

Development of Floriculture Information System in West Bengal: A SWOC Analysis

Synopsis

By

BELA MONDAL

Under the Supervision of

Dr. Krishnapada Majumder

**Retired Professor, Department of Library & Information Science
Jadavpur University**

**Department of Library & Information Science
Jadavpur University
Kolkata – 700 032
West Bengal, India
2021**

CONTENTS

1. Introduction.....	3-5
2. Objectives of the study.....	5
3. Review of related literature.....	5-10
4. Methodology.....	10-15
5. Floriculture in West Bengal: An Overview.....	16-18
6. Floriculture Information System and role of its components in West Bengal.....	18-21
7. Major Findings.....	21-34
8. SWOC(Strengths, Weaknesses, Opportunities and Challenges) analysis of Floriculture Information System in West Bengal.....	34-43
9. Conclusion & Suggestions.....	43-50
10. Bibliographic References.....	51-55

1. Introduction:

Flower is the symbol of beauty, love, purity and a medium of expression of human feelings. It is an integral part of human life for its usability in day to day life such as in social and religious purpose.

Floriculture: Floriculture can be defined as a sub-branch of horticulture, which deals not only with cultivation of flowers and foliage plants but production of value added products from the flowers and also marketing of flowers and those products.

Floriculture Community: Community as “a group of people who have something common. This can be their age, education, religion, interest, political affiliation, activity, work, profession or a combination of two or more of these” (Giggey,1988)¹. People associated with floriculture are called floriculture community.

Stake Holders: The different stake holders under floriculture community are- Government of India sponsored floriculture sector organization and institution, State Government sponsored floriculture sector organization and institution, Floriculture Research Centre, Non-government organizations (NGOs), Flower growers or farmers, People related to flower marketing, producers of manures, fertilizers, seeds which are used in floriculture.

In India, the state West Bengal blessed with unique physiographic condition, distinctive weather and agro-climatic condition. West Bengal emerged as a flower producing state in the atlas of Indian floriculture. The strength of floriculture development in West Bengal is due to suitable agro-climatic condition, availability of man power and lastly large demand of floriculture products in national and international markets (Bhattacharyya, 2013)¹². Due to this reason the state can be called as a paradise of flowers. West Bengal floriculture is comprises of both loose flowers and cut flowers.

According to NHB (National Horticulture Board) Database, West Bengal ranked 4th in position as a flower producing state (10.5%), after Tamil Nadu (18.20%), Andhra Pradesh (13.9%) and Karnataka (11.9%). But West Bengal is the highest producer of cut flowers in 2018-2019 among the states in India and ranked 7th in terms of production of loose flowers. The total

area under floriculture production in West Bengal is 27.62 Ha with a production of 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19.

According to ASSOCHAM (Associated Chambers of Commerce and Industry of India), it is estimated that near about 2lakh people are involved in only cut flowers production in West Bengal which is blessed with diverse agro-climatic conditions suitable for flower production (Pratim, 2014)¹⁶.

Floriculture Information System: Information is very important for each and every community, rather it can be said that Information is a very powerful tool to address the needs of any community and if it is used in right direction then it can create a huge impact on a country's economy. The term 'Information' is defined as "Information is structured data within a context that gives it meaning" (Checkland and Holwell, 1998)⁴. Information is a basic needs of human life, therefore, it can be said that without information, survival and development of any community is not possible (Satpathy, 2006)⁷. For this reason, information is very much essential for the development of floriculture community because the overall development of the entire community is crucially depend on floriculture productivity and proper marketing.

Floriculture information can be defined as any useful information related to floriculture such as information related to floriculture resources (soil, water, and climate), inputs (labour, seed/saplings, pesticides/insecticides, and equipments), technologies for production of flowers, post-harvest management and marketing related information.

So, to increase the floriculture productivity a well developed floriculture information system is needed which will disseminate floriculture information in timely manner to the floriculture community for their overall development. "In general an Information System is accepted as a system, automated or manual, that comprises people, machines, and/or methods organized to collect, process, transmit, and disseminate data which represent information" (Demiryurek, 2010)⁸. Therefore, a model floriculture information system can be defined as a system in which floriculture related information is generated, consolidated, transformed, received and delivered to the target group i.e., floriculture community in their regional language according to their needs and requirements.

To evaluate and improve the performance of the existing floriculture information system there is need to identification and analyzation of the Strength, Opportunity, Weakness and Challenges (SWOC) of the existing floriculture information system and then suggestion can make for the implication of better functioning floriculture information system.

2. Objectives of the study:

Keeping in view the importance of Floriculture Information System in West Bengal, the present study has been designed with the broad objectives. The main objectives of this study are as follows:

1. To study the present scenario of floriculture and information need of floriculture community in West Bengal.
2. To perform a SWOC (Strength, Weakness, Opportunities and Challenges) analysis of the existing components of floriculture based information flow.
3. To establish a strong coordination among all the existing components of floriculture based information flow for the betterment of floriculture community in West Bengal.
4. To provide a platform to the floriculture community by developing a model Floriculture Information System through SWOC Analysis for West Bengal that can extend required information support to improve their livelihood.

3. Review of related literature

3.1 Global Prospects of Floriculture:

Gudeta (2012)¹¹ assessed the impact of cut flowers on environment, economic and occupational condition of Ethiopia. By this study social and environmental issues are identified. The social issues are job opportunity creation, workers health and occupational safely, workers right, surrounding community health, compensation of previous land holders and socio cultural change. The environmental issued are water resource utilization, water and soil pollution, air pollution and land cover change. The only one issue has the positive impact

on society that is wide job creation of the floriculture industry and rests of the issues are the negative implication of floriculture sector of Ethiopia.

Gorman et al. (2015)¹⁸ stated about the different factors that influencing the growth of floriculture industry in the Australia. The author pointed out the factors that influence participation and growth in floriculture industry in Australia and suggested that research and development opportunities are needed to improve the growth of this industry.

3.2 Prospects of Floriculture in India

Saha et.al. (2014)¹⁷ explored the role of All India Coordinated Research Project for the development of floriculture in India. The research projects focused on development of new and improved varieties of flowers, measures for control of insect pests and diseases, post harvesting technologies, extraction of essential oils, make dry flowers to promote floriculture in India.

In an article **Ali et al. (2017)²¹** mentioned about the requirement of infrastructural facilities for the development of floriculture in Kashmir. Infrastructural facilities in Kashmir are not adequate for floriculture. Lack of storage facilities, packing, assistance to the growers and post harvest technologies are hampered the sector. No tissue culture laboratory available. The authors mentioned about the existing position of floriculture and necessary measures needed to promote this lucrative industry in Kashmir Valley.

3.3 Prospects of Floriculture in West Bengal

Sharma (2013)¹⁴ stated that to promote floriculture in West Bengal, North Bengal University (NBU) established the state's first tissue culture production centre named Centre of Floriculture and Agri-Business Management (COFAM) for orchids in commercial purpose. In this state, planting materials of orchids mainly bought from tissue production centre of Pune and Bangaluru in India and also from abroad like Holland and Australia, which increases the transportation cost. But now to counter this problem COFAM growing

35000 saplings of orchids at a time under green houses and poly houses. Mainly four varieties of orchid's viz. *Cetellia*, *Dendrobium*, *Phalenopsis* and *Oncidium* are produced by tissue culture in COFAM. This initiative makes a bridge to reduce the constraints in supply of planting materials to flower growers and increase the delivery system of orchids in domestic, national and international markets.

Gangyapadhyay (2016)¹⁹ explained that due to infrastructural problem in Mallickghat Flower Market, flower traders are facing lots of problem. Mallickghat Flower Market is the property of Calcutta Port Trust. but in the year 2000 the then Sate Government of West Bengal taken lease that place in just one rupee for 99 years from Calcutta Port Authority. But it was decided at that time that a well decorated flower market will built at that place for reducing day to day problem of flower seller. It was also decided that not only a flower market, a cold storage for flower, a packaging centre, export centre and a canteen will also built in that place. But after 18 years the place remains same due to lack of government support. According to State Horticulture Department, in the year 2004, 37 crore rupees were imposed for this purpose of the flower market building. For this purpose 5 crore rupees were given by the then Central Government to the then State Government. A blueprint of well infrastructured flower market on 3400 square feet area of port trust also prepared at that time. Bur the work was not started timely, for this reason the package money returned to the then central government.

3.4 Role of Agricultural Information Centre and System

Kizilaslan (2006)⁶ investigated the agricultural information system in Turkey and its effectiveness for farmers. The study highlighted the problems of agricultural information flow, insufficient coordination among the various organizations dealing with this system, and also discussed how farmers are suffering to get agricultural information for lack of connection between the publishing activities of research institutions and other institutions active in this field.

Prasad (2010)⁹ discussed different aspect of Agricultural Information System. Many isolated attempts such as information on agriculture price, agricultural extension, information on climatic condition, information on marketing techniques were made to

provide agriculture information to the farmers. The study stated that the consolidated information system has needed to entire India to serve the farming community to increase the agricultural productivity

3.5 Components of Agricultural Information System

- **Agricultural Extension Service and Application of Information Communication Technology (ICT) in Agriculture.**

Van Den Ban (1993)² focused on different aspects of Agricultural Knowledge and Information System for the improvement of agricultural extension of a country. The author discussed about the identification of information needs of farmers. Researchers have to choose research topics very carefully to satisfy the farmers' needs by the extension workers. By the cooperation of researchers, extension agents and farmers development of agriculture is possible. Extension workers have to create a bridge to provide scientific knowledge and information to the farmers. Many possibilities have been raised in this study to help farm families and to contribute more to the agricultural development in a country.

Singh, Meena and Swanson (2013)¹⁵ analyzed the role of Agricultural Extension System in India. This system is comprises of Ministry of Agriculture, State agricultural department, Agricultural institutes for technology dissemination and non-government organization. The study showed that there are large gaps in between research and extension approaches in India. There are need to evaluate the performance and socio-economic impacts of research and extension.

- **Information Needs of Agricultural Community**

Ozowa, (1995)³ emphasized the information needs of small-scale farmers in Africa. In this study it has been seen that not enough attention has been paid to the information dissemination process by the extension workers which is the most important ingredients for the development of agriculture. A new approach should be taken by the government to understand the exact information needs of the farmers. By the assessment of the

process of information flow in agriculture, opinions are suggested by the author for the improvement of the present situation.

Haldar et al. (2016)²⁰ discussed the Agricultural Information Network in West Bengal. The information needs of farmers are satisfied by progressive farmers, extension personnel and agricultural organization those are deals with extension program. These all are interconnected by direct or indirect path of communication to provide information and knowledge to the farmers.

- **Agricultural Marketing**

Bista, Patidar and Manjunath (2018)²³ highlighted the use of mobile phone to build a network among the farmers to deal the auction in agricultural mandi. The mobile based e-auction system is very helpful to the farmers to access the wide market information. By this system the famers can sell their product directly by removing the interference of middleman.

Bhargav (2017)²² showed the problems related to marketing of agricultural products. Due to lack of awareness and education farmers faced lots of problems in the marketing of organizational products and middlemen enjoy the benefits at the cost of poor Indian farmers. To boost the standard of living of rural farmers of India there is need of an agricultural marketing system.

