Discussion and Conclusions

Agriculture is the backbone of India’s economy. Agricultural marketing plays an important role in accelerating the rate of economic development and also in stimulating production and consumption. The aim of the research is to provide the opportunity of marketing agricultural products that are concentrated to a specific geographical location. This concluding chapter focuses on the important findings of the research addressing the objectives of the study, the key implications, recommendations, and limitations, thereby providing direction for future research.

5.1 Findings

The goal of the research was to develop a strategic e-commerce model for Udupi jasmine. To fulfil this goal several methodologies were followed based on a set of objectives. The primary objective is to develop an e-commerce model and farmer database that will keep track of various farmers and their yearly agricultural output. To achieve the primary objective of the study, secondary objectives were framed. This section summarises the result and methodology used to address each objective of the study framed in Chapter 1.

Objective 1: Study of different agricultural models and agricultural marketing techniques

To facilitate the research objective, a Focused Group Discussion with Jasmine growers from Udupi District was conducted to understand the various aspects of jasmine trade, factors affecting jasmine price and issues faced by jasmine growers. The focused group discussions gave significant indications to confirm the issues and problems related to marketing and sale of Udupi jasmine. Agents and traders too were subjected to a focused group study. Ten agents and two traders were the part of the focused group.
The characteristics of their trading operations were studied, and the role agents and traders play in the community-based enterprise were analysed. Focus group discussions helped in developing the questionnaire which is aiming at finding reliable response from jasmine growers.

Expert opinion was collected from experts in Zonal Agriculture Research Station, Udupi District and National Bank for Agriculture and Rural Development (NABARD). The responses collected from experts were important indicators to frame questions in the consumers and farmers questionnaire used in both exploratory and descriptive research.

Literature review is critical in understanding the work done by researchers in different fields as it can provide information and direction for future research. A literature review was done to analyse the use of ICT and the role of e-commerce in the agriculture sector, the same explained in Chapter 2. To gauge the socio-economic impact of jasmine cultivation and ICT awareness among growers, traders and to understand jasmine price fluctuations three case studies were undertaken.

**Case study 1 - Socio-economic impact and ICT awareness among growers**

It was found that jasmine cultivation had a significant impact on the socio-economic development of growers. ICT awareness among growers was found to be significantly low. Along with socio-economic impact and ICT awareness information, the case study also highlighted the participants in this community-based enterprise were satisfied with the existing system of supply chain management and with the fixing of prices. Prediction of jasmine growth cannot be done accurately due to several natural factors. Mode of communication involved in jasmine trade was via voice calls and there is no existing system which provides the jasmine grower daily flower production information.
Case study 2 - ICT awareness and willingness to adopt ICT among agents

Agents played an important role in the jasmine trade as they were the backbone of the entire supply chain. They collected the jasmine from the grower and the same was then supplied to the traders. Hence these agents would keep track of daily jasmine production of each grower they are associated with. This information on the grower and their daily output was recorded and maintained using a hard copy. Information on daily production is critical in terms of agricultural e-commerce.

As an e-commerce system needs to have constant sources that provide the product needed to be sold. Hence agents were approached as they were connected to a set of households and data on jasmine quantity was collected on a daily basis from the growers. Although the data was in written format it can be converted into digital format. From the case study, it was observed that the majority of the agents used smartphones for their daily transactions and all of the interviewees had the knowledge of using SMS facility. Using a quantitative approach to classify the willingness to automate the existing system K-NN classifier model was used on the data set. It is observed that there is a clear willingness among the majority of the agents are to use ICT to automate the existing system. As the majority of the agents use smartphones and they have some level of awareness using this technology, a mobile application can be developed to automate the existing process that the agents follow.

Case study 3 - Udupi Jasmine Price analysis.

