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Maximising farm profitability through entrepreneurship development and farmers' innovations: Feasibility analysis and action interventions

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ABSTRACT

The focus of capacity building has been shifting from primarily production to agri-business, based on market-led integration and developing other value chains aiming at enhancing farmers' income. It requires identification and supporting of rural enterprises through technology and skill training, entrepreneurship training, market information, access to institutionalized credit, and other infrastructure related facilities.The need for appreciation of farmers as actors in the innovation system, and institutionalization of farmers' wisdom for their scalability has been realized at most levels. To develop farming as a business venture and to integrate the farmers' innovations and opportunities in secondary agriculture an action research study has been conducted in National Capital region of India. Institutional arrangement for facilitation of networking among stakeholders and resources was opined as the foremost requirement for enhancing farm income. The skills in social processes of group management and enterprise management were found lacking among the farmers. The entrepreneurial and technical trainings led to income generating activities. The price spread in major commercial crops showed that the longer chain reduced the producers' share in consumer rupee drastically which implies the production linkages need to be developed with involvement of all the stakeholders. Through the lessons and opinion of respondents, maximizing farm profitability was found to be interplay of entrepreneurial competencies, entrepreneurial climate, and farmers' innovations which suggest convergence and synergistic linkages.

Key words: Agripreneurship, Capacity building, Entrepreneurial competencies, Farmers' innovation, Linkages, Price spread

Agriculture being the engine of economic development of our nation, needs to be supported with efficient secondary agriculture, marketing system, reduction of post-harvest losses, diversification towards high value crops and promotion of agri-entrepreneurship in wake of shrinking resource base and rampant unemployment in rural areas. Also the farmers' wisdom in the form of their innovations needs to be incorporated during the process of agripreneurship development to attain agricultural growth rate of 4%. There is proven nexus of entrepreneurship and innovation for sustainable development and need of the day is to encourage entrepreneurial agriculture for human development and maximum farm profits. Farm Innovators could effectively become consultants and entrepreneurs leading to off-farm income generation options after getting training and support in certain distinguishing capacities like foreseeing institutional requirements and linkages, comparative financial impact and success analysis ability in addition to analyze projected demand and required changes in socio cultural and infrastructural domain (Nain *et al.* 2018). On other hand according to social network theory, entrepreneurs' social ties influence their recognition of entrepreneurial opportunities and entrepreneurial pursuits (Hills *et al*. 1997). The development of a rural entrepreneurial support system necessitates creating a supportive environment, or social networking, to flourish in an entrepreneurial climate through building partnerships (Dabson *et al.* 2003). Developing partnerships includes the coordinated efforts of central and local governments, municipalities, academies and non-governmental organizations to help spur the entrepreneurial activity of that region (Kulawczuk 1998). Proper motivation supported by technical backstopping by research institutes, forward and backward linkages for financial needs, learning-by-doing, supported by network collaboration may enhance the competitive potential of new entrepreneurs (Nain *et al*. 2015). The strength of infrastructure development plays a crucial role in rural entrepreneurship development (FAO 997). Infrastructure development is highly correlated with the level of entrepreneurial activity across different

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countries (Zacharakis *et al*. 1999). Since basic infrastructure development and availability of financing (Kulawczuk 1998) are necessary for any entrepreneurial venture, it is assumed that a country's rate of the development of the national framework conditions may be a crucial link between a variety of other social, intellectual and environmental dimensions and rural opportunity recognition in a country. There is no proper appreciation of farmers as actors in the innovation system, little information provided about different sources of knowledge involved, or the flow of knowledge and little attention to long-term impacts on livelihoods (Brigidletty *et al*. 2012). Fuentes *et al.* (2013) suggested that private players should assist in the commercialization of farmer-led innovations. Supporting organizations need to facilitate the scaling out process beyond short term research or development projects (Miller and Connell 2010). In order to develop the model of farming a business venture incorporating farmers' innovations, an action research study was conducted in 3 NCR Delhi villages during 2014-18 and the experiences of feasibility analysis and action interventions were documented and presented.