- **Information and Communication Sources of Agriculture**

Rees et al. (2000)⁵ reported the role of agricultural knowledge and information system in Kenya. The major sources of agriculture has been identified, those are-local neighbors', family, markets and community based organizations. The author also reported that extension personnel treated as an important source of information but farmers have dissatisfied to the extension personnel due to lack of frequent interactions. The information requirements of the most of the farmers are not addressed by the extension personnel. Inadequate human resources from the government organizations and poor local leadership create a serious barrier in effective information flow to the farmers

where as extension workers faces lack of resources to disseminate farm communities and poor communications with researchers leading to information distortion.

Kamruzzaman et al. (2013)¹³ discussed the involvement of rural women in agricultural activities and the use of communication sources by them in Bangladesh. The rural women had inadequate use of communication sources which results poor yield from agricultural work. There is need to develop extension approach for agricultural production.

Jain (2011)¹⁰ focused on the impact of empowerment of rural people in agriculture through e-choupal in India. E-choupal is a internet kiosk conceived by ITC which gives information regarding weather forecast, market rates of crops, soil testing. The study indicated that users had good knowledge than non-users about all aspects of agriculture service

4. Methodology

Research methods defined as all those methods or techniques that are used for conduction of research. Research Method, thus refers to the methods the researchers use in performing research operations.

- **Research Design**

This study used descriptive research design to prepare the SWOC Analysis of Floriculture Information System in West Bengal. The other name of descriptive method is survey method. In this method researcher has to present the things which are happening and exist at present. It deals with conditions or relationships that exist, opinions that prevail, processes that are going on, effects that are manifest, or trends that are developing. It is mainly concerned with the present though it often considers past events and influences as relating to current status

- **Sampling**

Stratified sampling technique has been used in this study. This sampling technique is practiced when the population is not homogeneous but can be divided into various

In this study samples has been taken from different separate homogeneous groups such as Flower Growers, Flower Sellers and Extension Workers of Krishi Vigyan Kendras, Experts of floriculture department Krishi Viswavidyalaya, Experts of Horticulture department.

- a. To collect data on the existing condition of education and research in the Field of Floriculture in West Bengal as a component of this system, 2 State Agricultural University viz., 1) Bidhan Chandra Krishi Viswavidyalaya (BCKV) and 2) Uttar Banga Krishi Viswavidyalaya (UBKV) have been selected.
- b. To collect extension activity related data in the field of floriculture, 9 Krishi Vigyan Kendras of main flower producing districts of West Bengal have been selected. Apart from this in order to assess the channel of floriculture information dissemination process at the state level, Food Processing Industries & Horticulture and at the district level, 1 District Horticulture Department (Cooch Behar), 1 Block Development Office (Mathurapur-I Block, South-24-PGS) and 1 Panchayat Office (Bhagabatipur Gram Panchayat, Mathurapur-I Block, South-24-PGS) have been selected.

➤ **Selected 9 Krishi Vigyan Kendras in West Bengal are-**

- 1) Nadia Krishi Vigyan Kendra, 2) Howrah Krishi Vigyan Kendra, 3) Purba Medinipur Krishi Vigyan Kendra, 4) Seva Bharati Krishi Vigyan Kendra (Paschim Medinipur), 5) Nimpith Krishi Vigyan Kendra (South-24-Parganas), 6) Ashoknagar Krishi Vigyan Kendra (North-24-Parganas) 7) Coochbehar Krishi Vigyan Kendra , 8) Jalpaiguri Krishi Vigyan Kendra and 9) Darjeeling Krishi Vigyan Kendra.
- c. To collect ground level data about the information and extension services provided by the government organizations to the flower farmers and to measure their knowledge and awareness about the government facilities in the field of floriculture, 331 flower farmers from 9 leading flower producing districts have been selected and to collect data on the issues of flower marketing system and infrastructural constraints related to floriculture,

218 flower sellers of 5 popular flower markets of West Bengal have been selected for this purpose.

➤ **331 flower growers from 9 leading flower producing districts in West Bengal:**

- 1) Village Kakharda in Sahid Matangini Block of Purba Medinipur District-45 farmers.
- 2) Villages-Phalashpur and Bar-Phalashpur in Pingla Block of Paschim Medinipur-74 farmers.
- 3) Village Nokari in Ranaghat -II Block of Nadia District- 42 farmers.
- 4) Village Shimulpur in Gaighata Block of North 24-Parganas- 39 farmers.
- 5) Villages- Bhagabatipur, Ramjibanpur and Boro Sudhi in Mathurapur-I block of South 24 Parganas-36 farmers.
- 6) Village Khalor in Bagnan-I Block of Howrah District-28 farmers.
- 7) Village Bijanbari in Darjeeling Pul Bazar Block of Darjeeling District-22 farmers.
- 8) Village Purba Magurmari in Dhupguri Block of Jalpaiguri District -21 farmers.
- 9) Village Pundibari in Cooch Behar II Block of Cooch Behar District-24 farmers.

• **218 flower sellers from 5 popular flower markets in West Bengal:**

- 1) Mallickghat Flower Market (Kolkata) - 57 flower sellers.
- 2) Kolaghat Flower Market (PurbMedinipur) - 48 flower sellers.
- 3) Dhantala Flower Market (Nadia) - 41 flower sellers.
- 4) Nokari Flower Market (Nadia) - 28 flower sellers.
- 5) Thakurnagar Flower Market (North-24-Parganas) - 44 flower sellers.

- **Sources of Data**

In this study, both primary and secondary data has been collected. The primary data has been collected from the government reports and publications of Food Processing Industries & Horticulture Department, Government of West Bengal, Annual Reports and publications of Krishi Vigyan Kendras of West Bengal, Government Reports of District Horticulture Departments of West Bengal, conference proceedings, research based journal articles and current newspaper articles.

For Secondary data books, encyclopedias, dictionaries, journal articles, e-resources like Websites of Indian Council of Agricultural Research (ICAR), State Agricultural Universities (SAUs), National Horticulture Board (NHB), Agricultural & Processed Food Product Export Development Authority (APEDA), Matir Katha Portal have been studied.

- **Data Collection Methods**

Data collection methods or techniques allow us to systematically collect information about our objects of study (people, objects, phenomena) and about the settings in which they occur. The present study has been carried out by the following data collection methods:

- **Questionnaire Method**

In this study, three types of questionnaire have been designed for purpose of survey to collect necessary data. Both types of questions i.e., open-ended (respondents have to write their answers at some length) and close-ended (respondents have to opt their answers from mostly readymade alternative answers prepared by the researcher) has been included in these questionnaires.

- a) To collect extension activity related data in the field of floriculture, a structured questionnaire has been designed circulated to the selected nine Krishi Vigyan Kendras of main flower producing districts of West Bengal by personal contact. Filled in questionnaires were collected from the nine Krishi Vigyan Kendras.

- b) To collect ground level data about the information and extension services provided by the government organizations to the flower farmers and to measure their knowledge and awareness and the government facilities in the field of floriculture, a structured questionnaire has been designed and circulated to the flower farmers of selected nine main flower producing districts of West Bengal by personal contact (mentioned in Sampling Design). Total 331 filled in questionnaires have been collected from the selected areas of West Bengal.
- c) To present the SWOC Analysis of the Floriculture Information System in West Bengal more authentically by this study, another structured questionnaire has been designed. To collect data on the issues of flower marketing system and infrastructural constraints related to floriculture, this questionnaire circulated to the flower sellers of five popular flower markets of West Bengal (mentioned in 3.3-Sampling). Total 218 filled in questionnaire have been collected due to their busy time schedule in pick hours of flower selling in the flower market.

➤ **Interview Method**

Interview means conversation with a purpose.

- a) To collect data on the existing condition of Education and Research in the Field of Floriculture in West Bengal semi-structured interview method has been conducted. Head of the Floriculture Department and Librarian of Bidhan Chandra Krishi Viswavidyalaya (BCKV) and Uttar Banga Krishi Viswavidyalaya (UBKV) were interviewed to collect necessary data on the mentioned topic of Floriculture Information System in West Bengal.
- b) In order to assess the channel of floriculture information dissemination process in the district level, semi-structured interview has been conducted. In this context, to collect necessary data Assistant Director of Horticulture Department of Coochbehar District, Agriculture Development Officer of Block Development Office of Mathurapur-I Block, South-24-Parganas and Member of Panchayat of Bhagabatipur Village, Mathurapur Block-I, South-24-Parganas has been interviewed.

c) To collect district wise Area Production & Productivity of flowers in West Bengal a semi-structured interview was conducted. To collect required data on the topic Assistant Director of Horticulture, Department of Food Processing Industries & Horticulture, Government of West Bengal has been interviewed.

➤ **Observation Method**

To assess the present situation of Floriculture Information System in West Bengal observation method was carried out. Observation method is useful to collect complete and detailed data by the means of photographs, pictures, recording of conversations, and video recording of different activities. During the present course of study a number of photographs, pictures has been captured as well as conversations have been recorded as an important data.

● **Data Analysis**

Collected data has been analyzed on the basis of responses received from the different components of Floriculture Information System. Collected data are analyzed in tabulation form with percentage method which is the process of classified data from data-collecting tools into tabular manner so that systematic examination of the data becomes convenient and effective and the tabulated data presented by graphical method through number of charts, graphs by the help of MS-Excel. The graphic method of the presentation of collected data is very effective in attracting the attention of reader. Based on the findings, inferences have been prepared to justify the objectives of this study.

● **Referencing Style**

In this study, American Psychological Association (APA) Referencing Style, 7th Edition has been used to present bibliographic references and citations.

5. Floriculture in West Bengal : An Overview

West Bengal emerged as a leading flower producing state in the atlas of Indian floriculture. The strength of floriculture in West Bengal is due to suitable agro-climatic condition, availability of man power and lastly large demand of floriculture products in national and international markets. According to NHB (National Horticulture Board) Database, West Bengal ranked 4th in position as a flower producing state (10.5%), after Tamil Nadu (18.20%), Andhra Pradesh (13.9%) and Karnataka (11.9%). But West Bengal is the highest producer of cut flowers in 2018-2019 among the states in India and ranked 7th in terms of production of loose flowers. The total area under floriculture production in West Bengal is 27.62 Ha with a production of 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19.

According to ASSOCHAM (Associated Chambers of Commerce and Industry of India), it is estimated that near about 2lakh people are involved in only cut flowers production in West Bengal which is blessed with diverse agro-climatic conditions suitable for flower production..

• Flower producing zones in West Bengal

In South Bengal the main flower producing districts are Nadia, Purba Medinipur, Paschim Medinipur, Howrah, North 24- Parganas and South 24- Parganas and in North Bengal, the main flower producing areas are Darjeeeling, Kalimpong, Jalpaiguri and Coochbehar district.

