

## Agricultural Informatics With Reference To Its Possibilities and Potentialities in Management, Commerce and Allied Branches

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**Abstract-** Agricultural Informatics is an important and emerging practicing domain and technologies responsible for the agricultural related activities ranging from the information, documentation and technology related aspects. This is ultimately dedicated to ICT practice in agriculture and allied areas including in horticulture and environmental sciences. Further, this is applicable in modernization, capacity building and development in agricultural activities leading to further production. Agricultural Informatics is become a field of practice also in recent past due to its growing importance and role. Internationally many universities have started academic programs leading to Bachelors, Masters and Doctoral. Agricultural Informatics as an interdisciplinary subject and apart from the technology and information here important role is exists of Management Sciences including Commerce and Economics. Due to the role there is a high potential to offer Agricultural Informatics and allied branches; mainly in science and engineering streams; whereas due to managerial role the branch can also be offered with Management and Economical Sciences related subjects internationally. This paper is conceptual nature and deals with various aspects of Agricultural Informatics including its evolution, stakeholders, and features. Paper also discusses about the roles in general of Agricultural Informatics regarding smart agricultural sciences. Further, due to the objective of the paper this is emphasized with potentialities of the management and commercial sciences in respect of Agricultural Informatics.

**Keywords-** Agricultural Informatics, ICT, Agricultural Information Technology, Commerce, Management Education, Emerging Degrees, Higher Education

### Objective

The present work 'Agricultural Informatics with reference to its possibilities and potentialities in Management, Commerce and Allied Branches' is theoretical and deals with following aim, objective and agendas (but not limited to)—

- To learn about the Agricultural Informatics including its evolution and origin in brief.
- To get knowledge on Agricultural Informatics with reference to get the functions of the field.
- To learn about the Agricultural Informatics and its allied nomenclature and current programs in the field.
- To learn about the job opportunities and job areas in the field of Agricultural Informatics in brief.
- To proposed and suggest in Agricultural Informatics programs in Management, Commerce and allied areas in international and Indian scenario.
- To learn about the emerging role of Agricultural Informatics including the issues, challenges in the Agricultural Informatics and allied fields.

### Methods

This work 'Agricultural Informatics with reference to its possibilities and potentialities in Management, Commerce and Allied Branches' is theoretical. Hence to prepare this work various published secondary sources have been consulted viz. on IT, Agricultural Sciences. Due to interdisciplinary nature of the work here various primary sources have also been gathered, analyzed and reported in this policy based work. Different websites of the Agricultural Informatics service providing companies also been consulted and mapped in this work which is ultimately helpful in the current roles, job opportunities. Websites of various universities also considered important for doing this work and government and different agency's report here also analyzed and incorporated.

## I. INTRODUCTION

The applications of Information Science are growing rapidly and this is become a field of healthy and developed IT and information systems towards modern information reach society and community [9], [18], [29]. Information Science is a socially connected field and concentrated with the solutions for the different sectors. As far as agriculture is concerned, there is a great connection with Information Science and its allied areas. Further, Information Science is also known as Informatics in some countries; mainly in European countries. Agricultural Informatics as a field of study has been emerged in recent past but growing rapidly. In the developing countries as well this trend is noticeable. Still only Science and Technology degrees offered with Agricultural Informatics but there are potentialities for its more development in the Management Sciences viz.—

- Management
- Business Administration
- Commerce
- Economics etc

The field Agricultural Informatics is gaining rapidly in developing countries as well and thus in this context proper manpower development is urgent and need of the hour. The inclusion of latest technologies is also important for solid result in this context.

