

**RESEARCH ARTICLE****SWOT Analysis of Three Agro Ecological Zones of Haryana****Elizabeth Jose<sup>1</sup> and K. Ponnusamy<sup>2</sup>**

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**ABSTRACT**

*The present study aimed to analyse the three agro-ecological zones based on their SWOT factors. The study was conducted in Kaithal, Hisar and Bhiwani districts of Haryana during 2021-22 by selecting 60 experts. The SWOT analysis was done through Factor Evaluation Matrix method. SWOT analysis through IFE and EFE matrix will be highly useful to quantify the factors which are having high impact on the development of an area. This matrix (IFE and EFE) as a management tool usually used in business context. In this research this tool is utilized to quantify SWOT factors of different AEZs of Haryana. Hence this tool helps to evaluate how these factors effectively get explored by stakeholders in the field of farming sector in Haryana. The study found that AEZ1 majorly strengthened by factors such as fertile soil for intensive cultivation (0.591) and locational advantages of rice mills and sugar mills (0.363). AEZ2 majorly strengthened by availability of cotton mills and Guar gum industries (0.330) and is also known as breeding tract of Murrah buffalo (0.231). The proximity to the huge market of National Capital of Delhi with road and rail connectivity (0.708) is the major strength of AEZ3. From the EFE matrix values current strategies of AEZ 1(1.205), AEZ 2 (1.685) and AEZ 3 (1.67) are not well designed to meet the opportunities and defend against threats in these zones. Effective price policies, mechanization, electronic marketing platforms, climate smart approaches, insurance programmes and digital technology can promote the state agriculture to achieve its maximum output. By analyzing SWOT elements using the matrix technique, area-based planning can be carried out successfully because priority regions can be quantified in this way.*

*Key words : Agro-ecological zones; SWOT factors; Factor Evaluation Matrix method.*

India was able to overcome a serious food deficit and achieve food grain self-sufficiency because of the Green Revolution, which was successfully implemented in the states of Haryana, Punjab, and Western Uttar Pradesh, particularly in the case of wheat and paddy. However, continued monocropping of rice-wheat cropping system create a threat to the viability of the future agricultural production system in terms of soil, water, and climate features. In order to promote diverse farming systems and address changes in food consumption patterns, particularly among middle-class and high-income groups, specific efforts are required (CRRID, 2017).

About 65 per cent of ground water of Haryana is of poor quality and the second generation problems of green revolution in the state have caused a steep decline in resource base, soil degradation (soil compaction, soil salinity, sodicity, water logging, and

pesticide residue) and reduction in soil organic carbon content, hydrological imbalance, that have increased the overall cost of cultivation. There is an increase in pollution of soil, water and environment in this state remarkably (Haryana Kisan Ayog Report, 2014). In order to manage the ecological constraints, farm diversification could be one of the suitable strategies for the state.

To develop the farming sector in Haryana, it is necessary to overcome the restrictions that are presently existing for certain crops/allied enterprise. Study related with sustainability of scientific maize cultivation practices in Haryana shows that timely availability of quality seed, use of vermin compost, govt. control on supply, quality and cost of fertilizer and reduction in cost of irrigation were the important suggestions as given by the farmers for improving maize cultivation (Yadav et al. 2016). Study related to apiculture in

Haryana suggest that the extension workers/ experts should organize more and more trainings on bee pests/ diseases and other hazards; the business of bees; bee-hive products and their processing and medicinal values and essential operations and management of bee colonies during different seasons (Singh *et al.*, 2016). In a study related to summer moong cultivation indicates that FLD is greater tool of mass awareness and can also motivate other farmers to adopt improved practices of summer moong cultivation (Singh *et al.*, 2019). In a study related to crop residue management shows that, rice varieties producing minimum biomass and mature in short period can widen the time gap between harvesting of rice and sowing of wheat. Machineries which can be driven with low horse power tractors must be encouraged. The custom hiring centers must be promoted in cluster mode of villages in the state (Anuradha *et al.*, 2021). A study related to hi-tech farming shows that majority of farmers got short duration trainings i.e. 3-7 days which is not sufficient for such hi- tech farming, so long duration vocational trainings should be organized at centre of excellence for vegetables and other research institutes (Ghanghas *et al.*, 2018). Goyal and Goyal (2022) reported that frequent fluctuation in prices was the most common constraint during marketing of onion in Ambala district followed by non-availability of storage facility.