Jasmine's price analysis for a period of six years starting from the year 2010 was undertaken. This was done to understand the reasons that caused fluctuations in jasmine price. The average price for six years was taken, and the year was divided into four quartiles. Analysis of jasmine price showed that there was a direct correlation between jasmine prices, festivals, functions and occasions. Also, the production too played a key
role in the variation of jasmine price. Whenever there were festivals and special occasions there was a sharp rise in the price. As growers cannot dictate jasmine production, stability in jasmine price could be achieved through a consistent demand. As there are several consumers who use jasmine for daily consumption providing an online option for buying jasmine would increase demand for jasmine as it will be available easily to a wide range of consumers.

**Objective 2:** To design an e-commerce model

Based on the analyses of the data collected from the literature review, focus group discussions, expert opinion, and case studies, an e-commerce model was developed to market Udupi jasmine with several interrelated functionalities. The same is presented in chapter 4, Figure 4.7. The interactions between various functionalities were shown and how it can be used to organize the existing system.

**Objective 3:** To deploy and test the solution for selective agricultural products

An e-commerce web application was developed based on the proposed model. The application had various features that would assist the user in buying jasmine online. The web application was tested for functionality and to check if the system was behaving as expected. The working, features and snapshots of various pages of the web application are presented in chapter 4.

**Objective 4:** To validate the e-commerce model.

Technology Acceptance Model (TAM) has been employed, effectively and suitably, to elucidate and predict the personal acceptance of technology use. Hence validation of the e-commerce model was done using TAM. The same was used to understand the willingness among the general public to use the e-commerce application for online jasmine trade. Assessment of TAM variables Perceived Usefulness (PU), Perceived
Ease Of Use (PEOU), Behavioural Intention (BI) and E-commerce Use (EU) was found to be very high suggesting a positive response from the respondents. To analyse the relationships between PU, PEOU, BI, and EU in TAM, Structural Equation Modelling (SEM) technique was adopted. SEM was chosen to be used because it simultaneously analyses the paths in the model and tests the goodness of fit of the model. As TAM variables are inter-related, SEM is expressed using path analysis with model fit indices.

The SEM model fitted between PU, PEOU, BI and EU showed reasonably good model fit according to multiple SEM fit statistics. As all the values fall within the desired range it represents a good fitting model. The path diagram and the table showed that the relation between PU and PEOU is significant and positive. The analysis suggests that Behavioural Intentions of consumers will influence them into actual E-Commerce use. Behavioural Intention exerts a significant positive influence on the actual E-commerce Use (BI -> EU = 0.68) suggests that, if provided with an e-commerce application to purchase Udupi jasmine online consumers are likely to accept and use it. Thus, it validates the model using which the web application is built.

5.2 Implications

E-commerce applications continue to expand every year and has penetrated almost all sectors. Agriculture sector in India needs a major overhaul to keep up with the present global trends, usage of e-commerce is the need of the hour. There are several GI based crops in India which do not have the luxury of marketing as regular crops since they are restricted to a specific geographic location. The implications of the research are outlined as follows:

- Providing structure to a fragmented agricultural market.
The Udupi jasmine market is a large and dispersed market. E-commerce may assist in providing answers by assimilating individual actors to improve the structure of the organization. Through the internet, many aspects of business can be managed systematically and effectively.

- **With limited investment, e-commerce can improve the market reach.** Irrespective of the geographical location ICT provide options to link various actors in the farming chain with minimum investment in infrastructure. By reducing the obstacles of geographical locations such as time and distance it increases the market reach through online transactions.

- **Price transparency and stability will improve.** Online access to product and price information will allow comparison of products and increase price transparency. Fluctuations in price will likely diminish because of the increase in competition. Also, the demand will increase as the accessibility is increased to a larger population and hence stability in price can be established.

- **Accessibility will be key to acceptance.** Adoption of ICT depends on the accessibility along with the benefits it offers. Udupi jasmine has got a significant socio-economic impact on the community-based enterprise. The community-based enterprise has an unstructured system. Thus, e-commerce will assist to extend the reach of Udupi jasmine to a larger market through its structured reach.

- **Better information exchange.** Information exchange can help to reduce the gap between consumers and producers. Hence ICT serves as a platform to provide authentic information not only to the existing stakeholders but also can attract more players into the
system. As information is readily available there will be better information exchange.