## II. AGRICULTURAL INFORMATICS: THE CLUSTER OF AGRICULTURE & INFORMATION SCIENCES

Agricultural Informatics is an interdisciplinary and emerging field of study and combines with the engineering, technologies, sciences, management and economical studies as well. Agricultural Informatics majorly consist with two major stream—

- *Agricultural Sciences &*
- *Information Sciences*

As far as Agricultural Sciences is concerned, it is an Applied Science that deals with the procedure, methods, tools and principles of science and art that is helpful in the cultivation of various crops, plants, animals, etc [1], [7]. The following information is important to get the knowledge on this subject viz.—

- Agriculture is dedicated in sedentary human civilization and makes enable people to live in cities and rural areas.
- According to the expert, agriculture systems were developed about thousands of years ago; initially it is about 105,000 years ago.
- However as far as nascent farming is concerned, it was about 11,500 years ago and some of the animals viz. pigs, sheep, cattle, etc was started domesticated about 10,000 years ago.
- Worldwide today about 11 regions doing the cultivation and agricultural activities commercially.

- It is worthy to note that, farming is the concept of the cultivation whereas agriculture is the commercialization of the cultivation and farming of various products viz. plants, tress, seeds etc. It is due to the possibilities in maximizing financial income.
- Some of the non agro based products such as fertilizers, leather, sugar, alcohols cotton, wool, silk etc are treated as part of the agriculture [3], [11], [26].

Agricultural Science is broad enough and connected and related with the various other subjects mentioned in the Fig: 1.

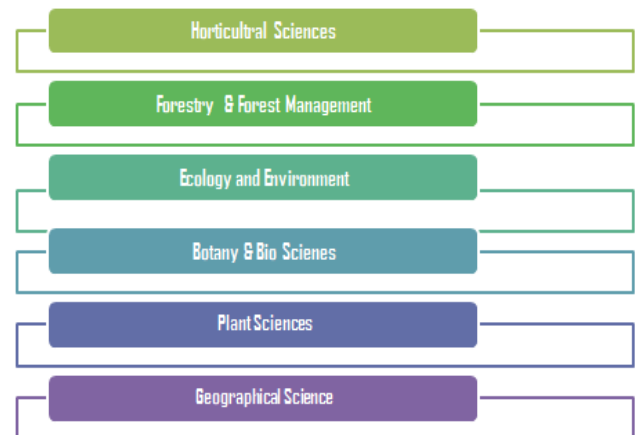


Fig: 1-Allied Areas of Agriculture

Agricultural Informatics is consisting with other field i.e. Information Sciences and it is a broad, interdisciplinary area like Agricultural Sciences. It is consist with various other subjects and component. Some of the information given bellow can be considered as important and valuable—

- Information Science is a broad field and incorporated with all the subjects related to the information and Computing [5], [14], [27].
- It is an interdisciplinary subject and combines with the focus on social sciences, management science utilization of information and technologies in different sectors.
- Among the different sector specific applications of the information science important are business and commerce, education and training, governance and administration, manufacturing and industries are common and important.
- Information science has long history of origin and treated as one of the oldest field concentrated with information.
- Information Science is broader than other allied fields viz. Computer Science, Computer Applications, Computer Engineering, Information Technology, ICT, Information Systems etc.
- There are different nomenclature in Information Sciences available and some of them are depicted in the fig: 2.
- Information Science with applications to other subjects have emerged other subjects viz. Bio Informatics, Geo Informatics, Health Informatics etc.

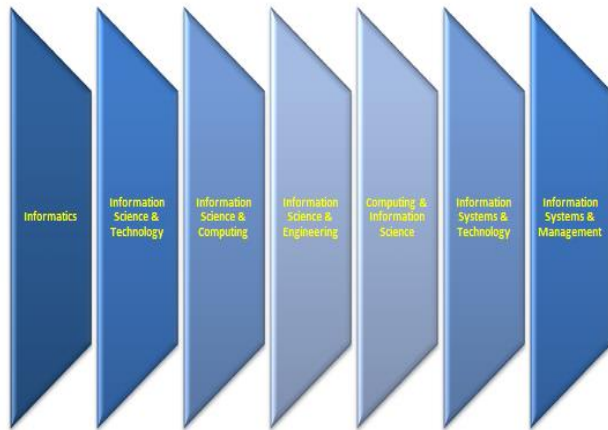


Fig: 2-Allied nomenclature of Information Sciences

**Agricultural Informatics: Features, Natures and Facets**  
 ‘Informatics’ and ‘Information Science’, both are used synonymously in academics and industries. In some countries and territories one of the term is popular. However, literary Informatics is considered as important branch in practice deals with information & technological utilizations directly; whereas Information Science is a field first then its aim and agenda. The interaction, applications of Informatics/ Information Science (or similar nomenclatures/ subjects) in other branches have been also created various fields. Agricultural Informatics is an emerging field and basically deals with following features and facts viz.—

