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Welcome...





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Diffusion of Innovations paradigm- strengths and limitations; multiple sources of innovation- farmer innovation, institutional innovation; farmer participation in technology generation and promotion; strength and limitations.



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WHAT IS DIFFUSION?

Diffusion: Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system.

Elements in the diffusion of innovations:

innovation

communication channels

Time

social system



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WHAT IS INNOVATION?

Innovation: An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption.

Innovation has two component:

- object component
- Idea component

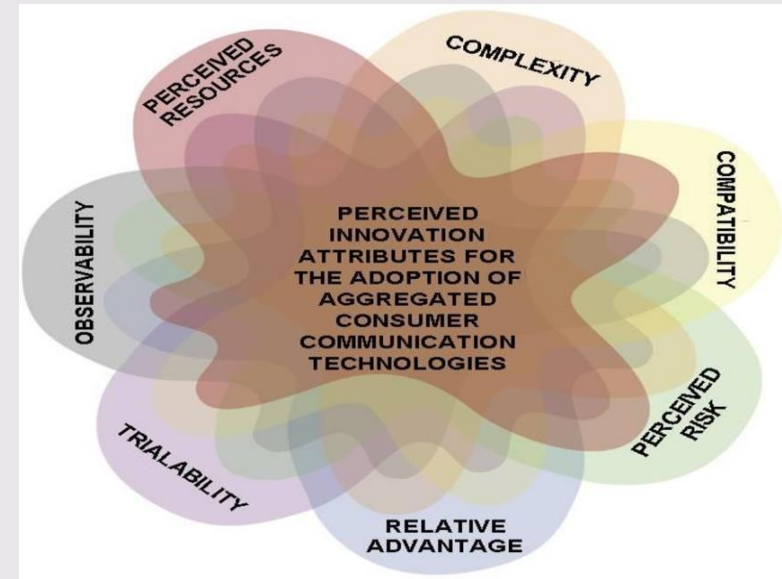




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PERCEIVED ATTRIBUTES OF INNOVATION



Relative advantage: It is the degree to which an innovation is perceived as better than the idea it supersedes.

Compatibility: It is the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters.

It has two dimension :**Situational** and **Cultural**



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CONTS:

Complexity: It is the degree to which an innovation is perceived as difficult to understand and use.

Trialability: It is the degree to which an innovation may be experimented with on a limited basis.

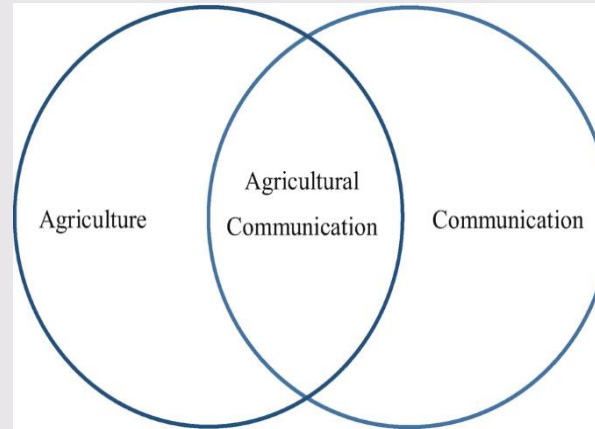
Observability: It is the degree to which the results of an innovation are visible to others.



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COMMUNICATION CHANNEL



A communication channel is the means by which messages get from one individual to another.

i) Interpersonal channels - It refers to those which are used for face to face communication between two or more individuals.

ii) Mass media channels - These enable the messages to reach a larger, diverse audience simultaneously in a relatively shorter time. e.g.: Radio and T.V.



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CONTS:

- iii) **Localite channels** - They originate within the social system of the receiver. eg: neighbors, relatives, opinion leaders etc.
- iv) **Cosmopolite channels** - They originate outside a particular social system. e.g. Extension worker, sales personnel etc.



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TIME

The time dimension is involved in diffusion

In the innovation - decision process.

In the innovativeness of an individual or other unit of adoption.

Innovation's rate of adoption in a system.