MATERIALS AND METHODS

The study was conducted in Faridabad and Palwal districts of Haryana where, 3 villages; Fatehpur Biloch, Manjhawali (Faridabad) and Swamika (Palwal) were selected purposively for action interventions being predominantly engaged in agriculture and having scope of agripreneurship development due to their proximity to National Capital of Delhi. At first stage 135 farmers and farm women (45 from each village) were identified to examine the perceived determinants for maximizing farm income and capacity building needs in agripreneurship development. On the basis of need analysis action interventions were identified and at this stage 110 farmers and farm women were involved on the basis of their interest and motivations. Pre-training and post-training data on entrepreneurial competencies as suggested by McClelland (1969) was collected from 110 farmers and farm women trained on various aspects of entrepreneurship development. In order to understand the backward and forward linkages, 30 farmers each (a total of 120 farmers) cultivating tomato, cauliflower, tuberose and gladiolus were interviewed and the perceived linkages were mapped on 3 point continuum from poor linkage, fair and good linkages with a corresponding score of 1,2 and 3 respectively. Weighted mean scores for each type of linkages were calculated and on the basis of highest and lowest received mean scores, the linkages were classified as poor (up to 1.7), fair (1.7 to 2.3) and good (above 2.3). The price spread (the difference between the price received by the growers and the price paid by the consumers) for 4 farm products, viz. tuberose, gladiolus, cauliflower and tomato was calculated with standard procedures and the estimate of producer's share in consumer rupee (₹) was performed with the formula: PS = (PF÷PR) × 100, where, PS = Producer's share in consumer's rupee, PF = Price received by farmer/producer and PR = Retail price (consumer's price). To test the scalability of the farmer led innovations, a test was standardized consisting of 7 broad parameters, viz. credibility, complexity, testability, observability of results, relevancy, relative advantage over existing practices and sustainable source of funding with suitable modifications in scaling up toolkit of Cooley and Ved (2012). The data for analysis of scalability of the innovation were collected from 60 farmers (20 from each village) from project locations. Simple statistical tools averages, percentage, mean score, weighted mean score were employed to accomplish the different objectives of the study.

RESULTS AND DISCUSSION

Farmers' perceptions on the requirements to maximize farm income: An attempt was made to analyze the requirements to maximize the farm income as per the perceptions of the farmers and farm women. Farmers opined that strengthening institutional and individual capacities for scaling up followed by facilitation of networking amongst extension service providers and farmers in the region, mobilizing and allocating resources for scaling up of technological activities and facilitating the sharing of available knowledge on new technologies and innovations were major factors in maximizing farm income (Table 1). In the lower order introduction of innovative production enhancing technologies, development of commodity value chains with farmers' organisations and emergence of large-scale agribusinesses were also enumerated. As such production technology and value addition practices can help farmers to become independent of the fear of a perishable commodity and not to indulge in distress sale of their produce. This entrepreneurial orientation may help farmer to increase their income and result in prosperity. A paradigm shift to commercial farm management and agribusiness orientation is needed at present. Also secondary agriculture and its derivatives *inter-alia* food processing and

Table 1 Determinant for maximizing farm income (N=135)

Parameter	Per cent	Rank
Introduction of production enhancing technologies	66.7	V
Development of commodity value chains	41.7	VI
Facilitation of the development and functioning of farmer organisations	36.7	VII
Facilitation in the emergence of large-scale agribusinesses	16.7	IX
Mobilization of farmers through farmer-based organisations	25.0	VIII
Facilitating the sharing of available knowledge on new technologies and innovations	70.0	IV
Facilitation of networking amongst extension service providers and farmers in the region	75.0	II
Strengthening institutional and individual capacities for scaling up technologies	76.7	I
Mobilizing and allocating resources for scaling up of technological activities	73.3	III

value addition need to be addressed adequately.

Expressed training needs of farmers and farm women and interventions: Training interventions were conducted after assessing training needs of farmers and farm women. Farmers and farm women expressed needs for training in four areas; technical production skills, project launching skills, marketing skills and enterprise management skills (Table 2). Most of them were found to be confident of production and technical skills for taking up value addition enterprises but were found to skeptical of marketing and enterprise management skills. This may be due to the traditional nature of enterprises as they have been taking up value addition of surplus vegetables/fruits at their household level. The social processes of group management skills were also mentioned by farm women for formulating Self Help Groups (SHG) as one significant training need area. In villages Manjhawali and Swamika, farm women were proactive in forming SHGs, whereas more intense efforts of convincing on part of researchers were needed in Fatehpur Biloch for mobilizing farmers/farm women to take up group entrepreneurship.

