION

In the context of ground water declining scenario, diversification is an essential requirement for the state like Haryana. Certain factors have much impact on promoting diversification like increased road density, improved access to market information and proximity to NCR etc. do not create the same impact in all regions like, the access to market information possessed by progressive farmers differs from those who are deprived of those facilities, and areas with well-developed transportation infrastructure are significantly superior to those that lack the same. However, among these resource-constrained farmers, there is a significant potential for diversification. So the policy makers can take appropriate measures to address this. Other fact revealed that, paddy cultivation is fully mechanized from sowing to harvesting, whereas, mechanization is lacking in every stages of alternate crops. Strict government policies related to the procurement of other than paddy crops at MSP may address this issue.

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