- **Nadia District:** If the state scenario of flower cultivation is considered it is seen that Nadia district ranked 1st in terms of area devoted to flower cultivation and amount of production of different flowers. The main flower producing areas in Nadia district are- Ranaghat, Hanskhali, Chakdaha, Nakashipara, Haringhata, Hanskhali, Santipur, Karimpur, Chapra, Debagram, Jugalkishor, Raghunathpur, Dhantala, Punyanagar, Dhubulia, Kalinarayanpur, Birnagar and Badkulla

- **Purba Medinipur:** Purba Medinipur district ranked 2nd in position in terms of area and production of flowers. The main flower producing areas of this district are-in Panskura block- Haur, Satyeswar, Manur, Ghoshpur, Maishora, Keshapat, Chaitanpur, Haur and Mahatpur. In Kolaghat block- Deulia, Barisha, Khanadihi, Pulsita and Mihitukri. In Khirai block-Sherhati, Dokanda, Jodra, Usudpur, Naskardighi, Dhairanda and Kalidan. In Shahid Matangini block-Kharui, Jayramchack, Kakharda and Jagannathpur.
- **Paschim Medinipur:** Paschim Medinipur district ranked 3rd in position in terms of area and production of flowers. The main flower producing areas of this district are in Debra block- Balichak, and Baragarh, in Pingla block-Phalaspur and Bar-Phalashpur, in Daspur block- Loada, Gopalnagar, Brindabanpur and Sagarpur, Sabang block and Kharagpur-II block.
- **North 24- Parganas:** North-24-Parganas district ranked 4th in position in terms of area and production of flowers. The main flower producing areas of North-24-Pargana district are, Bangaon, in Gaighata block- Thakurnagar, Jaleshwar, Dharmpur, Shimulpur, Chandpara, Madhusudankati, Phulsara, Shutia, Ramnagar, Jhaudanga, and Duma.
- **South 24- Parganas:** South-24-Parganas district ranked 5th in position in terms of area and production of flowers. The main flower producing areas of South-24-Pargana district are in Bhangar I block- Shaksahar, Chandaneswar and Bodra, in Bhangar-II block- Panapukur, Baniara, Chilatala, Sanpukuria, Polerhat, and Ghatakpur, in Bishnupur-II block- Bakhrahata, Chak-Enayetpur, Parberia-Jaychandipur, in Mathurapur –I block- Bhagabatipur, Ramjibanpur and Boro Sudhi.
- **Howrah:** In Howrah district the main flower producing areas are in Bagnan II block- Bankurdaha, Deulti, Orphuli and Dharmonna, Kantapur, Saratchandra Udaynarayanpur block, in Bagnan-I block- Khajutti, Ulliberia, Shyampur block and Shankrail.
- **Darjeeling:** The main flower producing areas of Darjeeling district are Mirik, Kurseong, in Darjeeling-Pulbazar block-Bijanbari, Jorbunglow-in Sukhia Pokhari block, in Rangi-Rangliot block-Takdah, Ratomati, Pehla Gaon, in Siliguri-Matigara, Nakshalbari, Kharibari and Phansidewa.
- **Kalimpong:** The main flower producing areas of Kalimpong district are in Kalimpong- I block, Kalimpong-II block, Gourbathan block, Bara Mangwa and Poshyar Busty.

- **Jalpaiguri:** In Jalpaiguri district the main flower producing areas are in Dhupguri- Purba Mallickpara, Bandhunagar, Natunpara, Maynaguri, Kranti, Gossairhat, Shibnathpur, Jamaladaha, Koardanga and Purba Magurmari.
- **Cooch Behar:** In Cooch Behar district the main flower producing areas are in Cooch Behar II block- Kholta, Pundibari, in Tuphanganj block- Maruganj, in Dinhata block- Shitalkuchi, Gosanimari and Sitai, Mathabhanga I and II block, Haldibari block.

6. Floriculture Information System and role of its components in West Bengal

This system is a national platform for information and knowledge sharing and exchange for floricultural research and development for target groups and stakeholders at a country level. It serves as a knowledge repository aiming for strengthening, coordinating and adding value to the floriculture sector in order to increase the production and improve the standard of living of farmers.

• Functions of Floricultural Information System

- To develop tools and methodologies for the collection, storage, management and dissemination of floricultural information based on Information Communication Technology (ICT).
- To establish links and partnerships among countries and organizations with the appropriate resources, experiences and capabilities in pursuit of the capacity building goal.
- To facilitate the exchange of information at national, regional and international levels by promoting collaboration, information sharing and joint projects.
- To provide a platform that can provide support services to the floricultural community and helped in uplifting the floricultural community and improving their quality of standard of living.

- **Role of different components of Floriculture Information System**

By the review of related literature, it has been established that an Agricultural Information System consists of three major components viz. Research & Education, Extension and Farmers. Though, Floriculture is a micro-subject of agriculture then the components of Floriculture Information System are the same in this respect.

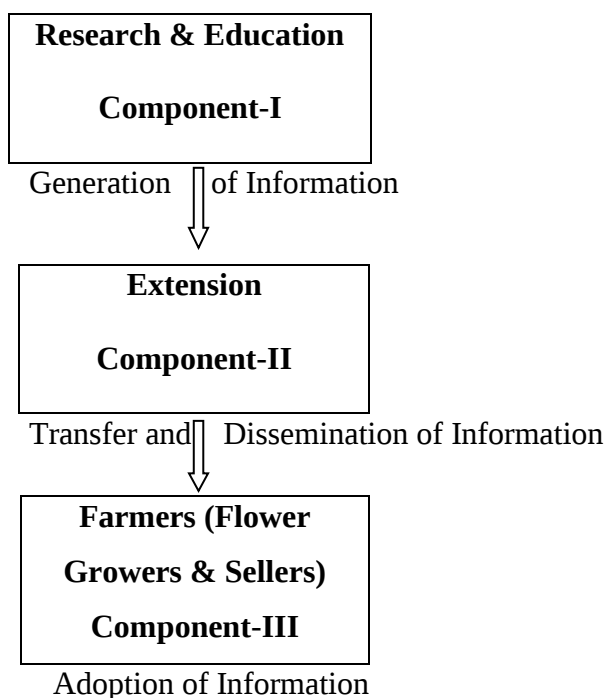


Fig. 1: Components and its role of Floriculture Information System

a) Component-I: Research & Education in the field of Floriculture in West Bengal:

In state level, basically State Agricultural Universities (SAUs) performed the responsibility of research and education in agriculture as well as floriculture. State Agricultural Universities (SAUs) are an autonomous organization with state wide responsibility for agricultural research, education and extension education. The SAUs are headed by a Vice-Chancellor, governed by a board and advised by an advisory committee. The governing boards of the SAUs have representatives from government, farmers and agri-business. Being autonomous organizations, they are able to effectively

integrate research and education and carry out their mandate. These Universities get direct funding from the State Government for research, education and extension education and substantial grants from the National Agricultural Research Council (Singh, Meena & Swanson, 2013).

In West Bengal, two State Agricultural Universities -a) Bidhan Chandra Krishi Viswavidyalaya (BCKV) and b) Uttar Banga Krishi Viswavidyalaya (UBKV) have been studied to know the present situation of research and education in the field of floriculture.

b) Component-II: Extension services related to floriculture in West Bengal

Extension service means reaching out to solving public needs with resources available through a variety of outreach programs (Kizilaslan, 2006)⁶. Floricultural Extension Service means reaching out to solving the needs of flower farmers with resources available generated from education and research through a variety of outreach programs such as training, front-line demonstration and advisory service.

Extension services in the field of floriculture basically provided by Krishi Vigyan Kendas, Kisan Call Centres and collaboratively by the extension workers of District Horticulture Department, Block Development Office and Panchayat Samiti.

Two types of services have been provided by the centres a) On-field services -provided by the extension workers of Krishi Vigyan Kendras, collaboratively by the extension workers of District Horticulture Department-Block Development Office-Panchayat Samiti and b) Off-field services provided by Kisan Call Centre.

c) Component-III: Farmers (Flower Growers and Flower Sellers) in West Bengal

Farmers (growers and sellers) are the third component of this system. They are the main target groups. Because generated information are meaningless if it is not adopted and applied by the farmers. Farmers are the adopter of generated, consolidated and transferred knowledge and information.

To collect ground level data about the information and extension services provided by the government organizations to the flower farmers (growers and sellers) , and to measure their knowledge and awareness about the government facilities in the field of floriculture, 331 flower growers from 9 leading flower producing districts (Nadia, Purba Medinipur, Paschim Medinipur,

North-24-Parganas, South-24-Parganas, Howrah, Darjeeling, Jalpaiguri, and Cooch Behar) have been selected and to collect data on the issues of flower marketing system and infrastructural constraints related to floriculture, 218 flower sellers of 5 popular flower markets(Mallick Ghat Flower Market, Kolaghat Flower Market, Dhantala Flower Market, Nokari Flower Market, Thakurnagar Flower Market) of West Bengal have been selected for this purpose because floriculture is not only deal with production of flowers but also deals marketing of those flowers.

7. Major Findings

By the analysis and interpretation of collected data through the help of questionnaires, interviews and observations method on the three components of Floriculture Information System viz., 1) Research & Education 2) Extension and 3) Farmers, the major findings has been prepared and inferences have been made to justify the objectives of this study.

- **Findings of Component-I: Research & Education related to floriculture in West Bengal**

To know the existing condition of Education & Research in West Bengal Bidhan Chandra Krishi Viswavidyalaya and Uttar Banga Krishi Viswavidyalaya has been selected. The findings on the Component-I: Education & Research are as follows:

- a) **Bidhan Chandra Krishi Viswavidyalaya (BCKV):**

- The university established on 1974.
- **Research Area:** Germplasm Collection & Conservation, Mutation Breeding, In vitro tissue culture, Dehydration of flowers.
- **Library Collections:** Maintained huge collection of print as well as digital repositories to strengthen Research & Education. The collections including -Books- 76,057, Pamphlets- 8,252, Bound Journals- 25,023, International Standards- 95, Thesis and Dissertations- 4315, Annual Reports-190, Current Indian Journals (Hard Copy) – 10, Research Bulletin – 9893

CD ROM Database, Non-Book Materials like- Video Cassettes (37), Audio Cassettes (06), Book Accompanying CDs (55), Thesis Soft Copies (309), and Proceedings Soft

Copies (36), Indian & Foreign Journals through 'CeRA'- 2200+, Krishikosh- More than 1,60,000 digital volumes and Krishiprabha- 10500+ Doctoral Dissertations

- **Special Library Facility to Farmers:** Library services are also given to the local participated farmers during the period of different training programs, seminar and workshops organized by different departments of BCKV.
- **Initiatives:** Initiatives have been taken by BCKV is both research and extension oriented due to sufficient infrastructure.
- **Barriers to conduct Research:** Though enough infrastructures developed for research and education purpose at BCKV campus, but research on floriculture is being treated as secondary requirement due to non-edible value of flower than other horticultural crops. Due to this reason funding in floriculture research purpose is comparatively low than other horticultural crops
 - ❖ **Inferences:** In spite of having huge library collection and infrastructure to conduct research and education in the field of floriculture, funding issue is the main barrier to promote floriculture at BCKV in West Bengal.

b) Uttar Banga Krishi Viswavidyalaya (UBKV):

- The University was established in the year 2000.
- **Research Area:** Micro-propagation of high-valued ornamental plants, Germplasm Collection & Conservation, post-harvest management and packing of flowers, protected cultivation of high valued ornamental crops.
- **Library Collections:** Collections are comparatively less than BCKV. Digital repository accessed as a registered university of ICAR. The collections including Books - 31,917, Bound Journals – 4034, Periodicals – 95, Thesis and Dissertations (Digitized) – 310, CD ROM -131, CD ROM Database-08, Indian & Foreign Journals through 'CeRA'- 2200+, Krishikosh- More than 1,60,000 digital volumes and Krishiprabha- 10500+ Doctoral Dissertations
- **Library Facility to Farmers:** No such kinds of facilities are provided to the farmers like BCKV.
- **Initiatives:** Initiatives are taken by UBKV is mainly extension oriented due to insufficient infrastructure.