Based on the needs, two kinds of training modules were designed; on campus and off campus for entrepreneurship development in project villages. One training course was administered at IARI campus in which selected participants from all 3 villages (10 each) were exposed with the technological innovations of IARI based on their prioritized potential agri-enterprises to be taken up as identified earlier through micro-screening exercises with the assumption that these 10 participants from each village will serve as opinion leader and transfer the learnings to fellow farmers and perspective agripreneurs. Afterwards, specific technical training courses (3) and entrepreneurial labs (3) were conducted in all the 3 respective villages with 110 participants. The participation of various stakeholders in each village; non-governmental organisation, government departments (Agriculture, Horticulture), bankers (Syndicate Bank, Corporation Bank, NABARD), established entrepreneurs (in value addition, post-harvest processing of flowers and seed production) and researchers were also elicited. The training courses resulted in not only enhanced motivation, aspirations, entrepreneurial orientation but also creating a facilitative entrepreneurial climate in the form of effective business linkages among various stakeholders.

Table 2 Training Need expressed by respondents in project village (N=90)

Project village	Enterprise launching skill	Market-ing skill	Enterprise management skill	Production technical skill
Manjhawali	23 (76.7)	25 (83.33)	13 (43.3)	4 (13.1)
Swamika	30 (100.0)	30 (100.0)	20 (66.7)	15 (50.0)
Fatehpur Biloch	29 (96.7)	29 (98.7)	19 (63.3)	03 (10.0)
Total	82(91.1)	84 (93.3)	52(57.7)	22 (24.4)

Figures in parenthesis indicate respective percentages.

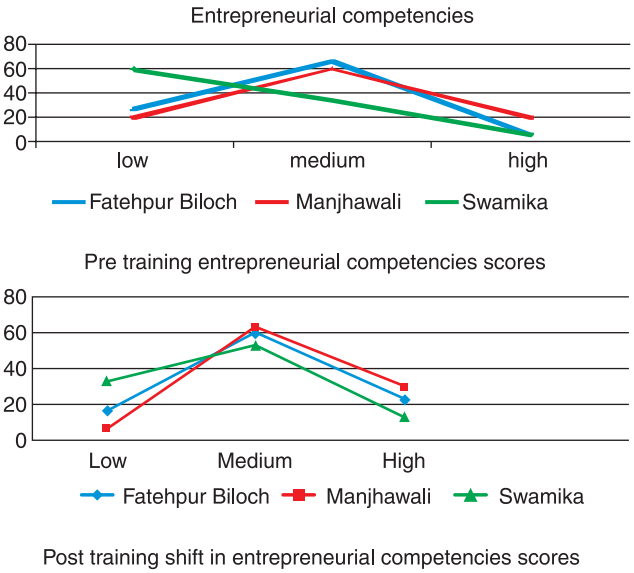

Fig 1 Pre and post-intervention comparison of Entrepreneurial competencies.

Pre and post-training data was collected and it shows that (Fig 1) the levels of thirteen entrepreneurial competencies shifted towards moderate risk taking behaviour and other competencies also shifted towards moderate from lower level. As a result of capacity building interventions 57 farmers/farm women (out of 110 trained) initiated additional income generating activities/agri-enterprises.

Production linkages of various agri-enterprises: Among production and expenditure linkages, production being of direct concern involves backward as well as forward linkages. Backward production linkages are the linkages from farm to the part of the non-farm sector that provides inputs for agricultural production, whereas forward production linkages refer to the part of the non-farm sector that uses agricultural output as an input. The distribution and processing of agricultural outputs are fundamental components of forward production linkages. The type of linkage that exists between the stakeholders decides to a large extent the type of learning and kind of relationship between them. Farmers' perceptions on their forward and backward linkages were sought on 3 point continuum ranging through poor, fair and good with scores of 1, 2 and 3 respectively. Only fair type of linkages (2.03) was perceived in overall with slight variation in case of flowers and vegetables (Table 3). Linkages with; whole sellers (2.75), peer group (2.70), credit organizations (2.60) and with input suppliers (2.45) was perceived as good whereas the linkages with; secondary processors (1.25), big marketing agencies and exporters (1.35), market researchers (1.40) and cold stores (1.70) was at its lowest ebb with slight variation in vegetables and flowers. In case of vegetables, farmers opined fair type of linkages with cold stores that too for potato and onion only. The linkage with consultancies and advisory service agencies, seed and planting material suppliers and with primary processors was reported as fair. The data shows that the forward and backward linkages for maximizing farm

