



Agricultural Entrepreneurship through Extension Education

*Prabhavati A. K.¹, Vishwanath S Naik¹ and Dr. P. Vasudev Naik³

¹Project Assistand (Seed Hub), ²CEO, FPO, Dharwad

³Senior Scientist and Head, ICAR-KVK, Raddewadgi, India

*Corresponding Author's email: prabhakudagi@gmail.com

Agriculture is no longer limited to producing crops and livestock. Increasingly it comprises input supply, mechanisation services, processing, packaging, aggregation, digital advising, logistics, rural tourism and direct marketing. But to participate in these rising possibilities, farmers need to transcend beyond production-oriented knowledge to gain entrepreneurial capabilities. Extension education may promote this shift, allowing rural people to discover possibilities, appraise markets, handle financial risks, establish collective businesses and link with supportive organisations. Extension in the modern context consequently has to operate not just as a conduit for the transmission of technology but as a system to promote company growth and innovation. This article describes how extension education fosters agricultural entrepreneurship via experiential learning, business planning, market information, mentorship, networking, digital technologies and institutional convergence. Evidence from Farmer Field Schools, Farmer Business Schools, agricultural advisory services and entrepreneurship-training courses indicates that well-designed extension may boost knowledge, innovative behaviour, technology uptake and company performance. Yet, training alone may not provide consistent revenue when businesses do not have funding, infrastructure, solid markets or regular mentorship. Thus, effective extension-led entrepreneurship needs locally appropriate programs that integrate technical education with company incubation, loan facilitation, value-chain collaborations and post-training assistance. This technique may generate jobs, boost value addition, develop rural economies and make agriculture more appealing to youth and women.

Introduction

Agriculture is often referred to as an occupation, a career, or a way of life. But in a fast-changing food market it must also be seen as an area of entrepreneurship. The agricultural entrepreneur is not just a producer of a crop or animals. The entrepreneur recognises an unmet need, assembles resources, brings a useful product or service to the market, assumes calculated risk and adds value for customers. An agricultural entrepreneur is a farmer that sets up a nursery, processes milk into branded goods, offers equipment on rental basis, aggregates veggies for urban markets or runs a digital advising service. The need for this change is arising since just increasing physical productivity does not always enhance agricultural revenue. Farmers may produce more, but still get low returns due to market volatility, post-harvest losses, insufficient negotiating strength, improper grading or dependency on middlemen. Entrepreneurial thinking makes manufacturers ask alternative questions: What do the customers need? What action creates the most value? Can a farm by-product turn into a saleable input? Can farmers in surrounding countries share machinery? Can the product be processed, packaged, or sold collectively?

Consequently, researchers have classified farmers as prospective entrepreneurs, who need not just production skills, but also strategic, networking, opportunity-recognition and business-management talents. Human capital, prior experience, access to information, social networks,

institutional conditions and the ability to innovate under uncertainty influence entrepreneurial behaviour in agriculture. This transformation is especially important for extension education. It is between research institutes, farmers, markets, government agencies, financial institutions, private corporations and civic society. Well structured extension may allow rural people to translate knowledge into productive economic activities. Its purpose is considerably wider than just imparting an appropriate seed rate or fertiliser dosage. This involves confidence development, decision making, testing company ideas, forming producer groups, creating market ties and helping entrepreneurs in the tough early phases of an enterprise.