- Agricultural Informatics is an interdisciplinary field and combines with the subjects and areas of the Agricultural Sciences and Information Sciences.
- The field is also very much close with the other subjects and areas viz. horticulture, veterinary sciences, forestry, ecology, geography, anthropology, sociology etc.
- Agricultural Informatics is dedicated to build advanced agriculture, smart agriculture or digital agriculture etc [13], [20], [31].
- In this field various kind of tools, techniques and technologies are important from the areas of Information technologies and management science.
- Various IT components such as database technologies, networking technologies, web technologies, multimedia technologies etc are common in Agricultural Informatics practice; further more emerging technologies are also increasing viz. cloud computing, big data, usability engineering, IoT etc.
- Agricultural Informatics indirectly also connected with the Computer Science, Computer Engineering, Systems Engineering and allied fields.
- Contents and information are important in Agricultural Informatics including in the Agricultural Documentation for better agro information and technological solutions.
- Human resources is important response of application of Agricultural Informatics practice and it could be both the designer and practitioners who develops the systems and on other hand the users of the Agricultural Informatics.

Agricultural Informatics practice needs support in the awareness, governmental supports, supports from the NGOs, societies etc for more development and growth. The branch Agricultural Informatics not only applicable in Agricultural Sciences but also in other subjects, in this respect in is worthy to note that some of the related areas of Agricultural Informatics may be consider as depicted in Fig: 3.

### Smart Agriculture: Towards Healthy Agriculture

Agricultural Informatics is an important and emerging field as it is responsible more betterment in economic development role from agriculture. Agricultural Informatics has many potentialities in better Agricultural development and progress. In Agricultural production enhancement, productivity and easiness Agricultural Informatics is using from recent past. Even apart from the developed nations it is now been started practices in many developing and undeveloped nations.

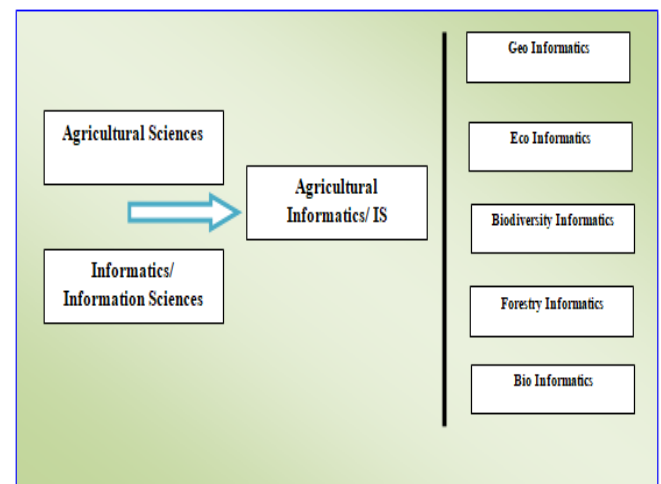


Fig: 3-Allied fields of Agricultural Informatics

It is important to note that, in many countries and millions of people are associated with the Agriculture related jobs and professions; directly and indirectly. Agricultural Informatics has many potentialities in easiness in agricultural activities to the farmers who are unable or not aware the benefits of IT/ Computing in Agricultural Systems. Further the business professionals related with the Agriculture may also get the benefit of the Agricultural Informatics and allied domains directly and indirectly [10], [17], [25].