- **Barriers to Conduct Research:** Infrastructure, man power and funding are the main barriers to conduct research in UBKV.

❖ **Inferences:** It is seen that due to lack of funding, infrastructure and manpower, in UBKV, research and education has not promoted in at larger extent.

- **Findings of Component-II: Extension activity Education related to floriculture in West Bengal**

To know the existing situation of Extension Services in West Bengal 9 Krishi Vigyan Kendras have been selected for this study. The following findings have been prepared by the present study.

- **Extension services provided by the Krishi Vigyan Kendras:** a) Training to farmers including farm women, b) Extension Functionaries, c) Front Line Demonstration d) Soil Testing, e) Seed production and distribution, f) Irrigation facilities g) Weather and Climate related information, h) Market related information i) Disease Forecast j) Training of Rural youth for employment k) Group Meeting l) Advisory services m) Scientist visit on farmers field n) Soil Health Camp o) information related to govt. schemes on floriculture as well as agriculture p) Talk shows.
- **Initiatives taken in the field of Floriculture:** a) On-Field Demonstration on Floriculture b) Awareness camp to promote scientific floriculture c) Post-harvest management d) Supply of quality planting material e) Cultivation of export oriented high value flowers like- Gladiolus, Anthurium, Chrysanthemum, Orchid etc. f) Technical intervention was made like quality seedling production, quality bunch production for Gerbera, Orchid, Chrysanthemum, Marigold and Tuberose g) Value added products from flower by preparation of dry flower, scent, organic colour h) Awareness on nursery development and protected cultivation.
- **Challenges faced by the experts of the Krishi Vigyan Kendras:** a) Lack of Infrastructure b) Lack of funding c) Low literacy rate of farmers to deal with application of new technology d) Lack of marketing related information e) Less number of efficient workers f) Limitations of land for poor and marginal farmers

to adopt new technology g) Most of the time the generated technology by the scientists and researchers are not farmers friendly (cost effective).

- ❖ **Inferences:** In spite of taking many initiatives to promote floriculture by the selected Krishi Vigyan Kendras, due to some challenges like- lack of infrastructure to conduct research, lack of man power, lack of marketing related information, lack of farmers friendly research output, a communication gap has been identified in between the agricultural experts and farmers.

- **Findings of Component-II: Extension activity Education related to floriculture in West Bengal**

To know the ground reality of farmers as a component of Floriculture Information System in West Bengal, 311 flower growers from 9 leading flower producing districts and 218 flower sellers from 5 popular flower markets have been selected. The following findings on flower growers and flower sellers are as follows:

- **Flower Growers:** Those who cultivate flowers.

- a. **Socio-economic characteristics of flower growers-**

- **Age:** The results shows that out of 331 respondent flower grower **38(11.48%)** respondents were the age between 18-25, **93(28.09%)** respondents were the age between 26-35, 104(31.41%), respondents were the age between 36-45, **62 (18.73%)** respondents were the age between 46-55 and **34(10.27%)** respondents were the age between 56-65.

- ❖ **Inference:** The data states that the categories of age i.e. 18-25 and 26-35 have higher respondents due to enough energy to engaged flower cultivation compare to other categories.

- **Educational Qualification:** The results shows that out of 331 respondents **79 (23.86%)** respondent flower growers had completed Primary Education, **172 (51.96%)** respondents had completed Secondary Education, **53 (16.01%)** respondents had completed Higher Secondary Education and **27 (8.15%)** had completed Graduation.

- ❖ **Inference:** The data revealed that majority of respondents flower growers in the rural areas have not gone for higher level of education. The results show that the

percentage of respondents up to secondary level is high, that means literacy rate of respondents is lower.

- **Financial Status:** The results shows that out of 331 respondents flower grower **156 (47.12%)** were Below Poverty Level, **123 (37.16%)** were Lower Middle Class and **52 (15.70%)** were Upper Middle Class.

- ❖ **Inference:** The data shows that 47.12 % respondents were under Below Poverty Level and 37.16% respondents were under Lower Middle Class because the marginal and small farmers are large in number. Due to get less amount of share, their income is not sufficient.

- **Experience in Floriculture:** The results shows that out of 331 respondents flower grower **45 (13.59%)** respondents have 1-5 years of experience in floriculture, **188 (56.79%)** respondents have 5-10 years of experience in floriculture, **85 (25.67%)** respondents have 10-15 years of experience in floriculture and only **13 (3.92%)** respondents have 15-20 years of experience in floriculture.

- ❖ **Inference:** The data states that majority of the respondent not very experienced because they are gradually shifting from traditional cultivation (Paddy, Jute) to floriculture due to incremental income.

- **Sex:** The result shows that out of 331 respondents, **147 (67.43%)** respondents were male farmers and **71 (32.56%)** respondents were female farmers.

- ❖ **Inference:** Male respondents are large in number than female respondents because female respondents also engaged with their houses hold works. But they are also work in field whenever they get time.

b. Flower Growers' Perceptions regarding Floriculture Information System:

- **Types of flowers cultivated by the respondents:** The results shows that out of 331 respondents **68 (20.54%)** have cultivated Loose flowers (mainly-Marigold, Hibiscus, Beli, Jasmine, Balsam and Aparajita). **263 (79.45%)** respondents have cultivated Cut

flowers (mainly- Rose, Dutch Rose, Tuberose, Gerbera, Gladiolus, Orchids, Anthurium, and Chrysanthemum) and **44(13.29%)** respondents have cultivated both types of flowers.

❖ **Inference:** During the survey it has been noticed that in South Bengal both types of flowers are cultivated but loose flowers cultivation is predominant and in North Bengal, cut flowers are predominant due to the varied agro-climatic condition of that place.

- **Types of seeds/saplings used by the respondents:** The result shows the data about the type of seeds/saplings used by the respondent flower growers. Out of 331 respondents **82(24.77%)** respondents have used local/traditional seeds/saplings, **169 (51.05%)** respondents have used hybrid seeds/saplings and **80 (24.16%)** respondents have used both types of seeds/saplings.

❖ **Inference:** The data states that percentage of Hybrid seeds/saplings used respondents are larger in number, the reason behind the use of hybrid type of seeds/saplings because these are highly productive in nature and has disease resistance power. The reason behind the use of local or traditional seeds/saplings is easy availability of the seed/saplings in local market. In present time the respondents are shifting from traditional seed/saplings to hybrid seeds/saplings due to huge demand of flowers in domestic as well as national and international markets and also for high profitability.

- **Mode of selling flowers by the respondents:** The result states that out of 331 respondents **226 (68.27%)** respondents used to sell their flowers in open market/ mandi and **105(31.71%)** respondents used to sell through middle man.

❖ **Inference:** Due to lack of market information, farmers have compelled to sell their flowers in lower price through middle man.

- **Sources to access of floriculture related information:**

The results shows that in case of floriculture related information such as selection of seeds/saplings, fertilizers and pesticides out of 331 respondent flower growers, **37 (11.17%)** respondents have taken information from the agricultural experts of govt. organizations such as Krishi Vigyan Kendra, District Horticulture Office, Block

Development Office and Krishi Prajukti Sahayak of Panchayat Samiti, **52(15.70%)** respondents have taken information from private organization, **168 (50.75%)** respondents have taken information from local agricultural shop and **74 (22.35 %)** respondents were taken information from self friends/other flower growers.

❖ **Inference:** From the above results it is clear that to seek information related to floriculture, flower growers are mainly prefer local shop, self friends/other local farmers and private organizations respectively than govt. organizations as a source of information. The main reason behind this situation is due to lack of coordination in between agricultural extension workers and farmers.

➤ **Awareness of flower growers about the government schemes related to floriculture:**

This section of the study discuss about the related schemes of floriculture in West Bengal. There are three govt. schemes on floriculture are available for the small and marginal farmers and other farmers such as Rashtriya Krishi Vikas Yojana, Mission for Development of Horticulture Schemes and Schemes of National Horticulture Mission.

The collected data shows that out of 331 respondents **106 (32.02%)** respondents benefitted by one scheme ie. Rashtriya Krishi Vikash Yojana, **13 (3.92%)** respondents benefitted by more than one mentioned schemes ie. Rashtriya Krishi Vikash Yojana and National Horticulture Mission and **212 (64.04%)** respondents did not heard about any of these three schemes.

❖ **Inference:** The above result showed that a huge communication gap has been identified in the floriculture information dissemination process by the extension workers of government organizations. So, the data revealed that maximum number of respondents were not aware about the govt. schemes related to floriculture. Therefore, it is clear that there is a big gap in floriculture information dissemination process by the government organizations, schemes related information is not properly reaching to the farmers by the agricultural extension personnel.

➤ **Usefulness of On-field services to the farmers by Government Organizations :**

This section of the study shows the usefulness of on-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants from govt. organizations such as – Krishi Vigyan Kendras, District Horticulture Offices and Block Level Offices by Front Line Demonstration, Advisory Services, Field Day. The results states that out of 331 respondents flower growers **89(26.88%)** got information from the govt. organization about this matter and **242(77.11%)** did not have any kind of information about the stated matter from the govt. organizations.

❖ **Inference:** From the analysis of data it can be state that dissemination of floricultural information by the government organizations are not up to the mark, it should be improved to provide right information to the right person at right time. Due to lack of communication farmers are not getting information properly.

➤ **Intervals of getting On-field services to the farmers by the Govt. Organization:**

This section of the study shows the intervals of getting of on-field information regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants from govt. organizations such as – Krishi Vigyan Kendras, District Horticulture Offices and Block Level Offices by Front Line Demonstration, Advisory Services, Field Day. The results states that out of **89** respondents flower growers **18(20.22%)** got information regularly from the govt. organization about this matter, **42 (47.19%)** respondent got information occasionally and **29 (32.58%)** got rarely information about the stated matter from the govt. organizations.

❖ **Inference:** The results pointed out about the frequency of usefulness of getting on-field information from the government organizations. From the above data it can be state that on-field services have not properly provided by the extension workers. Due to less number of efficient extension workers and lack of proper attention, dissemination of agricultural information is not timely reaching to the grass root level.

➤ **Usefulness Off-field services by Government Organization:**

This section of the study shows the usefulness of off-field information by toll-free number regarding soil test, use of fertilizers, selection of seeds/saplings of appropriate variety and disease of plants, weather forecast from govt. organizations such as- Kisan Call Centre and via Matir Katha App. The results states that out of 331 respondents flower growers only **76(22.96%)** flower growers have contacted to Kisan Call Centre to seek information about the stated matter and **255 (77.03%)** flower growers didn't have any information about such kind of organizations and out of 331 respondents **64(19.33%)** respondents heard about Matir Katha-Krishoker Katha App and **267(80.66%)** respondents not informed about Matir Katha-Krishoker Katha App.

❖ **Inferences:** The result states that though government has taken many initiatives to provide off-field information to the farmers but the fact is that most of the farmers have not familiar about this kind of services because of lack of awareness of them. In this respect, if the extension workers would organize awareness camp to provide information on this kind of services then the farmers would be information enriched. By analysis of the above data it can be requested that Govt. has to take initiatives to build awareness about the Kisan Call Centre and Matir Katha App and its services to practice proper utilization of information in this field.