Understanding Agricultural Entrepreneurship

Agricultural entrepreneurship or agripreneurship refers to the establishment or growth of a commercial enterprise in the field of agriculture and the broader agri-food chain. It may come from a farm, but this does not mean it must be primary production. It includes firms involved in inputs, farming, livestock, fisheries, processing, storage, transportation, consultancy services, retailing and environmental management. Agricultural businesses are divided into five major categories. The first includes production enterprises such as protected vegetable cultivation, mushroom production, bee-keeping, seed production, floriculture, aquaculture and commercial nurseries. The second category comprises input and service firms, such as custom-hiring centers, soil-testing services, bio-input production, artificial insemination, drone-based spraying and farm equipment maintenance. The third is post-harvest and value addition industries such as grading, cold storage, food processing, packaging and branding. The fourth category include marketing and aggregation firms, such as producer groups, digital trade, subscription delivery and direct marketing between farmers and consumers. Fifth, multifunctional activities such as agri-tourism, landscape services, ecosystem restoration and commercial application of agricultural expertise. Multifunctional agriculture is especially important for small farms, allowing families to combine produce with services, processing, tourism, environmental stewardship or cultural activities. Diversification may be a way of spreading risk and generating extra income but its effectiveness relies on management skill and on local market demand. Agripreneurship is more than just a new technology. A farmer may choose a high producing variety without becoming an enterprise. Entrepreneurship starts when the person applies knowledge creatively to react to an opportunity, creates a value proposition, arranges resources and accepts responsibility for the result. Technology may help the firm but the entrepreneur has to link it with clients, expenses, quality standards and a sustainable revenue model.

From Technology Transfer to Enterprise Development

Traditional agricultural extension was often structured on a linear model: researchers invented a technique, extension workers presented it, and farmers were expected to adopt it. This paradigm has been effective in the dissemination of many good practices, but it is inappropriate for entrepreneurship since firms are influenced by markets, institutions, customer preferences and local ties as well as technology. Current extension theory considers agricultural innovation as a systemic process. Innovation is a process of interaction between farmers, researchers, processors, merchants, financial institutions, government agencies and service providers. Extension professionals are thus facilitators, brokers, educators and network builders rather than mere messengers of scientific recommendations. Pluralistic advisory systems acknowledge that no one organization can satisfy all the needs of rural businesses. Public extension may provide inclusive outreach and public-interest information. Scientific competence is provided by universities and research institutions. Private companies provide specific technical and market services. Financial institutions provide assistance for investment. Producer organisations provide economies of scale. Instead of advocating for one uniform model, a 'best-fit' extension system customises this mix to the crop, region, farmer category and development target. For entrepreneurship development, extension must consequently integrate three dimensions:

1. **Technical competence**, which ensures that the proposed product or service is scientifically sound.
2. **Commercial competence**, which enables the entrepreneur to understand customers, costs, competition and cash flow.
3. **Institutional competence**, which helps the entrepreneur obtain licences, finance, inputs, partnerships and market access.

An intervention that addresses only the first dimension may produce a technically trained farmer but not a sustainable business owner.

Entrepreneurial Competencies Developed through Extension Education

Opportunity Recognition

Entrepreneurship begins with the identification of a problem that can be turned into an economic opportunity. Extension professionals may do participatory resource mapping, market surveys and value-chain analysis with farmers. For instance, these actions may disclose a lack of quality planting material, strong demand for cleaned and packed product, a lack of equipment services or an opportunity to process an under-utilized local crop. Opportunity discovery should be demand-driven rather than based on the availability of a specific training curriculum. Training hundreds of people to grow mushrooms is unlikely to create sustainable businesses where there is no local demand, no supply of inputs or no temperature-controlled facilities. Extension education should encourage participants to validate an opportunity via talking to clients, assessing market size, evaluating competitors and running a modest pilot before committing to a significant expenditure.

Business Planning and Financial Literacy

Many potentially helpful agricultural ventures fail because the promoter estimates predicted revenue but forgets the depreciation, interest, packaging, shipping, labour, power, mortality, waste or delayed payments. Extension courses should consequently teach realistic company budgeting. Participants should have practical competence in estimating fixed costs, variable costs, break-even production, and gross margins, cash flow and return on investment. They also have to learn that availability of cash is not profit. A business may make a profit over a year and yet run short of cash because it needs to buy raw materials months before it sells the finished product. Business planning education should not be about filling up a difficult template. Farmers learn better when they work out estimates for their own intended business using local current pricing. Business plans are decision-making tools that should be updated when market circumstances change.