Haryana State consists of three agro ecological zones. In order to implement strategies for further enhancement of farming sector of Haryana, it is important to assess the strength and weakness of each zone separately. It is better to implement strategies for each agro ecological zones separately rather than Haryana as a whole. This study highlights the Strength, Weakness, Threats, and Opportunities of three agro ecological zones of Haryana.

## METHODOLOGY

The present study was conducted in Kaithal, Hisar and Bhiwani districts of Haryana during 2021 by selecting 20 experts from different districts randomly constituting 60 experts for the present study. Interview schedule has prepared and responses were analyzed statistically.

SWOT analysis through IFE and EFE matrix will be highly useful to quantify the factors which are having high impact on the development of an area. Area based planning can be effectively done by the analysis of SWOT factors through matrix method since

priority areas can be quantified through this method.

### *Factor evaluation matrix*

*IFE and EFE matrix* : This matrix as a management tool usually used in business context. In this research this tool utilized to quantify SWOT factors of different AEZs of Haryana. Hence this tool helps to evaluate how these factors effectively get explored by stakeholders in the field of farming sector in Haryana.

*Internal Factor Evaluation (IFE) Matrix* is a strategy tool used to evaluate internal environment of a sector to reveal its strengths as well as weaknesses.

*External Factor Evaluation (EFE) Matrix* is a strategy tool used to examine external environment of a sector to identify the available opportunities and threats.

Methodology followed for construction of Factor Evaluation Matrix as given by David (2009) as follows  
Step 1: Identification of key external and internal factors

Step 2: *Assign weights and ratings to each factor* :

*Assigning weights*: Each key factor should be assigned a weight ranging from 0.0 (low importance) to 1.0 (high importance). If a zone wants to succeed in agriculture sector, this number indicates how important the factor is. The sum of all the weights must equal 1.0. Separate factors should not be given too much emphasis (assigning a weight of 0.30 or more) because the success in a sector is rarely determined by one or few factors.

*Assigning Rating*:

*EFE Matrix*: The ratings in external matrix refer to how effectively current strategy responds to the opportunities and threats in a zone. The numbers range from 4 to 1 (4 means a superior response, 3 – above average response, 2 – average response and 1 – poor response). Ratings, as well as weights, are assigned subjectively to each factor.

*IFE Matrix*: The ratings in internal matrix refer to how strong or weak each factor is in a sector. The numbers range from 4 to 1 (4 means a major strength, 3 – minor strength, 2 – minor weakness and 1 – major weakness). Strengths can only receive ratings 4 and 3 and weaknesses can receive ratings 2 and 1.

Step 3: *Assigning total weighted score* : The score is the result of weight multiplied by rating. Each factor has a score. Total weighted score is simply the sum of all individual weighted scores. The matrix can receive

**Table 1. Agro ecological zones of Haryana**

Zone	District	Area (%)	Farm enterprise options
I	Panchkula, Ambala, Yamunanagar, Kurukshetra, Kaithal, Karnal, Panipat and Sonipat	32	Wheat, rice, sugarcane, maize, cows, buffaloes, fruits, vegetables, floriculture, bee keeping, mushroom and poultry.
II	Sirsa, Fatehabad, Hisar, Faridabad, Palwal, Jind and Rohtak	39	Wheat, paddy, cotton, pearl millet, rapeseed, mustard, cows, buffaloes, bee keeping and poultry.
III	Bhiwani, CharkhiDadri, Mahendergarh, Rewari, Gurugram, Jhajjar, Nuh (Mewat) and Rewari	29	Wheat, pearl millet, rapeseed, mustard. Mewat area is also suitable for agroforestry, sheep and goat rearing.

the total score from 1 to 4. The total score of 2.5 is an average score.

Step 4: *Concluding matrix* : In external evaluation a low total score indicates that current strategies aren't well designed to meet the opportunities and defend against threats in a zone. In internal evaluation a low score indicates that the zone is weak against its strength in agricultural aspects.