➤ **Reason to not achieve desirable position in floriculture among the states in India:**

The result shows that flower growers are facing lots of problem in the field of floriculture during their cultivation process. The main reasons are 1) Lack of proper communication of floriculture related information by the extension workers 2) Lack of proper infrastructure related to floriculture. The results states that out of 331 respondents flower growers **84 (25.37%)** have accepted due to lack of proper communication of floriculture related information West Bengal not achieve the desirable position among the states in India, **53 (16.01%)** have accepted due to lack of proper infrastructure related to floriculture and **194 (58.61%)** have accepted both issues are responsible to not achieve the desirable position among the states in India.

- ❖ **Inference:** In spite of huge potentiality of West Bengal in floriculture due to lack of information and infrastructure the state does not achieve the desirable status in floriculture among the states in India. For this reason a well developed, well coordinated floriculture information system has been needed to provide a platform that can provide required information services to the farmers which will improve the standard of quality of living of them.
- **Flower Sellers:** Those who sell flowers called flower sellers.
 - a. **Socio-economic characteristics of flower sellers-**
 - **Age:** The results shows that out of 218 respondent flower sellers **36(16.5%)** respondents were under the age group 18-25, **75(34.40%)** respondents were under the age group 26-35, **86(39.44%)** respondents were under the age group 36-45, **14 (6.42%)** respondents were under the age group 46-55 and **7(3.21%)** respondents were under the age group 56-65.
 - ❖ **Inference:** The data states that the categories of age i.e. 26-35 and 36-45 have higher respondents due to enough energy to engaged flower carrying and selling compare to other categories.
 - **Educational Qualification:** The results shows that out of 218 respondents **71 (32.56%)** respondent flower sellers have completed Primary Education, **87 (39.90%)** respondents have completed Secondary Education, **53 (24.31%)** respondents have completed Higher Secondary Education and **7 (3.21%)** have completed Graduation.
 - ❖ **Inference:** The data states that like flower growers majority of flower sellers in the rural areas have not gone for higher level of education. The results show that the percentage of respondents up to primary and secondary level is high, that means literacy rate of respondent is lower.
 - **Financial Status:** The results shows that out of 218 respondents flower sellers **91 (41.74%)** were Below Poverty Level, **115 (52.75%)** were Lower Middle Class and **12 (5.50%)** were Upper Middle Class.
 - ❖ **Inference:** The data shows that 41.74 % respondents were under Below Poverty Level and 52.75% respondents were under Lower Middle Class because the

marginal and small farmers are large in number. Due to get less amount of share, their income is not sufficient.

- **Experience in Flower selling:** The results shows that out of 218 respondent flower sellers 57 (26.14%) respondents have 1-5 years of experience in floriculture, 72 (33.02%) respondents have 5-10 years of experience in floriculture, 81 (37.15%) respondents have 10-15 years of experience in floriculture and only 8 (3.66%) respondents have 15-20 years of experience in floriculture.

❖ **Inference:** The data states that majority of the respondent have not very experience because they are shifting from selling traditional crops (Paddy, Jute) to flower due to incremental income.

- **Sex:** The results shows that out of 218 respondent flower sellers, 147 (67.43%) respondents were male farmers and 71 (32.56%) respondents were female farmers.

❖ **Inference:** The data states that male respondents are larger in number than female respondents.

b. Perception of flower sellers regarding existing infrastructure of floriculture

- **Availability of permanent sitting arrangement:** The results shows that out of 218 flower seller respondents, 67(30.73%) respondents said yes, 57(26.14%) respondents said not sufficient and 94(43.1%) respondents said no to the availability of permanent sitting arrangement in the flower market.
- **Types of market land area:** Out of 218 flowers seller respondents, 174(79.81%) respondents said the types of market land area is government undertaking and 44(20.18%) respondents said the types of market land area is under the private organizations.
- **Stability of the market:** Out of 218 flowers seller respondents, 72(33.02%) respondents said they sell their flowers in permanent market and 146(66.97%) respondents were selling their flowers in non-permanent market.
- **Pay to the market land owner:** Out of 218 flowers seller respondents, 190(87.15%) respondents said yes they have to pay for sell their flowers, and 28(12.84%) respondents said that they don't have to pay for their selling in flower market.

- **Toilet facilities:** Out of 218 flowers seller respondents, 107(49.08%) respondents said yes to have toilet facility, 40(18.34%) respondents said not sufficient and 71(32.56%) respondents said no to the availability of toilet facility in the flower market area.
- **Availability of shading in rainy season:** Out of 218 flowers seller respondents, 64(29.35%) respondents said yes to have shade in flower markets, 134(61.46%) respondents said not sufficient and 20(9.46%) respondents said no to the availability of permanent shade arrangement in the flower market during all season as well as rainy season.
- **Drinking Water:** Out of 218 flowers seller respondents, 52(23.85%) respondents said yes to have drinking water, 77(35.32%) respondents said not sufficient drinking water and 89(40.82%) respondents said no, to the availability of drinking water in the flower markets.
- **Waste disposal area:** Out of 218 flowers seller respondents, 75(34.40%) respondents said yes to have disposal area, 55(25.22%) respondents said not sufficient and 88(40.36%) respondent said that no, the market has not any disposal areas for waste materials.
- **Cold storage near market:** Out of 218 flower seller respondents, 101(46.33%) respondents said yes to have cold storage near the market, and 117(53.66%) respondents said that they don't have cold storage facility near flower market.
- ❖ **Inferences:** The above data states about the existing infrastructure of floriculture in West Bengal. Most of the flower markets in West Bengal are going on government property such as-Mallickghat flower market is going on the land of the Calcutta Port Trust (Gangyapadhyay, 2016), Kolaghat flower market is going on the land of Indian Railway, Dhantala Market is going on the road side area that is under PWD except Thakurnagar flower market (private market). The land authority of these markets takes money from the sellers for their day to day business but due to overcrowding the sellers cannot get basic facilities from the market authority such as- sufficient toilet; sufficient drinking water; shades in rainy season; proper sitting arrangement; sufficient garbage place for waste and rotten flowers and cold storage near flower market for unsold flowers.

c. Problems & Requirements of Flower Sellers for the Development of Floriculture Information System

- **Lack of permanent govt. markets/mandi for flower selling:** Out of 218 flower seller respondents, **190(87.15%)** respondents said yes, to lack of permanent govt. flower markets/mandi, and only **28(12.84%)** respondents said that they sell their flowers in govt. markets / mandi.
 - ❖ **Inference:** During the survey it has been seen that most of the whole-seller flower markets/mandi in West Bengal are not permanent because the land owners are central government authority such as Mallickghat flower market under Calcutta Port Trust, Kolaghat flower market under Indian Railway (Eastern), except Nokari flower market(Govt. flower mandi). Due to lack of coordination between central and state government, these markets are still not permanent. Thakurnagar flower market is a permanent market but private market.
- **Lack of adequate storage facility:** Out of 218 flower seller respondents, **164(75.22%)** respondents said yes, to lack of adequate storage facility, and **54(24.77%)** respondents said that they don't have shortage of cold storage to keep flowers.
 - ❖ **Inference:** The data states that in West Bengal, there is need to be set up of cold storage to store valuable unsold flowers. It has been seen that due to inadequate storage facility sellers compelled to throw their flowers here and there.
- **Poor market information:** All **218 (100%)** flower seller respondents agreed that market related information is not available. For this reason many times middleman captured the share of other flower sellers.
 - ❖ **Inference:** The result of survey states that there is no marketing related information provided by any government organizations.
- **Requirement of arrangement of fairs and exhibitions for floriculture products:** All the 218 (100%) flower seller respondents agreed that the arrangement of different kind of fairs and exhibitions by the help of government organizations as well as private sectors needed to sell their flowers as well as to get global recognition and appropriate value of their flowers.

- ❖ **Inference:** The data states that there is need to organize different kind of fairs and exhibitions by the help of government organizations as well as private sectors to sell flowers and for global recognition to get appropriate value of their flowers.
- **Requirement of establishment of flower auction centre:** All the **218 (100%)** flower seller respondents agreed that an Auction Centre have needed to sell their flowers to get appropriate value of their flowers.
- ❖ **Inference:** The data states that there is need to be set up of flower auction centre because there is no flower auction centre is built to sell flowers in West Bengal.

Requirement of global information network: All 218 (100%) flower seller respondents, agreed to the statement that a strong information network should be build in this state in between local, national and international market to pick the chance to entering into the global market.

- ❖ **Inference:** In West Bengal, there is no marketing information provided by any govt. organization. There is no inter- linkage between local flower markets as well as national and international flower market. The farmers produce flowers and sell according to demand for auspicious ceremony (locally called lagan).

8. SWOC(Strengths, Weaknesses, Opportunities and Challenges) analysis of Floriculture Information System in West Bengal

In general, a SWOC (Strength, Weakness, Opportunity and Challenge) Analysis is a structured planning method used to evaluate the Strength, Weakness, Opportunity and Challenge involved in any organization, project or business sector.

- **Strengths of Floriculture Information System of West Bengal**

- **Suitable Agro-climatic condition:**

West Bengal endowed with suitable agro-climatic condition and abundance of natural resources for diversified floricultural production. The climatic condition of this state is very unique. The climatic condition of South Bengal and North Bengal is totally different from each other. The climatic condition of South Bengal is mainly hot and humid in

nature with adequate rainfall and moderate winter while the hilly areas of North Bengal have tropical and pre-humid climatic condition, adequate rainfall, moderate temperature and prolonged winter. These unique climatic conditions of West Bengal are most favourable for the production of various types of flowers. The average rainfall of this state is ranging in between 1234 mm to 4136 mm. The temperature is varies in between 24⁰c to 40⁰ c during summer and 7⁰c to 26⁰c during winter.

The soil of West Bengal is very fertile; predominance of alluvial soil is responsible for huge amount of flower production. In West Bengal well developed irrigation system facilitating higher cropping intensity. Many rivers traversed by this state and many canals and tanks supporting the irrigation system of this state and maintain underground water level.

➤ **Availability of Labour and Land**

West Bengal is an agrarian state. The total area of this state is 86.84 ha, of which 52.98 lakh ha area is net sown area from which the total area of flower cultivation is 27.62 ha. It is seen that the area of flower cultivation is increasing day by day due to incremental income and availability of land.

Floriculture is generally a labour intensive sector in which care and attention is required to grow flowers from cultivation to marketing. In rural areas of West Bengal, there is no scarcity of labours to work for cultivation of flowers. There is a vast resource of comparatively cheap labour is an advantage for floriculture.

➤ **Large Network of Agricultural Extension System**

India as well as West Bengal has a large network of agricultural extension system in terms of professional and technical agricultural staffs. In state level different institutions an organizations such as State Agricultural University, Krishi Vigyan Kendra, Kisan Call Centre, District Agriculture Department, District Horticulture Department, Sub-divisional office, Block level office, Panchatay Samiti are involved in agricultural extension program to disseminate information and knowledge in the field of agriculture and its allied sectors such as- Horticulture (Floriculture), Animal Science, Fisheries and Dairy farming.

- **Weaknesses of Floriculture Information System of West Bengal**

- **Lack of funding in the field of research at university level and for extension in KVKs**

During the survey it has been noticed that at university level the main barrier to conduct research is funding. Due to lack of funding, the required infrastructure has not been developed for research purpose in State Agricultural University. The reason behind the low funding is because floriculture being treated as secondary requirements due to non-edible value than other horticultural crops.