- **Formation of an alternative market structure.**
  It will decrease rural isolation and increase market transparency and thereby help the stakeholders to explore alternative market for the benefit of market expansion.

- **Enhance farming techniques and best practices.**
  In general, timely interventions can help improve farming techniques and adopt best practices in agriculture. Corresponding to Udupi jasmine the producers can experiment the possibility to adopt best practices because of information accessibility. This will also be helpful for the policymaking bodies to alter or redefine the policies on a timely basis.

Implications of the proposed e-commerce model is illustrated in Figure 5.1.

![Figure 5.1: Implications of the e-commerce model.](image-url)
DISCUSSION & CONCLUSIONS

The grower is given the maximum priority as they occupy the bottom of the pyramid. Grower’s will have information about prices, best agriculture practices, government policies etc. E-commerce will integrate traders and consumers to provide an organized market. Traders will be assisted by the trading platform to conduct trade. Finally, the consumers will have a portal that will allow them to buy the product irrespective of their geographical location. As the market reach increases there will be an increase in demand which will directly affect the price of the product. Hence the grower will benefit from the increase in demand. Effective information dissemination will be possible as the sector gets organized. As data will be integrated at all levels through the data warehouse it will allow experts to provide inputs in various aspects of the supply chain that will assist in government policymaking.

Agriculture product promotion is a critical factor for e-agriculture to succeed. Promotion is the element of market mix that includes all the ways a firm communicates the merits of its products and persuades its target customers to buy it. Hence, product promotion will assist the product in reaching a larger audience. From an academician’s perspective, this work can be applied in agricultural sectors that are localized to specific geographical locations. Presently India has 615 geographical indication (GI) products out of which 103 belong to the agricultural sector. This model can be customized for such crops which are specific to a geographical location. This will help in the promotion of such agricultural products to a wide range of consumers and organise a largely unorganized sector. This study provides a new pathway for the use of e-commerce in these sectors providing a means for increasing their market share. The research shows that by keeping localization in mind, e-commerce model can be built and used to market localized crop such as Udupi jasmine.
5.3 Recommendations

Create and preserve links between small farmers, markets, support services, and policymakers:
Small farmers face several constraints in terms of production and marketing. The most uphill task small farmers face is the lack of information in marketing and the failure to meet the quality standards. Information pertaining to market needs and quality standards provided by agencies and policymakers needs to be simplified and distributed to small farmers. These small farmers need to be made aware of the dynamics of market, competitions, standards to be maintained, technology that can be used to meet these standards to minimise market risk.

Creation of agricultural development teams to cater to needs expressed by community-based farmers:
To cater the needs of community-based farmers, rural development organizations with agriculture experts are not enough. The creation of agricultural development teams consisting of experts from multiple disciplines and from different sectors who are knowledgeable about the agricultural process is also needed. Researchers from across universities, research institutions should also be made a part of these agricultural development teams as they can provide valuable insights into farming and marketing practices. The result of such a diverse team of specialists across multiple disciplines working together would provide strong assistance to the agricultural demands faced by the community-based farmers.

Promote investment in the agricultural ICT sector.
Through the right policy-framework, improve the business environment that facilitates research, innovation, development along with investment. Public-Private Partnerships are a good example that would encourage investment in ICT infrastructure and applications. Through the right policy-frameworks, development can be accelerated in
open source and other technologies that would be easily available to rural small farming communities.

**Promote linkages between institutions and farming communities through ICT.**
An increase in globalization and liberalization of trade have immense benefits and these benefits can be used by agricultural systems. Small farmers need competence in connecting agricultural production with processing of agricultural products, marketing and the creation of grower’s organizations. The total system is made up of these small domains of each agricultural disciplines. Linkages between institutions and farming communities through ICT will result in an increase in farmer's competence in agricultural production, marketing, finance and micromanagement of details that would enhance agricultural productivity.