Farmers from almost all the countries are faces few challenges and issues and among these important are include the heat, cold, flood, drought, insect, pest infestations, disease of the Agricultural corps etc. Moreover in predication in the weather and climate change this field is applicable nicely. Even this field is required in betterment in food habits; regarding the nutritional, global agro business development, technological systems in terms of agriculture, ecological aspects etc. Agricultural Informatics is strategically, methodologically applicable in

different areas of agriculture particularly in strengthening agricultural systems (but not limited to)—

- Input and Output systems of the cultivation and agriculture (in pre production)
- In Climate systems including weather forecasting.
- Harvesting and allied activities.
- For enhancing food security to the common people.
- Agricultural development in the Value-chain development.
- In Integrating and facilitating better agro stakeholders.
- Agro Marketing and business promotion.
- Agro supply-chain systems and models.

Different components, tools, systems of the Information Technologies, Information and Communication Technology, Computing Sciences are important in Agricultural Informatics and complete Agriculture development and this trend is gaining internationally. This is due to the sophisticated and required skill sets from both the fields viz. Agricultural Sciences and Information Science [16], [17], [32]. In global innovations and designing for the agricultural systems including the productivity, economical and social development, etc Agricultural Informatics is important. Ultimately Agro Informatics will helps different agro based activities such as—

- Agricultural Informatics is helpful in making **Efficiency** and betterment in agricultural monitoring which helps in better agro based products development and management, in real time.
- **Expansion** with smart closed-cycle agricultural systems is another benefit of Agricultural Informatics practice in agro zone. Further in Cleaning and Purity of Agro Space also, Agro Informatics can be a good tool and useful in other affairs viz. managing pesticides and fertilizers etc.
- **Quicker & Speedy Agricultural Systems** become possible with the help of Agricultural Informatics powered by the IoT, Big Data, robotics, analytics, HCI etc.
- In **Quality Production of Agricultural Systems** Agricultural Informatics is important as it is helps in pre production and different tools are used to identify the nature of the soil, crops, weather etc using various IT tools viz. aerial drone monitoring systems etc.
- Agricultural Informatics is also helpful in the **Quantity Enhancement of Agro Products** using various kind of IT tools and systems. The real monitoring, automated harvesting, medication, agro based treatment etc helps in this regard.
- In **Livestock Management** also Agricultural Informatics is very important and valuable such as in post production, marketing, agro business promotion, web portals etc.
- **Agricultural Literacy** creation could be considering another important area that may consider valuable contribution of Agricultural Informatics practice. With the help of agro based websites, portals, agro networks, agricultural systems the farmer can get knowledge of farming, about the current trends etc [6], [12], [33].

Agricultural Informatics thus emerging in different countries and in this regard various organizations and institutions, research centres, agro business forums, council are doing well nationally and internationally. A sustainable, intelligent and techno focused agro systems become deployable with the help of Agricultural Informatics practice in agricultural sectors.

### III. EDUCATIONAL OPPORTUNITIES IN AGRICULTURAL INFORMATICS

Agricultural Informatics as an emerging and rapidly growing field is available with different nomenclature and subjects. And all these are directly and indirectly associated and responsible for the creation of sustainable, intelligent, smarter and productive Agricultural systems. Initially there was no subject on this domain and people with Agricultural or IT/Computing degrees entered and practiced with this field. There are huge opportunities in Agricultural Informatics allied jobs and most of these jobs previously countered by the either by the Agricultural Sciences (including allied fields) or Information Science (including allied fields) educated. However after the initiation of the Agricultural Informatics it is playing an important in developing agro systems as well as in other activities and areas [8], [19], [24]. Agricultural Informatics or similar technologies is increasing rapidly in creating the jobs. Additionally professionals from other allied both the fields can go with proper training etc in getting Agricultural Informatics jobs. However following could be consider as important in better practice in Agricultural Informatics

- Accurate amount of skilling
- Knowledge in diverse areas of Agricultural Sciences.
- Communication skills to deals post production of agro business.
- Entrepreneurship skills to deals post production of agro business.
- Leadership qualities for designing better agro systems, marketing and international business.