Lack of funding is also a big issue in case of infrastructural development for extension purpose in Krishi Vigyan Kendras.

- **Lack of Information**

- a. Market related information :**

In order to compete with other states as well as in global markets, the flower sellers of West Bengal needed updated marketing information.

In case of grass root level due to lack of market information the small and marginal flower growers are exploited by middle man or intermediaries. They reduce the share of the profit of the small and marginal farmers. Because government has no control on market price for that reason needy farmers don't get the exact price of the flowers.

In case of flower sellers, due to lack of information related to major flower trade fairs and exhibitions at national level and international level, information related to consumer profiles, types of demand at national and international auction, they do not compete with other states. The farmers of this state produce flowers according to demand for auspicious ceremony.

There is no sale promotion activities, no information related to inter-linkage between local, national and international markets. There are no organized co-operatives which can take care of floriculture trade in West Bengal.

Government has no control on market price for that reason small and marginal farmers do not get the exact price of flowers. For this reason productivity of flowers are still not up to the mark as compare to the other leading flower producing states like-Tamil Nadu, Andhra Pradesh and Karnataka.

b. Technological information

Different types of technologies are invented in the field of floriculture by the researchers, but it has no value unless it is applied by the farmers. Due to lack of technological information at grass root level, maximum number of flower growers are cultivated their flowers in traditional way.

Some government organizations like Krishi Vigyan Kendras are involved in dissemination of technological information and knowledge by extension work. But in many cases at ground level the information has not reached properly. Different technological information related to floriculture like advanced cultivation practice by protected cultivation under green house, poly house and shade net, organic method of flower cultivation, irrigation management, plant protection technology, post-harvest management related information are not reached properly to the small and marginal farmers.

c. Government schemes related information:

Many government initiatives have been taken to promote floriculture by central as well as state government like different kind of subsidies for making Green House, Poly House, Shade Net, Creation of water resources, loan through Kisan Credit Card etc. During the survey according to the flower growers of this state the problem is that the proper information related to these initiatives or schemes are not reached to the actual needy farmers in timely manner.

➤ **Lack of Research-Extension-Farmer Linkage**

It is very important to grow latest varieties of flowers to compete with the changing needs of floriculture at national and international level. There is lack of appropriate planting materials, tissue culture units to produce good export quality flowers. There is lack of information on new varieties which continuously keep changing in the international markets and lack of knowledge about importing and exporting countries. Due to lack of proper research in plant breeding, tissue culture units for flowers in this state, farmers have to purchase planting materials from other states like Karnataka, Maharashtra and also from outside of the country like Holland. Government should set up need based research by its Research & Development institutes in the field of floriculture. There is need to create a strong linkage to disseminate generated information through scientific research by the extension personnel to the farmers.

➤ **Lack of Efficient Extension Workers**

Agricultural as well as floricultural information is mainly disseminated by Agricultural Extension personnel such as through front line demonstration, training, advisory services etc. But due to lack of efficient extension workers, in many cases agricultural information has not reached to the grass root level properly. A wide gap in between extension personnel and farmers has been noticed by this study such as lack of emphasis on farmers training, inadequate communication capability, little focus on empowering farmers, lack of infrastructural support below district level, inadequate support for promotion of floriculture. Though having large agricultural extension network with large human resources for the development of floricultural community, the support is not reached properly.

➤ **Infrastructural Problems**

a. Lack of Cold Storage

In West Bengal shortage of multipurpose cold storage and pre-cooling unit is a big issue to store flower. Being highly perishable in nature, flower growers and sellers sometime needs pre-cooling unit for refrigerated transport to reach flower market and cold storage to store unsold flowers or to store huge amount of flowers in festive season for making profit but due to lack of cold storage facility, in many times huge amount of unsold flowers are thrown by the flower growers and sellers. Especially in flower

producing district and near flower market multipurpose cold storage is needed for the flower .

For instance, due to lack of multipurpose cold storage and pre-cooling unit, flower sellers of Mallick Ghat Flower Market, Dhantala Flower Market, Kolaghat Flower Market are facing lots of problems. During the survey, most of the flower growers and sellers of West Bengal complaining about the absence of multipurpose cold storage due to their financial loss.

b. Lack of Permanent Flower Market

In West Bengal another big infrastructural drawback of floriculture is lack of permanent flower market. Maximum big flower markets of West Bengal such as Kolaghat Flower Market, Dhantala Flower Market, Mallick Ghat Flower Market have not any shade to sell flowers except Mallick Ghat Flower Market, there is only 244 stalls are present. All these markets are not permanent markets such as- Mallick Ghat Flower Market is on the area of Calcutta Port Trust, Kolaghat Flower Market is on the area of Eastern Railway, Dhantala Flower Market is on the road side area and Siliguri also has not any permanent flower market.

Regularly approximately 2000-4000 flower sellers come to sell their flowers in the market. In spite of taking money from the flower sellers minimum facilities are not provided by the land authorities. In these markets, there are no proper sitting arrangements, no sufficient water, and no toilet is available for the sellers. Especially in rainy season the sellers face lots of difficulties to sell their flowers.

• Opportunities of Floriculture Information System of West Bengal

➤ Demand of flowers in Domestic, National and International markets

With the progression of civilization human are exploring the arena of floriculture and attempt to satisfy to their aesthetic needs. Gradually the consumption of flowers became regular in our daily life for this reason demand of flowers is rising day by day due to various social and religious functions round the year, West Bengal must grab on such opportunity. The state produces 221.64 MT cut flowers and 77.25 MT loose flowers in 2018-19 which is a good share among the states of India. Huge amount of flowers are exported in different parts

of country like Delhi, Bhubaneswar, Chennai, Jamshedpur, Mumbai, Varanasi etc and as well as outside of this country like Dhaka, Nepal, Amsterdam, Dubai, Europe and Auckland. So, West Bengal has the potential to increase the productivity of flowers and pick the chance to entering into the global market (Pratim, 2014)¹⁶.

➤ **Job Creation**

Floriculture emerged as an agri-business sector in West Bengal providing employment opportunity and entrepreneurship in both rural and urban areas. Floriculture basically is a labour intensive sector, where proper care and attention is needed from cultivation to marketing.

Large number of people in West Bengal earn either by cultivation or marketing of flowers. The economy of West Bengal is boosting by floriculture because it is the way of earning for marginal and small farmers and poor people also those who are associated with this. It is noticed that in this state, especially small and marginal farmers are shifting their farming from traditional to commercial floriculture which uplift the quality of standard of living of the farmers.

• **Government Initiatives**

To promote floriculture different initiatives have been taken by the Central Government as well as Government of West Bengal. Different schemes are implemented for the development of floriculture under the different schemes of National Horticulture Mission, Rashtriya Krishi Vikash Yojana and Integrated Mission for Horticulture Development. At present, government gives stresses on protected cultivation like Green House cultivation, Shade- Net cultivation, and Poly-House cultivation by financial assistance by these schemes.

• **Demand of Value-Added Products of Floriculture**

Besides flowers, the demand of value- added products of floriculture like organic colours, dry flowers, and essential oils are gradually increasing at national markets as well as in international markets. Due to the eco-friendliness nature organic colours and dry flowers have high demand in throughout the year. Essential oils are used in perfume industry. Therefore West Bengal has a big opportunity to explore this section of floriculture.

- **Challenges of Floriculture Information System of West Bengal**

- **Weak Research-Extension-Farmers Linkage**

In West Bengal, there is a big challenge to build coordination in between research in the field of floriculture and dissemination of the research product to the farmers by extension service. Only by the strong coordination and linkage, generated information would be disseminated to the farmers for their sustainable development. In West Bengal many research work is going on for the bright future of floriculture but it will be successful only when generated information and technologies have to be disseminated properly to the floriculture community by the extension functionaries.

- **Lack of sufficient government facilities**

In West Bengal, maximum flower growers are small and marginal farmers. Therefore the subsidies provided by the central as well as state government are not enough for them. We know that floriculture is a blooming industry for West Bengal, so it is requested to the policy makers to think about this matter. There are some more financial assistance should be provided by the government especially for small and marginal farmers. Another thing for farmers of West Bengal is largely depending on floriculture in present days but flower is not included in Fasal Bima Yojana, where other crops are enlisted. Due to natural calamity like heavy rainfall, storm, flood or insufficient rainfall the growers are facing huge losses because flower is a perishable goods. In this case, it is requested to the government to think about this matter.

- **Quality of flowers**

One of the main challenges is quality of flowers. To enter into international trade flowers require to meeting international standards. In West Bengal, there is a vast scope of floriculture, but the cultivation process and post-harvesting process is not done in scientific way, for this reason the quality of flowers do not meeting the quality requirement of International standards. The reason behind this, most of the farmers of this state are economically weak and have low literacy level, so they don't have much idea about protected cultivation or organic farming to get good quality of flowers. Other states like Tamil Nadu, Karnataka and Maharashtra are take advantage over this situation and capture a high share of

National and International flower markets. In this situation, the government organizations like Krishi Vigyan Kendra, Horticulture Department have to step forward to deal with this situation in this state.

➤ **Political Issues:**

During the survey it has been identified that due to different political issues in many places, different initiatives related to floriculture are still pending. For instances: **a) Flower Market in Thakurnagar:** By the government initiation a flower mandi was started to set up in the year 2017 at Thakurnagar near the railway station close to the old flower market. The market will be developed on a 3acre land of PWD. In this permanent market all the sellers will be accommodate under one roof. There will also be a cold storage and a processing unit for organic flower which will be prepared from waste flower. The budget of this project was 25 crore rupees from which 9 crore rupees was handover to the local administration to inaugurate the mandi. But after starting of this project within one year the construction work has been stopped due to political reason.

b) Nokari Cold Storage: In the year 2010, the then chief minister inaugurated the cold store at Nokari village in Nadia district to store different kind of flowers but the cold store become out of order within one year.

In Dhantala and Nokari flower market of Nadia district farmers bring their flower in every morning then after trading as the market varies regularly, farmers often left with unsold flowers of huge quantities which they throw on the streets and dumping area. According to the grower and sellers of the district, they have requested many times to the district administration for long time for make the cold store functional but nothing has been done yet.

c) Mallickghat Flower Market: Mallickghat Flower Market is the property of Calcutta Port Trust. but in the year 2000 the then Sate Government of West Bengal taken lease that place in just one rupee for 99 years from Calcutta Port Authority. But it was decided at that time that a well decorated flower market will built at that place for reducing day to day problem of flower seller. It was also decided that not only a flower market, a cold storage for flower, a packaging centre, export centre and a canteen will be built in that place. But after 18 years the place remains same due to lack of government support.

According to State Horticulture Department, in the year 2004, 37 crore rupees were imposed for this purpose of the flower market building. For this purpose 5 crore rupees were given by the then Central Government to the then State Government. A blueprint of well infrastructured flower market on 3400 square feet area of port trust also prepared at that time. But the work was not started timely, for this reason the package money returned to the then central government (Gangyapadhyay, 2016)¹⁹.

9. Conclusion & Suggestions

- **Conclusions:**

With the progression of human civilization, floriculture has emerged as an important agri-business sector providing employment opportunities in both, rural as well as in urban areas. Flowers which once adorned the gardens now become a potential source of lucrative business in global perspectives.