## RESULTS AND DISCUSSION

*SWOT analysis of three agro ecological zones of Haryana*: Factor Evaluation Matrix (FEM) is a strategy for evaluating environment of a particular sector by assessing its strength, weakness, opportunities and threats. In this study, it used to evaluate three agro ecological zones of the Haryana state. In the rating, 4 indicates major strength; 3 indicates minor strength; 2 indicates minor weakness and 1 indicates major weakness.

AEZ1 majorly strengthened by factors such as fertile soil for intensive cultivation (0.591) and locational advantages of rice mills and sugar mills (0.363). *Praveen et al. (2017)* conducted a study on suitability of different zones for rice cultivation based on climatic and physical factors of production using GIS approach in Haryana. It was found that clay and clay loam soil texture classes were identified as very appropriate for rice crop production. Haryana's north-east and east (Panchkula, Ambala, Yamunanagar, Karnal, Panipat, and Sonipat) covered under this.

AEZ2 majorly strengthened by availability of cotton mills and Guar gum industries (0.330) and is also known as breeding tract of Murrah buffalo (0.231). A spatio temporal analysis on cotton crop from 1966 to 2015 reveals that the highest proportion of cotton cultivation is found in the districts of Sirsa, Fatehabad and Hisar. The districts such as Karnal, Ambala, Yamunanagar, Panipat, Panchkula, Gurgaon and Faridabad were not cultivating cotton crop. North and north-eastern Haryana have built agricultural

infrastructure and irrigation facilities. As a result, these districts would rather grow rice, wheat, maize, mustard and vegetables than cotton. The study concluded that cotton cultivation in Haryana's western and southwestern districts is superior to that in the north and north-eastern parts of the state (*Rani, 2019*). Delineation of elite Murrah breed tract in Haryana using geo-informatics techniques shows that the distribution of elite buffaloes is mainly restricted to villages in central Haryana. Spatial scan statistics revealed a significant cluster of villages with elite Murrah buffaloes in Rohtak, Bhiwani, Jhajjar, Hisar, Jind and Sonipat districts (*Parmar and Sangwan, 2016*).

The proximity to the huge market of National Capital of Delhi with road and rail connectivity (0.708) is the major strength of AEZ3. Haryana, because of its proximity to the Delhi-NCR, has a great potential to provide a direct selling platform and become a peri-urban agri and dairy hub in the area.

From the EFE matrix (Table 1) values it is clear that current strategies of AEZ 1(1.205), AEZ 2 (1.685) and AEZ 3 (1.67) are not well designed to meet the opportunities and defend against threats in these zones. There is need to harness the further potentials in the areas of saline shrimp farming and commercial dairy farming in AEZ 1, promotion of fruit crops (pomegranate, ber and citrus), commercial buffalo based dairy farming in AEZ 2 and agri-processing infrastructure facilities in AEZ 3.

IFE score indicates that AEZ 1 (2.092), AEZ 2 (1.99) and AEZ 3 (1.835) zones are weak against strength based on the mentioned factors in the table 2. It shows that the potentials are yet to be discovered and effectively utilized for enhancement of farming sector in Haryana. It necessitates need for appropriate extension strategies to create awareness among farmers to understand the strength of their land and effectively plan their farming ventures based on that.