Table 3 Perceived Linkages in flower and vegetable production in project village

Item	Weighted mean score		
	Flower	Vegetable	Overall
Linkage with accredited credit organizations	2.5	2.7	2.60
Linkage with peer group (other farmers)	2.7	2.7	2.70
Linkages with market researchers	1.4	1.4	1.40
Linkages with input (plant protection material) suppliers	2.5	2.4	2.45
Linkages with seed and planting material suppliers	2.1	2.3	2.20
Linkages with consultancies and advisory services	1.9	2.0	1.95
Linkages with whole sellers	2.7	2.8	2.75
Linkages with big marketing agencies and exporters like Ferns and Petal etc.	1.2	1.5	1.35
Linkages with cold stores	1.3	2.1	1.70
Linkages with primary processors (decorators, retailers etc.)	2.1	1.8	1.95
Linkages with secondary processors (scent, gulkand (rose petal jam), beauty products, pickle companies, vegetables driers and packers etc.)	1.2	1.3	1.25
Overall	1.96	2.09	2.03

profitability were not well developed. Nain *et al* (2015) reported similarly that the partnership, networking, alliance and formal contracts for maximizing farm productivity were missing. Similarly Das *et al*. (2015) advocated that proper technical backstopping by research institutes, forward and backward linkages for financial needs and learning by doing supported by inter firm network collaboration have the capacity to enhance the competitive potential.

Backward-forward linkages of various agri-enterprises were understood for 2 commercial flower crops, viz. gladiolus and tuberose and two commercial vegetable crops, viz. cauliflower and tomato. Two different marketing channels were identified for gladiolus and tuberose, whereas 3 different marketing channels were found for tomato and cauliflower in the project villages of Faridabad (Fig 2).

There were 3 channels prevalent in marketing of vegetables (Table 4); Channel-I was the direct one without intermediaries, channel-II consisted of one intermediary in the form of retailer and channel-III consisted of two intermediaries, viz. whole seller and retailer. In case of tomato the producer share remained 38.46% in channel-II and only 25% in channel-III, whereas consumer prices increased to the tune of 116.7% and 333.3%, in channel-II and channel-III respectively in comparison to channel-I (direct marketing). On the other hand farmer (producer) received a profit of only 17% of the cost incurred through channel-II and channel-III, whereas it was 40% of the cost incurred in case of channel-I.

Similarly, in case of cauliflower, farmer (producer)

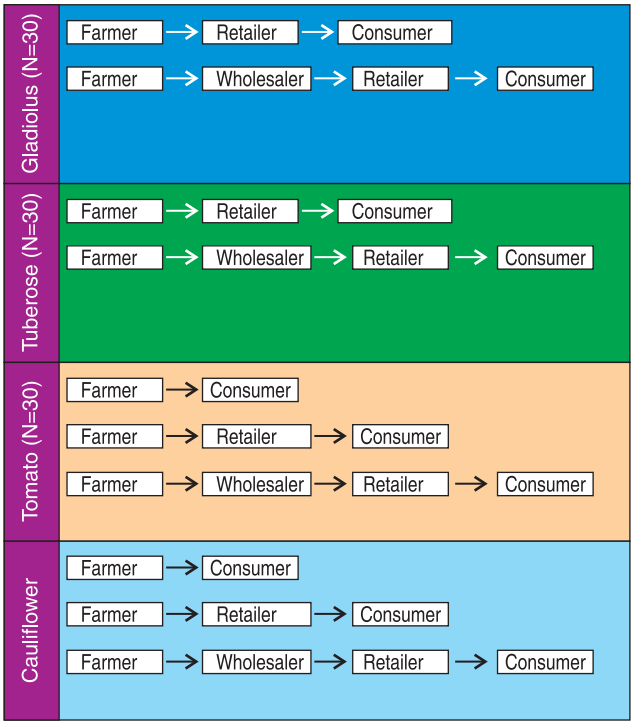

Fig 2 Identified forward linkages in major commercial crops.