West Bengal is very much resourceful as a flower producing state in the atlas of Indian floriculture. There is no denying fact that floriculture continues to generate employment and earning opportunities to the people in rural areas of West Bengal. West Bengal is the highest producer of cut flowers in 2019 among the states in India.

Information is vital for rural development. Information is the least expensive input for rural development, and it can also be viewed as a basic, necessary ingredient for bringing about social and economic change in rural areas. For the smooth running of floriculture sector in West Bengal, timely information is very essential, because information is very important for the development of every sector. For this reason, a well developed Floriculture Information System is needed to disseminate floriculture related information to the floriculture community. From the present study, it has been noticed that the low level of awareness, lack of information of advanced cultivation at grass root level, unavailability of ample hi-tech infrastructure, dearth of knowledge regarding the downward dissemination of technical know-how and unorganized marketing channels; have undoubtedly threatened the profitable aspect of the floriculture sector of West Bengal. In this state, a wide gap is noticed in between research, extension work and farmers. The result of various research programs on floriculture practiced at different

level, is not properly reaching to the floriculture community by the agricultural extension personnel. The policy makers should think about to strengthen the agricultural extension function at below district level, such as sub-division level, block level and panchayat level because the extension personnel have the responsibility to disseminate floriculture related information to the floriculture community in timely manner. Apart from this, many infrastructural problems are also associated with the floriculture sector, identified by this study. By the SWOC (Strength, Weakness, Opportunity and Challenge) analysis the positive side like strengths and opportunities of the Floriculture Information System are highlighted and the negative sides like weaknesses and challenges are also bring in focus by this study. To convert weaknesses and challenges of Floriculture Information System into strength, a well developed Floriculture Information System is required.

- **Suggestions:**

The following suggestions have been suggested for the development of Floriculture Information System in West Bengal.

- ❖ **Strengthen the Research-Extension-Farmers Linkage**

The present study reveals that in existing Floriculture Information System a wide gap has been noticed. The gap is poor linkage between Research-Extension-Farmers. The generated information and knowledge is disseminated by agricultural extension functionaries. Therefore to provide information and knowledge properly at the grass root level, there should be need for a cooperative agricultural extension system, which will work in the following manners:

- a. Develop strong linkage between National Institutions, State Agricultural Universities, District Agriculture Department, and District Horticulture Department to collect research and developments products, information and knowledge.
- b. To promote floriculture, the respective organization should organize need based training programs for farmers.
- c. To promote floriculture, the respective organization should organize awareness program, to aware the farmers in different issues related to floriculture, such as-aware the farmers on government facilities, schemes, subsidies, information on seeds and planting materials

appropriate for the particular place, application of modern technologies, appropriate fertilizers and pesticides needed for a particular floriculture crops.

- d. Build adequate communication capacity to inform the farmers time to time on different issues related floriculture and need to increase focus on farmers' empowerment program.

❖ **Incorporation of floriculture in Fasal Bima Yojana**

Flower is not included in Fasal Bima Yojana, where other crops are enlisted. Due to natural calamity like heavy rainfall, storm, flood or insufficient rainfall the growers and sellers are facing huge losses because flower is a perishable goods. According to the flower growers and sellers of this district they take loan through Kisan Credit Card for their flower cultivation but when they face losses due to the natural calamity they don't able to repay the loan due to huge loss. And also they have not left enough money for starting further cultivation because most of the farmers are financially weak. So, it is requested to government to think about this matter.

❖ **Public Libraries as Floricultural Community Information Centres:**

Our society is now-a-days going through a vast change due to generation of huge information in the field of agriculture. In this context, public libraries can play a vital role to disseminate agricultural information to the agricultural community. According to Giggey, 1988, "community is a group of people who have something common". This can be their age, education, religion, interest, political affiliation, activities, work, profession or a combination of two or more of these". In West Bengal, there 12 Government Public Libraries, 2460 Government Sponsored Public Libraries, 7 added libraries and 27771 non-government public libraries are situated. The public libraries of main flower producing districts of West Bengal can help the floriculture community to solve their day to day problem and can improve the quality of standard of living.

By careful research, public libraries can preserve the knowledge and information of past and present to solve the future problem of floriculture community. Public libraries can store books, leaflets, newsletters, magazines, news paper cutting related to floriculture as well as agriculture by contacting Rural Agricultural Information Centres time to time for the literate and progressive farmers.

Library professionals of public libraries of West Bengal can arrange discussion program, talk show by contact experts of Rural Agricultural Information Centres for the floriculture community to solve their day to day problem in the field of floriculture.

❖ A proposed Model of Floriculture based Information System:

By this present study it has been identified that floriculture related information generally provided by two ways in state level, viz. 1. Krishi Vigyan Kendra 2. Directorate of Horticulture.

The work flow system and function of Krishi Vigyan Kendra and Directorate of Horticulture as information and knowledge providing centres are described in details in the Chapter-5. But during the survey it has been noticed that generated information by education and research is not reaching to the needy flower farmers in timely manner by the agricultural extension workers. There is a big gap has been identified in research-extension-farmers linkage. Therefore, the flower farmers are suffering due to unscientific low production and low profit.

By the SWOC (Strength, Weakness, Opportunity and Challenge) analysis of existing Floriculture Information System in West Bengal different factors has been identified such as-

1. The research product materials being prepared by the government organizations containing information related to floriculture fail to communicate to the flower farmers at grass root level.
2. Due to lack of funding and man power agricultural extension workers are unable to cover all the areas falling under their jurisdiction.
3. There is no proper coordination in between the government and private agencies for this reason, the traders of private agencies communicate with the floriculture community through the advertisement of selected products for their commercial interests.

4. Documents like periodicals, pamphlets, leaflets, newsletters in regional language related to floriculture are insufficient.

Due to the all the above factors the existing Floriculture Information System does not properly meet the information needs of the floriculture community. To cope with this situation, the only way of proper dissemination of floriculture related information is the establishment of village-based rural Floriculture Information Centre. These centres would work at Panchayat level. Rural Floriculture Information Centre is basically an information centre that is provided for the survival and growth of the rural floriculture community. Rural information services basically tailored towards analyzing and providing for information needs of rural people.

Generally a Panchayat Samiti is consists of 10 to 12 villages. These Panchayat Samitis of flower producing blocks in West Bengal may set up the floriculture based Floriculture Information Centres to disseminate floriculture related information to the flower farmers.

- If under each Panchayat Samiti of flower producing blocks at least one Floriculture Information Centre is established, then the flower farmers will be benefitted from the centres. These Floriculture Information Centres will contain all documentary sources related to floriculture in regional languages such as periodicals, magazines, pamphlets, leaflets, different government facilities related documents. Basic infrastructure shall be required such as- a computer with internet connection, a printer, a scanner, an android tab with GPRS and a projector. By the help of information communication technology these centres can

arrange audio-visual programs, talk shows, discussion programs, weekly or monthly meeting with power point presentation by contacting agricultural experts of different government organizations in their regional language to solve the day to day problem of flower growers and sellers.

- These centres should function under the charge of – 1 Library and Information Science Professional and 1 Agricultural Science Professional having training in their respective fields (at least 6 months certificate course), appointed by the Panchayat Samiti. The professionals would pay by the Panchayat Samiti for their voluntary service with a consolidated monthly remuneration of Rs. 3000/- to each of them.
- The agricultural professional should visit farmer's fields to collect data as images and texts then put into the system. Then the system produces the advice and the library professional retrieves the advice and explain to concerned farmers in timely manner. Documents management (classification, cataloguing and accessioning) in those centres should be done by the library professional. The library professional should create a database on floriculture for the development of floriculture community.
- These centres also responsible to supply feedback to the panel of experts of District Horticulture Department and Krishi Vigyan Kendrs who analyze and provide solutions to the problems of the farmers that are relayed to them by the agricultural professional.
- **Financial Proposal:** To implement this proposal, a sum of Rs 80,000/- (approximately) per year is required by the Panchayat Samiti.

Cost per Centre-Rs. 80,000/-(approximately)/year

Man power-2 professionals (1-Agricultural Science professional and 1- Library and Information Science professionals)

Rs. 3000/-/month/professional=Rs. 3000/-x 2 = Rs. 6000/- per month

Per year- Rs. 72,000/- + *Contingencies Rs. 8000/- =80,000/-

(*Contingencies = Telephone and stationeries)

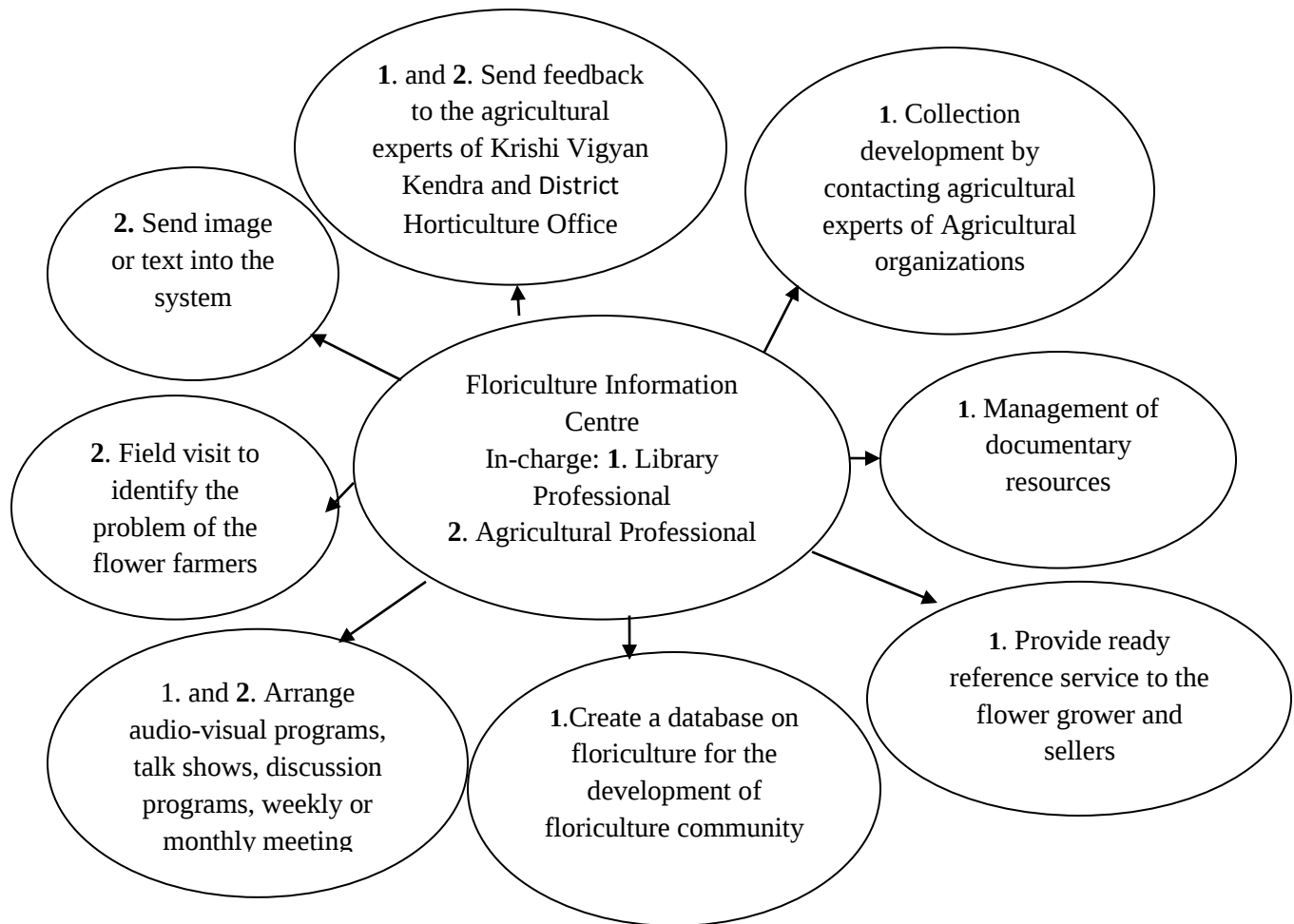


Fig.2: Diagrammatic representation of work flow of proposed Floriculture Information Centre under each Panchayat Samiti