Fig: 4-Allied areas Agricultural Informatics for the creation of smarter agricultural systems



Agricultural Informatics are responsible for the development of agriculture systems more sophisticated to lead and enhancing the cultivation, including pre and post agricultural production like marketing, better supply-chain management, research and extension services. There are different allied subjects in these fields and all are doing well in making healthy and smarter agriculture (refer fig: 4) in this regard. As far as jobs are concerned there are different kinds of job opportunities in Agricultural Informatics and allied fields and among these important are include—

- Agricultural Information Systems Developer
- Agricultural Information Systems Manager
- Agricultural Database Manager
- Agricultural Software & Apps Developer
- Agricultural IoT Experts
- Agricultural Robotics and AI Specialist
- e-Governance Architect
- Agricultural ERP & Systems Manager
- Agricultural Documentation Experts etc[15], [34]

These kinds of jobs are suitable for the Agricultural Informatics educated and skilled. The field additionally dedicated in the development of the scientific and research

organizations, Educational Institutes related to the Agriculture and Informatics fields. Sustainable and intelligent Agricultural development is possible with the Agricultural Informatics practice and apart from the educational, and research programs on Agricultural Informatics, different type of training programs could be offered using Agricultural Informatics. Agricultural Informatics is offered with the Bachelors, Masters and Doctoral degrees; but most of these degrees are offered with Science Stream internationally and in some countries also with Engineering/ Technology stream. In India we can find such type of programs. Refer Table: 1 for more details. Further in short term courses also Agricultural Informatics can be offered as a skill based training programs viz.—

- Certificate in Agricultural Informatics.
- Diploma in Agricultural Informatics
- Advanced Diploma in Agricultural Informatics
- Post Graduate Diploma in Agricultural Informatics etc.

These programs are suitable for the general farmers also those who are interested in enhancing the skill sets on this emerging technologies for better pre agro and post agro activities [4], [22], [33].

Table: 1-Depicted the available programs on Agro Informatics in few institutes

Universities/ Institutes	Degrees	Subjects
Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India	BTech	Agricultural Information Technology
Centre for Agricultural Informatics and E Governance Research Studies Shobhit University, Meerut, UP, India	BTech	Agricultural Informatics
Centre for Agricultural Informatics and E Governance Research Studies Shobhit University, Meerut, UP, India	MTech	Agricultural Informatics
Dhirubhai Ambani Institute of Information and Communication Technology (A Deemed University), Gujarat, India	MSc	IT in Agriculture & Rural Development
Anand Agricultural University, Gujarat, India	MTech	Agricultural Information Technology

#### IV. COMMERCE AND AGRICULTURE INFORMATICS: POTENTIALITIES— INTERNATIONAL & INDIAN CONTEXT

Agricultural Informatics is an interdisciplinary field; we already gathered knowledge on thus, further it is important to note that as per the curriculum analysis following become considered as important in respect of its practice viz.-

- Science and Technology
- Management and Commerce
- Economics and Statistical Sciences

However partially Agricultural Informatics is also deals with the Social Sciences, as Informatics holds the nature of social sciences whereas if it is Agricultural Information Technology then it is more on technology centric. Agricultural IT and other allied areas are helpful in getting data from the sensor systems in agricultural activities including cultivation and post cultivation. Moreover the pre production activities are include the weather

forecasting, soil analysis, harvesting, spraying, automated farming using robots, use of intelligent tractors etc. In all these, Agricultural Informatics could be applicable directly and indirectly. Moreover, in post production areas there are huge interaction and requirements of management sciences and commerce including the field of economics. In following areas these subjects are closely associated with—

- Agricultural Information Systems designing and development
- Marketing of Agricultural Products.
- Healthy Supply Chain Management
- Agricultural Business and so on

Some of the emerging and possible jobs of Management Centric Agricultural Informatics are (but not limited to) mentioned in Table: 1 herewith.

Table: 1 Few Popular job titles in Agro Informatics in context of Management & allied areas

Managerial Agro Jibs
Agro Commerce Portal Manager

Weather Forecasting Expert
Agricultural Financial Analyst & Expert
Agricultural Commodity Trader
Agro Documentation Officer
Agricultural Business Informatics Professionals
Knowledge Manager (Agricultural)
Agricultural Supply Chain Expert
Agricultural Consultant
Agricultural Business Management
Agricultural Systems Administrators
Crop and Agro Insurance Manager

Hence there is an urgent need of introducing Agricultural Informatics degree holders with management concentration. Regarding this, the existing programs could be tagged with Management focused viz.