received a profit of only 16% of the cost incurred through channel-II and channel-III, whereas it was 45% of the cost incurred in case of channel-I. The price of cauliflower for the consumer increased to the tune of 180% and 250% in channel-II and channel-III in comparison to channel-I (direct marketing). The producer (farmer) share in consumer rupee (₹) decreased to 28.57 and 22.85% in channel-II and channel-III respectively. Here it is worth to mention that longer the marketing chain lesser the share of producer in consumer rupee and higher the money spent by consumer to purchase the produce. It indicates that both the producer and consumer are at loss in the longer marketing chains and intermediaries reap the major portion of the benefit. Similar results were reported by Shankar and Singh (2016) where 3 types of channels were found for cauliflower marketing and producer's share in consumer rupee increased with the reduction of length of the chain. Hence, it implies the dire need for developing agripreneurs in marketing of farm produce and to shorten the length of the marketing chain in order to maximize farm profits. Singh *et al.* (1994) while studying the production and marketing of hill vegetables in Himachal Pradesh found that the producers' share of tomato was 43.15% in the consumers' rupee.

Framework for integrating famers' innovations into entrepreneurial development: Relevancy, relative advantage, sustainable source of funding, observability of the results and complexity were ranked as the desired characteristics of farmer led innovations, and had mean weighted score of 6.85, 6.75, 6.47, 6.37 and 6.30 respectively. The perceptions are similar to that of Rogers' innovation diffusion theory widely used as a theoretical framework for dissemination of technological innovation. Theoretically, the innovations

involving clear and replicable technology and self generating the financial resources needed for expansion may be best suited for scaling up. External environment and contextual factors along with analysis of the institutional requirements for implementing the innovation also play role in scaling process and their integration into income generating activities. In order to scale out and provide impetus to their institutionalization as an action intervention 5 farm innovators meets at regional level were organized in which over 60 farm innovators, equal number of extensionists, research managers, marketing agencies, policy advocates participated in each. With the experiences of screening the scalability it was evident that most of the farmers' innovations were based on logic of leverage or reconfiguration of existing resources giving incremental adjustments.The lessons learnt include; the requirement for establishing and maintaining a database of available technologies and innovations, establishing a database including a physical library of all sponsored/ unsponsored reports and publications, establishing and maintaining a meta-database of agricultural information, facilitating the database to act as a platform to exchange information and experiences, developing and disseminating theme-based knowledge products—posters, radio and TV messages, pamphlets, etc., publishing lessons learnt from development and adoption of innovation activities, undertake an analysis of partner institutions to assess their potential as participants in maximizing farm profits as primary information centre and building capacity of partner institutions (both human and infrastructure) to enable them become functional primary information centers as well as active partner. This all require development of institutional policies and quality assurance protocols.

On the basis of analysis of the successful cases and the action interventions undertaken a framework for agri-entrepreneurship and farmers' innovation dynamics has been conceptualized. The agri-entreprise development for maximizing farm profitability was found to be interplay of entrepreneurial competencies, entrepreneurial climate, and farmers' innovations (Fig 3). It was found that the competencies like opportunity recognition, drive for excellence, quality concern, moderate risk taking behaviour, innovativeness and business orientation in presence of suitable climate like networking, infrastructure, government priority and financial backstopping lead to experimentation not only for technological innovation, but also new ways of managing livelihood in general (networking, communication, institution building, information management, marketing, planning, accessing resources, etc.). The innovations which were economically viable and found sustainable source of funding were able to translate into entrepreneurial ventures having higher income and profits. Social networking of farm innovators has proved to be potential to construct knowledge. On the other hand to maximize the income, the farms required certain distinguishing capacities like foreseeing institutional requirements and linkages, comparative financial impact and success analysis ability in addition to analyze projected demand and required changes