Market Orientation and Value-Chain Understanding

The production-oriented extension approach frequently starts with the question, “What can farmers grow?” Entrepreneurial expansion starts with “Who will buy it, in what form, at what quality, and at what time?” Market-oriented education helps producers comprehend customer preferences, seasonal demand, grades, food-safety regulations, packaging, branding and contract duties. Imagine a vegetable gardener who has been trained exclusively on better productivity. The producer could have a big output, but might lose it all if all the fruit comes to market at once. An extension scheme with an entrepreneurial approach would also include staggered planting, customer needs, sorting, communal transport, temporary storage, processing of lower grade goods and alternative selling channels. Market education must be practical. A premium label or digital platform can’t generate demand on its own. Extension experts should assist businesses verify pricing, transaction costs, and true buyer commitment before they advocate costly expenditures.

Innovation and Problem-Solving

Agriculture entrepreneurship is a process of continual experimenting. Weather, biological systems, pricing and tastes of consumers are unpredictable. Extension education may improve problem solving ability via demonstrations, field labs, enterprise simulations, and participatory trials. Studies on entrepreneurial learning in multifunctional agriculture reveal that entrepreneurial capabilities are developed via experience, reflection, interaction and adaptation, not only through classroom teaching. Farmers experiment, try a new activity, talk

to peers about the outcomes, and adapt their economic model gradually. Extension courses should thus enable participants to experiment with firms on a reasonable size. A small processing unit, nursery unit, market stall or machinery-service pilot can reveal operational problems before the entrepreneur gets into large debt.

Networking and Social Capital

Entrepreneurs seldom succeed alone. They are dependent on input suppliers, technical experts, transporters, banks, regulators, other manufacturers and consumers. Social capital is about access to knowledge, trust and business ties. Extension agencies may develop networking platforms such as farmer groups, producer associations, buyer–seller meetings, exposure trips, business fairs and mentoring initiatives. Research on rural entrepreneurship has identified a positive relationship between enterprise performance and knowledge acquisition, entrepreneurial orientation and network relations. Collective entrepreneurship is very helpful for smallholders. An individual farmer may not be able to generate sufficient volume to bargain with an organised buyer or acquire expensive equipment. A group may pool output, standardise quality, share machines, use expert management and share marketing expenditures. But the expansion should also increase governance, transparency and accountability so that joint businesses are not hijacked by a few powerful members.

Risk Management and Resilience

Risk is a part and parcel of business but great entrepreneurs not only accept chances, they assess and manage them. Extension education should include production risk, market risk, financial risk, regulatory risk, and personal risk. Practical risk management solutions include enterprise diversification, phased investment, insurance, written contracts, emergency reserves, alternative suppliers, quality control and keeping of company records. Entrepreneurs should also assess climatic and environmental hazards. A business that makes a profit by over-extraction of groundwater or misuse of chemicals may be viable for a short time, but cannot be sustainable.

Effective Extension Methods for Agripreneurship

Experiential and Participatory Learning

Adults best learn entrepreneurial skills by tackling genuine challenges. An example of experiential education is Farmer Field Schools where participants observe, analyse and make decisions together. Evidence from East Africa suggests that such interventions may enhance knowledge and, under the right circumstances, lead to productivity and income results. But their success depend on the quality of the programme, the local institutions and the characteristics of the participants. The field-school concept may be extended to an enterprise laboratory for company development. Participants will learn how to do consumer interviews, analyse packaging options, calculate prices, keep records and propose business ideas to a panel. Learning is tied to the real choices that businesses need to make.

Farmer Business Schools

Farmer Business Schools are intended to increase farm management, marketing and commercial decision making. They usually include business selection, economics of manufacturing, market analysis, record keeping and collective action. A large-scale initiative in Malawi gives a significant lesson. Training increased certain knowledge and management outcomes, but had a minor average impact on crop revenue. Shortages of capital, productive resources and feasible commercial prospects continued to confront participants. This suggests that business education is necessary but not sufficient. Knowledge does not immediately turn into income if structural barriers are not overcome. Farmer Business Schools should be linked to finance institutions, buyers, incubation facilities and technological backstopping. A programme should be evaluated successful on the basis of firm survival, profitability, employment and market linkages and not only on the basis of number of trainees.