- BSc/MSc- Agricultural Informatics & Management
- BTech/ MTech- Agricultural Informatics & Entrepreneurship
- BS/MS- Agricultural Information Systems & Management

The following course gradients are normally considered as important and mandatory in Agricultural Informatics in this context it could be noted that in such courses most are belongs with the Management/ Commerce/Economical Sciences directly and indirectly.

- Basics of Agricultural Sciences/ Systems.
- Foundation in IT and Computing
- Basics of Remote Sensor s in Agricultural and allied Systems.
- Spatial Systems and its applications in Agriculture/ food production.
- Basics of Information Management
- Basics of Knowledge Economy and Agriculture
- Sustainable Development
- Agricultural Production and Marketing
- Big Data Analytics & Agriculture
- Ecological Agriculture
- Decision making and DSS
- Cloud Computing and Agro Informatics [11],[18], [30].

The Agricultural Informatics programs can easily deploy the agro systems into modern one by help in irrigation, cultivation, weather, marketing, supply chain management and for preparing various jobs in diverse areas like technological, managerial and agricultural based the Programs with Commerce, Management and Economical Sciences could be consider as important. The common degrees in Commerce are as follows—

- B.Com (Bachelor of Commerce)
- M.Com (Master of Commerce)
- PhD (Commerce).

The field is available in many countries of Asia including India and nearby countries, Australia, New Zealand, South

Africa, Canada etc. And most commonly with the specialization of the Finance, Accounting, Banking etc. In recent past some of the universities have started programs with domain concentration but very minimum and slowly viz. BCom-IT Management, B.Com Education Management etc. In this regard the Commerce degrees with Bachelors level could be offered with Agricultural Informatics and allied subjects. Refer fig: 2 for details.

Table: 2-Possible Programs of Agricultural Informatics with B.Com degrees

Agriculture Informatics at Commerce (Bachelors)
B.Com (Agricultural Informatics)
B.Com (Smart Agriculture)
B.Com (Agricultural Informatics & Globalization)
B.Com (Agricultural ICT)
B.Com (Agricultural Information Technology)

Similar to B.Com in Masters also i.e. M.Com the specialization of Agricultural Informatics not yet offered and here there are potentialities due to the nature of agro sector. Table: 3 in this regard can guide us a lot.

Table: 3-Possible Programs of Agricultural Informatics with M.Com degrees

Agriculture Informatics at Commerce (Masters)
M.Com (Agricultural Informatics)
M.Com (Smart Agriculture)
M.Com (Agricultural Informatics & Globalization)
M.Com (Agricultural ICT)
M.Com (Agricultural Information Technology & Agro Business)
M.Com (Agricultural Informatics & Trading)

This is the age of specialization and emerging technologies. As far as Agricultural Informatics are concerned emerging technologies are IoT, Cloud Computing, and Big Data etc and in this regard such can be offered with M.Com degrees proposed herewith in Table: 4.

Table: 4-Possible Programs of emerging Agricultural Informatics in MCom

Agriculture Informatics at Commerce (Bachelors)-Emerging & Super Specialty
MCom (Agricultural Informatics & IoT)
M.Com (Agricultural Informatics & Big Data)
M.Com (Smart Agricultural Management & Big Data)
M.Com (Agricultural Management & Informatics)
M.Com (Agricultural Management & Robotics)

In generally PhDs are considered as terminating degree and qualification and in this context Agricultural Informatics can be offered with directly with Agricultural Informatics nomenclature or may be in allied nomenclature as proposed and depicted in Table: 5.