**Enhance digital inclusion.**
The use of a variety of policy measures and technical means to bridge the gap between regions and groups in the country will help to promote access to the internet at a subsidized price for the rural population. Promotion in access to educational content and broadband connectivity in primary education will accelerate digital literacy among the rural population. Targeted technology information among community-based organizations will reduce inequalities in digital literacy levels and promote the development of a workforce for the digital economy.

**Encourage e-commerce cooperation.**
With cross-border trade facilitation, encouraging e-commerce cooperation can strengthen agricultural e-commerce in India. E-commerce cooperation can influence existing and future e-commerce projects to use ideas and concepts that are successful. This will also eliminate the time, effort and resources required to start new e-commerce projects at rural level.

**Encourage agricultural e-commerce investment**
With the evident profitability of e-commerce in different areas, promote investors to invest in agricultural e-commerce through government support system. This will encourage entrepreneurs to explore different agricultural areas that can take advantage of e-commerce. This subsequently will also attract researchers to delve into doing research in agricultural e-commerce. This will help the rural community-based organizations to market their produces on a larger scale.

**Promotion of GI based crops.**

With many crops having GI tag in India, government assistance in promoting these crops is quite essential. The government at the state level needs to form special teams to identify the communities that are involved in producing such GI crops and provide assistance to framing communities that are involved in growing these crops. Assistance can be in the form of modern agricultural techniques, use of ICT, marketing, and promotion. This will strengthen these community-based farmers in exploring new techniques that will enhance agricultural production.

### 5.4 Limitations and future study

As with any convoluted areas of study, one must consider the scope of the research. Here it was necessary to restrict the scope of the study to a community-based enterprise cultivating a GI crop. From the agent’s perspective, validation of technology acceptance of a mobile-based application needs to be addressed. For this, an application needs to be built and then tested to check for the acceptance among agents. Marketing of agriculture products through the internet has its own challenges due to several factors like shelf life, price, quantity, storage, and location. Hence these factors need to be examined. Challenges also exist in the actual implementation of the model along with the mobile application for agents and SMS module for growers.
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This involves interventions from both government and private players. Further research can be conducted in terms of involving concepts such as online food delivery systems like Swiggy, Zomato, Uber Eats, etc into the delivery of agricultural products. These have excellent delivery management systems hence the same can be incorporated into agricultural produces as well. The model can be further extended to other sectors that involve local community-based products.

5.5 Conclusion

Jasmine growing community in coastal Karnataka of India is a successful viable community-based enterprise for over 85 years. Due to the significant socio-economic impact of jasmine cultivation, the promotion and marketing of jasmine is inevitable for the sustenance of this community-based enterprise. Hence this study tries to provide a means of promotion and marketing using ICT, by the development of an e-commerce model. Mixed-method research approach helped in the identification of important factors that govern this jasmine community-based enterprise. Many crops in India are specific to a geographical location and Udupi jasmine is one among them. Existing e-commerce models cannot be used to market such crops as these models are not localized to market such crops. Localization of e-commerce is necessary to market such crops. The model proposed is localized to market Udupi jasmine and the model considers several factors that govern the entire jasmine growing community-based enterprise. It provides several functionalities that will assist the consumer and trader in conducting commerce effectively. The model also provides solutions in collecting and managing grower information that will assist government intervention when necessary. By integrating data of the entire system through a data warehouse, information dissemination at all levels can be achieved.
DISCUSSION & CONCLUSIONS

Data analysis will help to understand the problems faced by the farmers and timely intervention by the respective authorities can be sought. It will also help in forming effective government policies that will assist in improving the socio-economic status of farmers. Hence the e-commerce model will provide assistance in improving the market reach, reduce transaction cost, convenience of buying, transparency, efficiency in productivity and organize supply chain.

Digital shifts are reshaping economies and societies today as well as in the future. Keeping localization in mind the model developed provides new ways of marketing crops that are specific to a geographical location hence providing new direction in the sector of GI based crops. The study is an attempt to contribute to this collation of existing literature and an insight to any researcher willing to apply a mixed-method approach in a related context. This study is a guideline for an approach that will lead to a new direction for assisting such community-based enterprises through technology.