Table 4 Analysis of price spread in flowers (tuberose and gladiolus) and vegetables (Tomato and cauliflower)

Particular	Gladiolus (₹/ha)		Tuberose (₹/ha)		Tomato (₹/ha)			Cauliflower (₹/ha)		
	Channel -I	Channel- II	Channel- I	Channel -II	Channel-I	Channel -II	Channel-III	Channel-I	Channel-II	Channel -III
Cost of production	524220	524220	365820	365820	203132.5	203132.5	203132.5	58870	58870	58870
Marketing cost (MC) of producer	2427	2427	2427	2427	10433.0	10433.0	10433.0	10000.0	10000.0	10000.0
Gross returns to producer	800000	800000	485150	485150	300000.0	250000.0	250000.0	100000.0	80000.0	80000.0
Net returns of Producer (MM) (3-(1+2))	273353	273353	116903	116903	86434.5	36434.5	36434.5	31130	11130	11130
MC of wholesaler		1427		1427		15783.0	15783.0		12583.0	12583.0
Marketing Margin(MM) of wholesaler (7-3+5)		1678573		807156		384217.0	334217		187417	67417
Gross price to wholesaler		1760000		1293733		650000.0	600000.0		280000.0	160000.0
MC of retailer	3613	7500	3612.7	7500			5000.0			2560 .0
MM of retailer (10-7+8)	1196387	1525000	643254	1979142			395000.0			187440.0
Consumer price	2000000	3360000	1132017	2587468	300000.0	650000	1000000.0	100000.0	280000.0	3500000.0
Producers share in consumers price (3/10)×100	40.0%	23.8%	42.8%	18.26%	100%	38.46%	25.00%	100%	28.57%	22.85%
B:C ratio of producer (3/(1+2))	1.52		1.24		1.40	1.17		1.45	1.16	

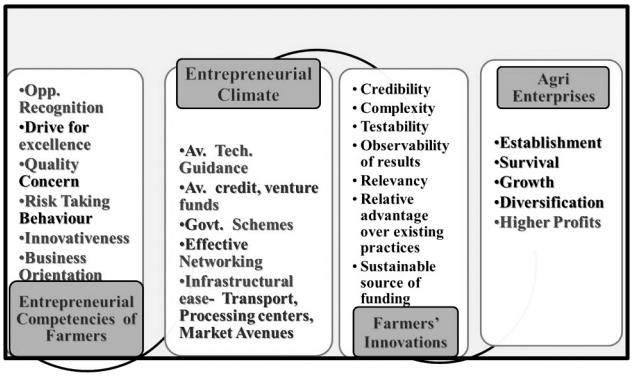

Fig 2 Identified forward linkages in major commercial crops.

in socio cultural and infrastructural domain. The results are in conformity with Singh *et al*. (2014, 2016).Whereas, it was inferred that individual motivations and aspirations trigger entrepreneurship and the competencies along with best practices (innovations) and convergence of synergistic linkage play sequential role for enterprise success.

Institutional mechanism and human resources base in rural ecosystem was found lacking in social processes of group and enterprise management skills along with marketing and communication skills. The capacity building interventions not only helped in changing entrepreneurial competencies but broadened the horizon of the participants to adopt secondary agriculture and launch their own income generating activities. The backward and forward linkages in the form of advisory services, input supply, marketing of the produce, financial backstopping was at a fairer level and the support and convergence of various stakeholders like banks, NGOs, research institution, state line department brought positive impact in the form of initiation of income generating activities. The price spread analysis of major commercial crops of the project location showed very wicked picture where the producers' share was found even less than one fifth of the consumer rupee in some cases. In order to reduce distressed sale and length of marketing chain the producers were trained and motivated in primary processing and were linked with innovative farmers and already established entrepreneurs for marketing and enhanced profitability. Screening for scalability of farmers' innovations and efforts for their institutionalization implied need for creation of platform for exchange of information and experiences, developing and disseminating theme-based knowledge products and undertake analysis of partner institutions to assess their potential as participants and building capacity of partner institutions. The framework for agri-enterprise development for maximizing farm profitability was found to be the function of entrepreneurial competencies, entrepreneurial climate, and farmers' innovations.

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