Table: 5-Possible Programs of Agricultural Informatics with PhD degrees in Commerce

Agriculture Informatics at Commerce (PhD)
PhD (Commerce)- Agricultural Informatics & Management
PhD (Commerce)- Agricultural Commercialization & ICT
PhD (Commerce)- Smart Agricultural Management
PhD (Commerce)- Digital Agricultural Management

Management is an interdisciplinary subject and considered as more applied to the business and organizations. In generally Management Education is considered with following bachelors degrees (mainly with the Business Administration and Business Management nomenclature)—

- BBA (Bachelor of Business Administration)
- BBM (Bachelor of Business Management).

In these programs the common specializations are Financial Management, Banking, Finance, Marketing, Human Resources, and Retail Management etc

Table: 6-Possible Programs of Agricultural Informatics with BBA &BBM

Agriculture Informatics at Management & Business (Bachelors)
<b>BBA/ BBM (Agricultural Informatics)</b>
<b>BBA/ BBM (Smart Agriculture)</b>
<b>BBA/ BBM (Agricultural Informatics &amp; Globalization)</b>
<b>BBA/ BBM (Agricultural ICT)</b>
<b>BBA/ BBM (Agricultural Information Technology)</b>

However in recent past at both BBA and MBA newer domain centric specializations have been started viz.—

- Hospital & Healthcare Management
- Hotel Management
- Hospitality Management
- Rural Management
- Agricultural Management
- Transport and Tourism Management etc.

Table: 7-Possible Programs of Agricultural Informatics with MBA

Agriculture Informatics at Management & Business (Masters)
<b>MBA (Agricultural Informatics &amp; Management)</b>
<b>MBA (Smart Agriculture &amp; Management)</b>
<b>MBA (Agricultural Informatics &amp; Globalization)</b>
<b>MBA (Agricultural ICT &amp; Agro Systems)</b>
<b>MBA (Agricultural IT &amp; Agro Business)</b>
<b>MBA (Agricultural Informatics &amp; Analytics)</b>

Hence in this context Agricultural Informatics can be considered as important and vital for the specialization of BBA/ BBM/MBA Degrees (refer table: 6 & 7).

It is worthy to note that in some countries and states (like India) BBM is offered but MBM is not so popular. However all the specialization proposed above can be offered with the following degrees as well, which is offered by some countries—

- BSc/BS-Management
- MSc/MS-Management
- B.Mgt. (Bachelor of Management)
- B.Bus. (Bachelor of Business)
- M.Mgt. (Master of Management)
- M.Bus. (Master of Business)

Table: 8-Possible technology centric programs of Agricultural Informatics with MBA

Agriculture Informatics at Management & Business (Masters)
<b>MBA (Agricultural Informatics &amp; IoT)</b>
<b>MBA (Smart Agriculture &amp; Analytics)</b>
<b>MBA (SMAC &amp; Agro Business)</b>
<b>MBA (Agricultural Systems &amp; Cloud)</b>
<b>MBA (Agricultural IT &amp; Robotics)</b>

**MBA (Agricultural Analytics & Management)**

Apart from these specializations the program can be offered with the emerging technologies viz. IoT, Analytics, Cloud Computing, Robotics etc (refer table: 8). As doctoral degrees mainly the PhD are considered as terminal degrees therefore Agricultural Informatics could be offered with PhD Degrees (refer table: 9, for more details). Here emerging specializations could also be added.

Table: 9-Possible Programs of Agricultural Informatics with PhD in Management

Agriculture Informatics at Management & Business (PhD)
<b>PhD (Management)- Agricultural Informatics &amp; Management</b>
<b>PhD (Management)- Agricultural Commercialization &amp; ICT</b>
<b>PhD (Management)- Smart Agricultural Management &amp; ICT</b>
<b>PhD (Management)- Digital Agricultural Management</b>
<b>PhD (Management)- Agricultural Information Science &amp; Systems</b>

PhDs are considered as vital and important for the jobs in academia, industries and research. However similar to MBA many universities internationally started the professional DBA or Doctorate of Business Administration programs with the Agricultural Informatics specialization with management concentration. These programs are based on huge coursework; thus candidates interested in practice or hands ‘on can go with the’ such DBA Degrees for the candidates having MBA or even any Masters. However, it is worthy to note that some of the universities offers by research or publications based DBA as well; hence candidates interested in Agricultural Informatics based research in management or economical context may go with this. Refer Table: 10 in this context.