**Table 2. Factor evaluation matrix of three Agro Ecological Zones (AEZ) of Haryana**

AEZ	Strengths	Weight	Rating	WS
AEZ 1	<i>Internal factors</i>			
	Availability of fertile soil for intensive cultivation	0.197	3	0.591
	Technological back stopping from agricultural institutions. (CSSRI, IIWBR, NDRI, NBAGR, IARI reg., SBI, CCS HAU reg. centre)	0.152	3	0.456
	Locational advantages of rice mills and sugar mills in the crop production zone	0.121	3	0.363
	Strong market facilitation for commercial cross breed dairy farming	0.076	3	0.228
	<i>Weaknesses</i>			
	Lack of infrastructure facilities to avoid post-harvest losses in fruits, vegetables, and flowers	0.227	1	0.227
	Lack of strict implementation of pollution control	0.136	1	0.136
	Lack of field-based models of entrepreneurs for emulation or replication	0.091	1	0.091
	<i>Score IFE matrix</i>			2.092
AEZ 1	<i>External factors</i>			
	<i>Opportunities</i>			
	Scope for diversification in favour of dairy based farming systems	0.206	2	0.412
	Improving the linkages and synergies with private sector, NGOs and other public sector	0.127	1	0.127
	Immense scope for mixed/multiple cropping for higher income and employment generation	0.079	1	0.079
	<i>Threats</i>			
	Continuous and exhaustive rice-wheat cropping system led to loss of soil fertility	0.206	1	0.206
	Problem of salinity and sodicity	0.159	1	0.159
	Lack of labour availability and high cost of labour at critical crop stages	0.127	1	0.127
	Unseasonal rainfall and heavy damage to crops and property due to sand storms	0.095	1	0.095
<i>Score EFE matrix</i>			1.205	
AEZ 2	<i>Internal factors</i>			
	<i>Strengths</i>			
	Soils are fit for most of the crops especially for cotton	0.132	4	0.527
	Availability of cotton mills and Guar gum industries	0.110	3	0.330
	Well-developed grain and vegetable market	0.077	3	0.231
	Breeding tract of Murrah buffalo	0.077	3	0.231
	<i>Weaknesses</i>			
	Poor availability and poor quality of irrigation water	0.143	2	0.286
	Declining water table, more than 1-2 feet per year	0.132	2	0.264
	Drainage and water logging problems of soil	0.121	1	0.121
<i>Score IFE matrix</i>			1.99	
AEZ 2	<i>External factors</i>			
	<i>Opportunities</i>			
	Scope of diversification due to existence different types of soils such as sandy, sandy loam and clayey	0.157	2	0.314
	Scope of diversification with fruit crops such as citrus, ber and pomegranate	0.128	3	0.384
	Commercial buffalo based dairy farming facilities	0.1	2	0.2
	Genetic improvement of Murrah buffalo with markets of upgraded Murrah buffalo	0.086	2	0.172
	<i>Threats</i>			
	Declining water table	0.186	1	0.186
	Increasing incidence of pest and diseases	0.157	1	0.157
	Increasing pesticidal resistance	0.1	1	0.1
Declining soil fertility due to intensive cropping system	0.086	2	0.172	
<i>Score EFE matrix</i>			1.685	
AEZ 3	<i>Internal factors</i>			
	<i>Strengths</i>			
	The proximity to the huge market of Delhi with road and rail connectivity	0.236	3	0.708
	Existence of well-established industries for cotton, oilseeds, gum and malt.	0.182	3	0.546
	<i>Weaknesses</i>			
	Poor irrigation facilities as most area are rainfed	0.254	1	0.254
	Poor fertility of land due to sandy soil leading to lower production	0.2	1	0.2
Less progressive farmers	0.127	1	0.127	
<i>Score IFE matrix</i>			1.835	

External factors	<i>Opportunities</i>			
	NCR provide access to the national and inter-national markets	0.187	2	0.374
	Agri-processing units, oil mills and gum factories can be established for employment	0.147	2	0.294
	Better marketing opportunities with fruit processing industries	0.107	1	0.107
	Scope for small ruminants such as sheep and goat as well as pig	0.067	1	0.067
	<i>Threats</i>			
	Increasing urbanization	0.187	2	0.374
	Costly land	0.147	2	0.294
	Fragmentation of land holding size	0.093	1	0.093
	Land degradation	0.067	1	0.067
	Score EFE matrix			1.67

## CONCLUSION

In the context of ground water declining scenario, diversification is an essential requirement for the state like Haryana, since Haryana is contributing a significant portion to the food basket of the country. Long term planning can strengthen the confidence of farmers and policy makers for ensuring food availability to the entire nation. Small and marginal farms can effectively utilize the various farming ventures as it is nearer to NCR region, which provides immense scope for promotion of their ventures. Effective price policies, mechanization, electronic marketing platforms, climate smart approaches, insurance programmes and digital technology can promote the state agriculture to achieve its maximum output.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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