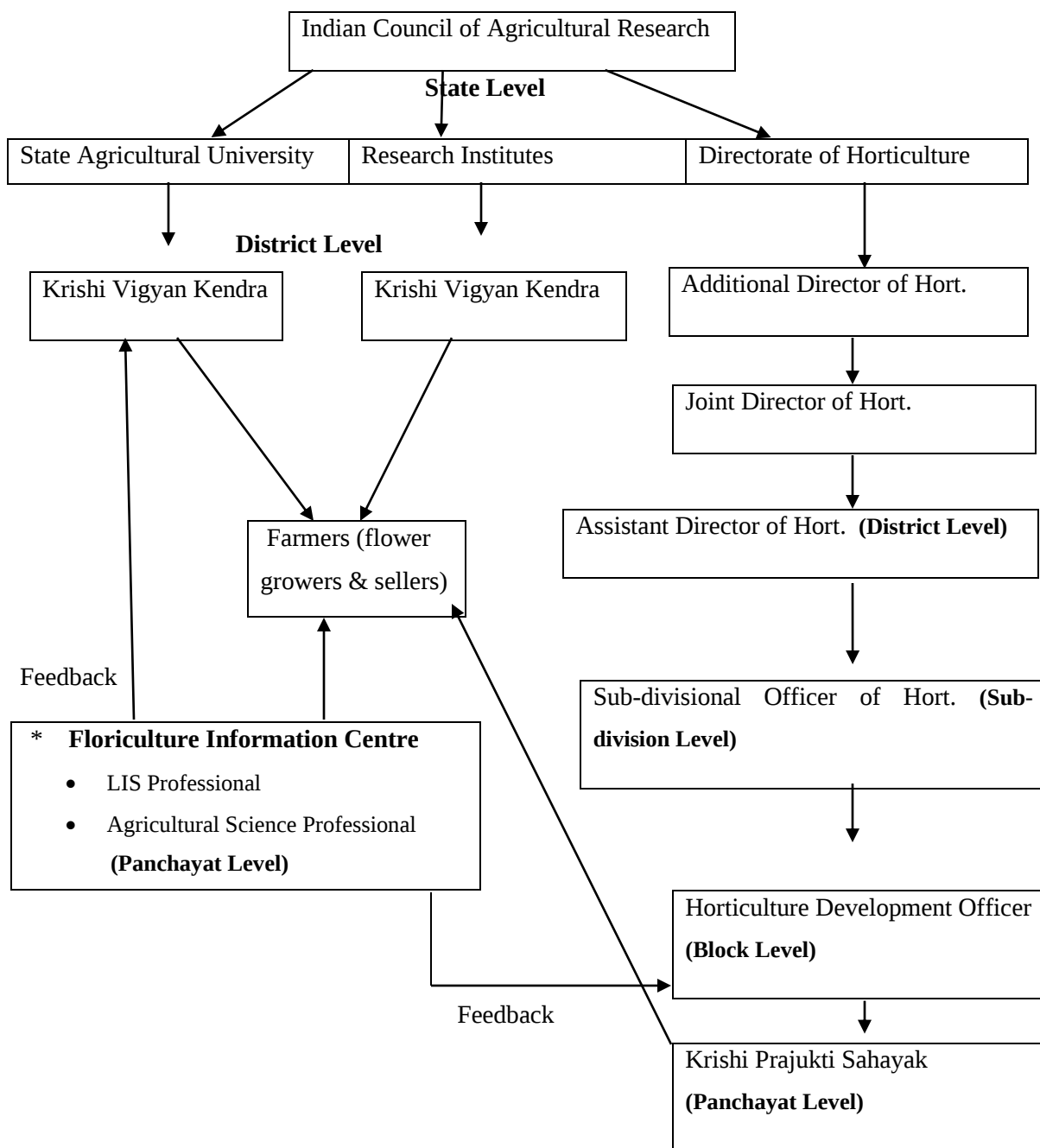


Fig. 3: Diagrammatic representation of information flow of proposed Floriculture Information System.

10. Bibliographic References

1. Giggey, S. (1988). *Rural community resources: A guide for developing countries*. MacMillan.
2. Van Den Ban, A.W. (1993). Studying agricultural information system for improving agricultural extension. *Indian Journal of Extension Education*, 29(1&2), 76-84.
<https://edepot.wur.nl/28741>
3. Ozowa, V.N. (1995). Information needs of small-scale farmers in Africa: The Nigerian example. *Quarterly Bulletin of the International Association of Agricultural Information Specialists*, 40(1), 15-20.
https://www.researchgate.net/publication/228870677_Globalisation_and_Small-Scale_Farming_in_Africa_What_role_for_Information_Centres/link/0deec52e77e90496f5000000/download
4. Checkland, P., & Holwell, S. (1998). *Information, systems and information systems: Making sense of the field*. John Wiley & Sons.
5. Rees, D., Momanyi, M., Wekundah, J., Ndungu, F., Odondi, J., Oyure, A.O., Andima, D., Kamau, M., Ndubi, J., Musembi, F., Mwaura, L., & Joldersmes, R. (2000). Agricultural knowledge and information systems in Kenya-Implications for technology dissemination and development. *Agricultural Research & Extension Network*, 107, 1-16.
6. Kizilaslan, N. (2006). Agricultural information system: a national case study. *Library Review*, 55(8), 497-507.
https://www.researchgate.net/publication/235280866_Agricultural_information_systems_A_national_case_study

7. Satpathy, S. K. (2006). Community information service (CIS) through public libraries: A realistic approach.
https://www.researchgate.net/publication/28805530_Community_information_service_CIS_through_public_libraries_a_realistic_approach
8. Demiryurek, K. (2010). Analysis of information systems and communication networks for agriculture and rural people. *Agricultural Economics*, 56(5), 444 – 452.
<https://www.agriculturejournals.cz/publicFiles/21266.pdf>
9. Prasad, M.R. (2010). Agriculture information transfer system: A dire need. *Indian journal of Agricultural Library and Information Service*, 26(1&2), 71-74.
https://www.researchgate.net/publication/236866475_Agriculture_information_transfer_system_a_dire_need
10. Jain, S. (2011). Information Empowerment of Rural people in Agriculture through e – Choupal. *Journal of Community Mobilization and Sustainable Development*, 6(1), 65 -70
https://www.researchgate.net/publication/324273874_Information_Empowerment_of_Rural_People_In_Agriculture_Through_e-Choupal
11. Gudeta, D. T. (2012). *Socio-economic and Environmental Impact of Floriculture Industry in Ethiopia* [Unpublished doctoral dissertation]. Wageningen University.
https://libstore.ugent.be/fulltxt/RUG01/001/894/550/RUG01001894550_2012_0001_AC.pdf
12. Bhattacharya, R. (2013). Cut flower production: A source of incremental income for the marginal farmers of the state of West Bengal in India. *International Journal of*

Economics and Engineering, 7(6), 1398-1406.
<https://zenodo.org/record/1335282#.YLZIDtVKjcc>

13. Kamruzzaman, Akhter, F., Sikder, R.K., Mehraj, H., & Jamaluddin, A.F.M. (2013). Use of communication sources in receiving agricultural information by the rural women. *Bangladesh Research Publications Journal*, 9(1), 7-14.
https://www.researchgate.net/publication/262494450_Use_of_communication_sources_in_receiving_agricultural_information_by_the_rural_women
14. Sharma, M. (2013, March 13). Orchids bloom for business in NBU. *The Telegraph*.
<https://kurseonginfo.wordpress.com/2013/03/13/orchids-bloom-for-business-in-nbu/>
15. Singh, K.M., Meena, M.S., & Swanson, B.E. (2013). *Role of State Agricultural Universities and Directorates of Extension Education in Agricultural Extension in India*. MPRA, 49108, 1-25. <https://mpa.ub.uni-muenchen.de/49108/>
16. Pratim, A. (2014, September 2). Phool uthpadane shirshe Bangla, report-e bollo ASSOCHAME [West Bengal in top list in floriculture, ASSOCHAME claims in its report]. *One India*. <https://bengali.oneindia.com/news/west-bengal/bengal-tops-list-in-floriculture-assochem-claims-in-its-report-002795.html?story=2>
17. Saha, T.N., Majumder, J., Kadam, G. B., Kumar, G., Tiwari, A.K., Girish, K.S., & Kumar, R. (2014). Role of all India coordinated research project in development of floriculture in India. *International Journal of Bio-resource and Stress Management*, 5(1), 159-165.
https://www.researchgate.net/publication/265165798_Role_of_All_India_Coordinated_Research_Project_in_Development_of_Floriculture_in_India

18. Gorman, J., Cunningham, A.B., Wei, S., Marcsik, D.M. and Hoult, M.D. (2015). Factors influencing the growth of the floriculture industry in the monsoonal tropics of the Northern Territory, Australia. *Acta Horticulture*. 1104, 421-428.
http://www.actahort.org/books/1104/1104_62.htm
19. Gangyapadhaya, P. (2016, June 27). Phool byabsar parikatham timirei chintay chashira [Infrastructure for flower business still in dark]. *Anandabazar Patrika*.
<https://www.anandabazar.com/calcutta/infrastructure-for-flower-business-still-dark-1.421064>
20. Halder, S., Misra, S., Pal, S., Basu, D., & Goswami, R. (2016). Understanding agricultural information networks in West Bengal. *Indian Research Journal of Extension Education*, 16(1), 25 -34.
https://www.academia.edu/19985762/Understanding_Agricultural_Information_Networks_in_West_Bengal_India
21. Ali, S., Singh, H., Mir, A.A., Ahmed, P., & Andrabi, R.H. (2017). Infrastructural facilities for floriculture development in Kashmir Himalayas with special reference to Greater Srinagar. *International Research Journal of Engineering and Technology*, 4(12), 763-768.
https://www.researchgate.net/publication/322007275_Infrastructural_Facilities_for_Floriculture_Development_in_Kashmir_Himalayas_with_special_reference_to_Greater_Srinagar
22. Bhargav, S. (2017). Agricultural marketing in growth of rural India. *International Journal of Management, IT & Engineering*, 7(7), 306 – 319.

https://www.academia.edu/35517094/Agricultural_Marketing_in_Growth_of_Rural_India

23. Bista. R.K., Patidar, R. & Manjunath, C.R. (2018). Mobile application for the agricultural mandi using e-auction. *International Journal of Trend in Scientific Research and Development*, 2(4), 222-228.
<https://www.ijtsrd.com/papers/ijtsrd12918.pdf>
-