Incubation and Mentoring

Short training events can be exciting but entrepreneurs often need support when they start to operate. They have challenges with equipment, quality of raw materials, price, licensing, workers, buyers and debt repayment. Incubators offer a safe atmosphere where fledgling

businesses may get technical advice, shared facilities, business services and mentoring. Extension personnel may not have all the expertise needed to incubate a business. Their expertise is in identifying requirements and linking entrepreneurs with accountants, food technologists, veterinarians, engineers, attorneys, financial advisors and experienced company owners. Mentoring should continue through establishment and early-growth phases, not stop with the distribution of training certificates. Research on agricultural entrepreneurship education has also pointed to the need to embed entrepreneurship more firmly in agricultural curriculum, including increased use of practice-based learning, interaction with industry and exposure to actual company difficulties.

Digital Extension

Agricultural consulting services are being expanded via mobile phones, internet markets, remote sensing, artificial intelligence and farm-management systems. Digital systems may provide weather information, market pricing, production advice, financial records and links with buyers. The digital extension works best when it is used to supplement, not replace, human help. In the literature on smart farming, advisers are described as 'sense-makers' who help farmers make sense of complex data and relate it to local decisions. So advisers need to be skilled at reading data, privacy, platform choice and digital business models. Evidence also warns against assuming information delivered over a phone will automatically change behaviour. A research in India of an SMS-based agricultural information service did not show statistically significant average gains in prices received, value contributed or production techniques. Limited consequences of information occur in the absence of access to financing, infrastructure, trust or capacity to act on advice. Hence, digital programming need to be created around user demands, local languages and real behavioural restrictions. Their effect should be tested rigorously, not assumed based on the number of messages delivered or app downloads.

An Extension-Led Pathway from Idea to Enterprise

A practical agriprenurship programme can be organised as a continuous pathway rather than a collection of unrelated training events.

Stage 1: Local Opportunity Diagnosis

Extension organisations should assess the local resources, skills, infrastructure, consumer trends and gaps in value chains. This diagnosis should include farmers, women's organisations, youth, merchants and processors.

Stage 2: Entrepreneur and Idea Selection

The selection should be based on interest, commitment, relevant experience and willingness to spend time. Participants should not be selected for programmes on the basis of their availability for training alone. The company proposal must be evaluated for its technical viability, market demand, and the entrepreneur's resources.

Stage 3: Competency Development

Training should combine production technology with costing, market assessment, communication, negotiation, digital literacy, legal compliance and risk management. Participants should work on their own enterprise plans throughout the programme.

Stage 4: Pilot Testing

The proposed product or service should be tested on a limited scale. Feedback should be collected from real customers. Production cost, quality, time requirement and willingness to pay should be documented.

Stage 5: Finance and Infrastructure Linkage

Extension personnel can help entrepreneurs understand loan conditions, prepare documents and approach suitable financing agencies. However, they should not encourage excessive borrowing or present subsidies as the foundation of a business. A viable enterprise must ultimately create value that customers are willing to pay for.

Stage 6: Market Connection

Potential buyers should be involved before commercial production expands. Written specifications concerning volume, quality, delivery and payment reduce misunderstanding.

Producer groups may be linked to retailers, processors, institutions or digital channels depending on the product.

Stage 7: Mentoring and Troubleshooting

Regular follow-up visits and digital communication can identify problems early. Peer-learning groups enable entrepreneurs to exchange solutions and reduce isolation.

Stage 8: Performance Assessment

Extension agencies should monitor enterprise survival, sales, net income, employment, repeat customers, loan repayment, environmental performance and benefits received by women or marginalised groups. Training attendance alone is not a meaningful measure of entrepreneurship development.