Table: 10-Possible Programs of Agricultural Informatics with Profession Doctorates

Agriculture Informatics in Professional Doctoral Context (Management)
<b>DBA- Agricultural Informatics &amp; Management</b>
<b>DBA- Agricultural Commercialization &amp; ICT</b>
<b>DBA- Smart Agricultural Management &amp; ICT</b>
<b>DBA- Digital Agricultural Management</b>
<b>DBA- Agricultural Information Science &amp; Systems</b>

Though the candidates are already having PhD degrees and interested in doctorate and Agricultural Informatics focus may mode to DBA programs as well. In some of the universities such higher entry/ credits transfer are allowed based on previous qualifications.

In other context, similar to Management/ Business/ Commerce another subject is closely connected i.e. Economics. And as far as Agricultural Informatics is concerned the programs can be offered with the specializations of Economics as well viz. BSc/MSc-Economics with Agricultural Informatics. Further, PhD Economics with specialization in Agricultural Informatics can also be offered. As far as professional doctorates are concerned, the same can be offered like DBA with Economics and Commerce degrees (refer table: 11) with the specialization of Agricultural Informatics with economical aspects.

Table: 11-Possible Professional Doctorates of Agricultural Informatics in Commerce & Economics

Agriculture Informatics in Professional Doctoral Context (Allied Branches)
<p style="text-align: center;"><b>Doctor of Economics</b> (Agricultural Management &amp; ICT)</p> <p style="text-align: center;"><b>Doctor of Commerce</b> (Agricultural Management &amp; ICT)</p>

It is worthy to note that some of the programs with the above Doctor of Economics has already offered in few institutes viz. Monarch Business School, Switzerland. As a higher degrees also this is offered by the Monash University; Australia, The University of Queensland; Australia, The University of New South Wales, Australia etc. In this context, Agricultural Informatics or allied areas could be consider to pursue such kind of degrees.

## V. SUGGESTIONS

Agricultural Informatics as an interdisciplinary field is growing rapidly and its applications not only in Agriculture but also in other areas. Initially only the educated in Agriculture and Information Sciences were pursued the specialization for the betterment of the field. But gradually it is become a field of study internationally. There is a current opportunity on Science and Engineering degrees with Agricultural Informatics. However it should be more than that and as proposed in this work several other streams also Agricultural Informatics and allied subjects could be offered. In this context degree with the Business Administration, Management, Business Management, Commerce, Economics etc could be offered. Furthermore, the specializations of Agricultural Informatics can also be offered in the professional doctorates in respect of Business Administration, Economics, and Commerce etc. The industrial exposure is very important in the Agricultural Informatics practice and thus proper collaboration with the field specific industries could be offer. As Agricultural Informatics is interdisciplinary in nature so that, linkages, tie-ups with other institutes and universities may be offered as well for better result and skilled, interdisciplinary mindsets.

## VI. CONCLUSION

Agricultural Informatics is a vast subject and more than only two fields. Each of the field that makes Agricultural Informatics is itself big enough and increasing its capacity day by day. Hence in this context proper steps are essential to take for the further development and growth. As the field is practice based and deals with various stakeholders viz. contents and information, peoples or users, technologies and agricultural facts etc. In developing Agricultural Informatics certain other things are associated viz. the funds of finance and in this regard proper initiatives and support from the government should be offered. Gradually other issues should be handled viz. proper awareness, training programs etc. In case of existing departments, institutes offering the subjects related to the Business Administration, Management,

Business Management, Commerce, and Economics may start the programs with the specialization of Agricultural Informatics and in this context allied IT or Computing related department could be best for collaboration. Moreover apart from the nomenclature of Agricultural Informatics others viz. Smart Agriculture, Digital Agriculture, Agricultural Information Technology, Agricultural Information Systems may also offered accordingly with such Management and allied sciences. The universities, policy makers, governments should deal with proper steps in this regard.

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