Relevance to Smallholders, Women and Rural Youth

For rural youngsters, agricultural entrepreneurship might provide options outside the narrow scope of paid work. Technology-enabled services, protected cultivation, mechanisation, food processing, logistics, e-commerce and precision agriculture are drawing young people. But courses should not present entrepreneurship as a panacea for unemployment. Starting a business is unpredictable, profits are delayed and it might fail. Young people need actual exposure, coaching and opportunity to start small. Women are already involved in production, livestock management, processing and marketing, yet their entrepreneurial development may be limited by the differential control over land, finance, mobility, technology and household decision-making. Extension programmes should thus provide information on training schedules and locations, financing mechanisms and market linkage activities for women. Participation in a training course should not be equated with empowerment unless women also obtain decision-making authority, control over income and ownership of productive assets. Smallholders are at a disadvantage in terms of size, collateral, storage and negotiating strength. Suitable entry points include collective enterprises, service-based businesses and low-investment value addition. Similarly, evidence on new entrants in European agriculture highlights the relevance of human and social capital in building entrepreneurial orientation but results from one location must be altered carefully before use elsewhere.

Evidence from Agricultural Extension and Entrepreneurship Programmes

Recent studies from high density plantation farming in Kashmir have shown association of access to extension with adoption of entrepreneurial production strategies. The research also found that farmers' participation was affected by land resources, loans and public backing. This helps to explain how extension works in a larger institutional context, and cannot replace good financing or good infrastructure completely. Indian studies of agriprenurship-support institutions have also emphasised the need for relevant training content and institutional ecosystems. Evaluations of training provided by Agri-Clinic and Agri-Business Centre reveal entrepreneurs like topics related to firm development and management. Institutional profile indicates organisations vary in their offerings, outreach and support systems. More broadly, entrepreneurship might help to rural economic development via its effects on innovation, employment, service supply and value addition. However, the association is not automatic. The benefits depend on the quality of the enterprise, market conditions, institutional support and whether innovation is economically and environmentally responsible.

Major Challenges

- The first hurdle is the training-event attitude. Institutions might record the number of programs, the number of participants, without knowing if firms were created or survived.
- The second is regular stuff. The same business strategy cannot serve every community, commodity and entrepreneur. Extension should be based on the best-fit concept and take into consideration local markets, infrastructure and social factors.

- The third is the finance-market gap. Credit without a market may produce debt and training without operating capital may develop knowledge that cannot be applied.
- The fourth is broken institutional support. Entrepreneurs sometimes have to contact many departments for technical clearance, funding, registration and help with marketing. Extension may act as a coordinating platform to decrease this fragmentation.
- Fifth is the digital divide. People who lack connection, gadgets, literacy or confidence may be excluded from digital services. There is still a need for human facilitation and different routes of communication.
- The sixth is bad impact measurement. Increased knowledge is useful, but not the same thing as a working firm. Long-term monitoring of extension systems should separate income from profit and business registration from enterprise sustainability.
- Finally, entrepreneurship should not be at the expense of food safety, worker welfare or natural resources. Responsible chemical use, water management, trash recycling, renewable energy and climate resilience must be woven into every company strategy, and extension education must do this.

Conclusion

Agricultural entrepreneurship offers a method to move agriculture away from the selling of homogeneous raw crops and towards a more diverse system of goods, services and value added activities. Extension education may facilitate this shift by blending scientific knowledge with opportunity awareness, business planning, financial literacy, market orientation, networking and risk management. But entrepreneurship cannot be whipped up by motivating speeches or isolated technological demos. When education links to actual experimentation, capital, infrastructure, buyers, incubation and continuing mentorship, sustainable firms come into being. Evidence from extension and business-school courses indicates the promise of experiential learning and the limits of information only methods. The future of extension is as an innovation and enterprise support system. Extension education may help create jobs, enhance farm income, add value, and contribute to resilient rural development by producing skilled entrepreneurs, building producer organisations and linking rural communities to markets and institutions. The ultimate success of this initiative should not be measured by the quantity of suggestions supplied but by the capacity of rural people to translate knowledge into responsible, successful and inclusive companies.

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