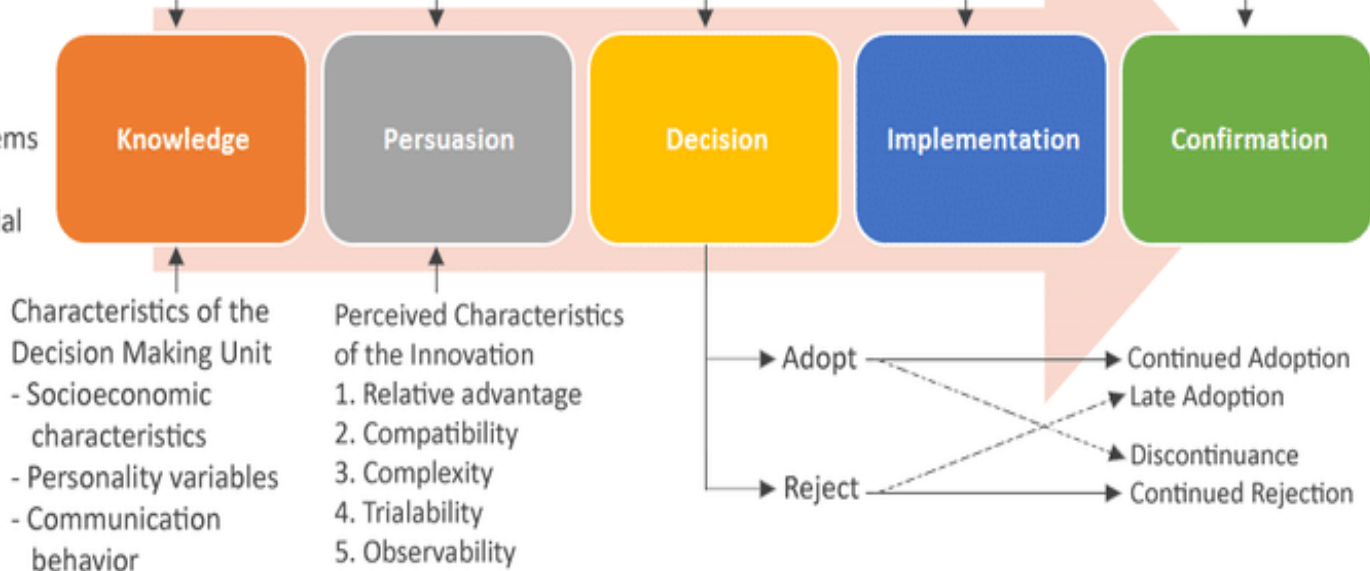
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The Stages in the Innovation-Decision Process

Communication Channels

Prior conditions
- Previous practice
- Felt needs/problems
- Innovativeness
- Norms of the social systems





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Innovativeness of an individual or other unit of adoption:

Degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system is innovativeness.



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CONS:

Innovation's rate of adoptions: This rate can be represented by the number of members of a society who start using a new technology or innovation during a specific period of time. The rate of adoption is useful for making comparisons.



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Variables Determining Rate of Adoption

Dependent Variable to Be Explained

I. Perceived Attributes of Innovation

1. Relative Advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability

II. Type of Innovation-Decision

1. Optional
2. Collective
3. Authority

III. Communication Channels

Increased by more and better mediums

IV. Nature of Social System

E.g., traditional versus modern, isolated or interconnected to other systems

V. Efforts of Change Agents

Educational and promotional efforts

**Rate of Adoption
of Innovation**

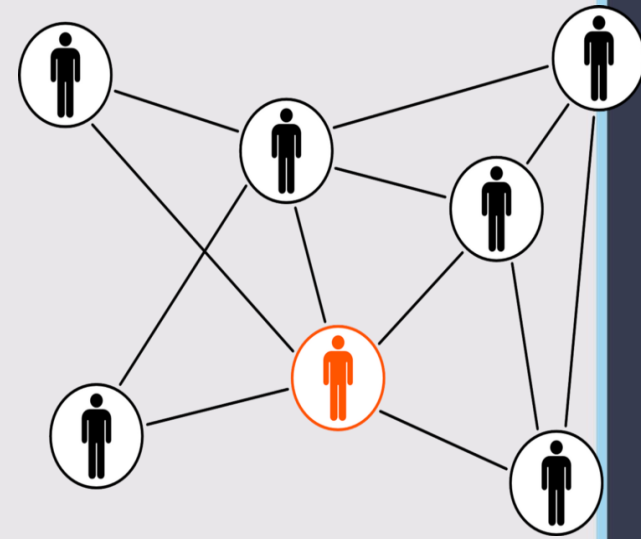
Adapted from Everett Rogers,
Diffusion of Innovations Fig 6.1 (2003)



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SOCIAL SYSTEM



SOCIAL SYSTEM: It is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

Functions:

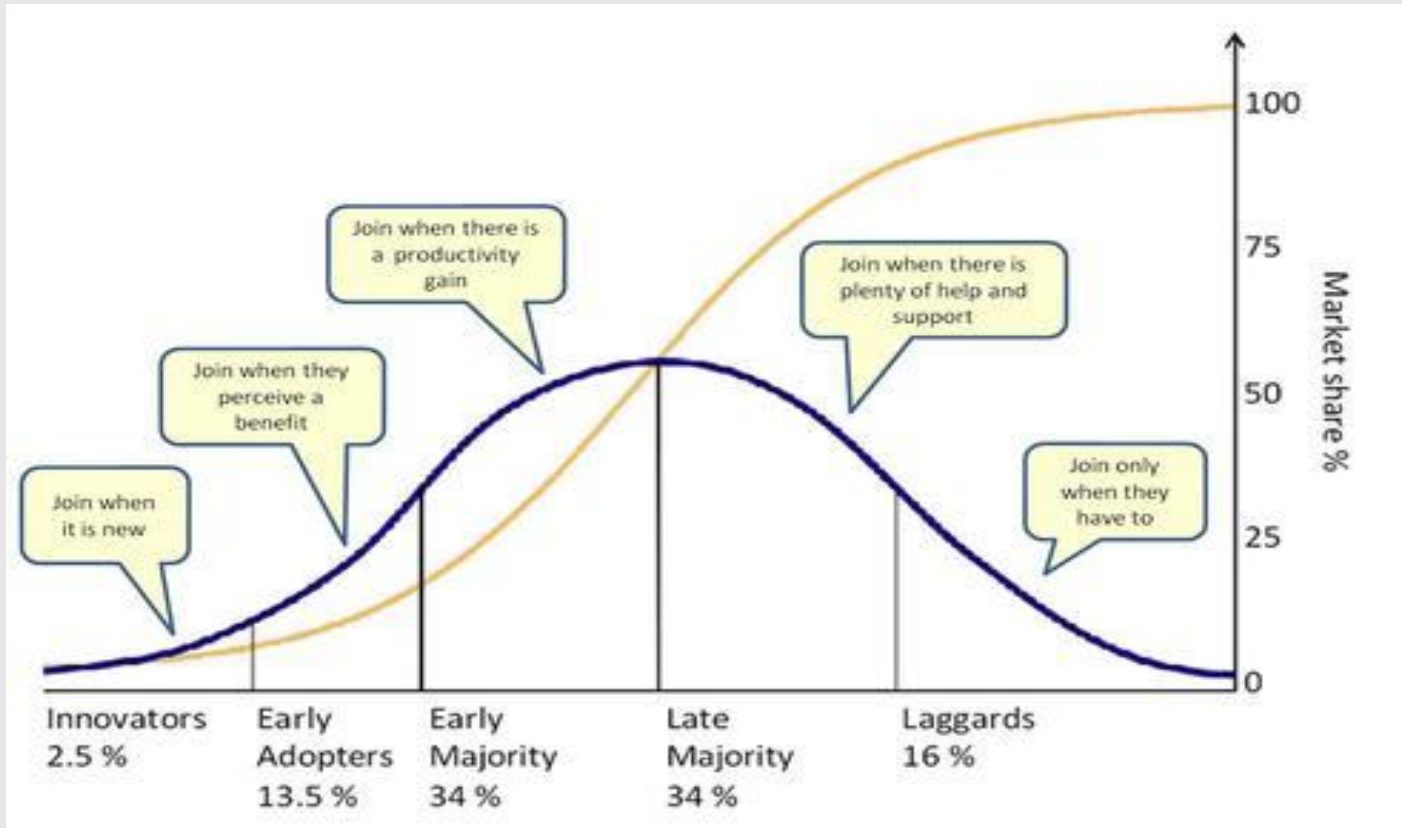
The members or units of a social system may be individuals, informal groups, organizations and / or subsystems.

The social system constitutes a boundary within which an innovation diffuses.



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ADOPTER CATEGORIES



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FARMER INNOVATION

- **Introduction:** India is home to 1.3 billion people, and globally ranks second in terms of the agricultural output. Both demand and supply side factors play a crucial role for the adoption and diffusion of improved agricultural technologies. Demand side factors include awareness and knowledge about .technology, access to credit and - relevant inputs, risk implications and marginal returns.





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CONT...

The private sector is gradually contributing to developing and marketing of improved technologies. Delivery of improved technologies through agricultural extension mechanisms play a key role in their up-scaling and out-scaling. In fact, agricultural extension system addresses demand side factors such as awareness creation, risk reduction and proficiency improvement.





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CONTS...

Agricultural Technologies in India: Adoption and their Impact

Genetic Enhancement
Natural Resource Management
Farm Mechanisation
Climate Smart Agriculture
Biotechnology and Genetic Modification
Digital Technologies.





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ADOPTION AND THEIR IMPACT

Genetic Enhancement

Develop **resistance** against various **biotic** and **abiotic** stresses.

Reduce length of growing season and crop duration.

Improve quality traits for better **tastes** and **prices**.

Natural Resource Management

Improving water use efficiency.

Increasing input use.

Conserving soil and water resource.



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Farm Mechanisation

The adoption of labor-saving technologies has the potential to increase agricultural productivity. It takes less time .

Climate Smart Agriculture

The KVKs and the National Bank for Agriculture and Rural - Development (NABARD) are making efforts to promote climate smart or climate resilient villages in different agro-ecologies to expose their benefits to the farmers. There are multiple opportunities emanating from CSA technologies for minimizing the impact of climate change



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CONS...

Biotechnology And Genetic Modification

Application of modern science such as biotechnology and nano-technology in crops provides an opportunity to enhance their genetic potential including agricultural productivity, input requirements and sustainability of agriculture.

Agricultural biotechnology is being used as a scientific tool and technique to - enhance genetic potential and/or reduce risks due to biotic and abiotic stress.

Digital Technologies

Adoption and diffusion of digital technologies in agriculture can help in transforming agricultural systems towards sustainability.

The adoption of technologies such as artificial intelligence, robotics, remote sensing image analysis, optical sensors and equipment design for monitoring have huge potential for sustainable development of agriculture.

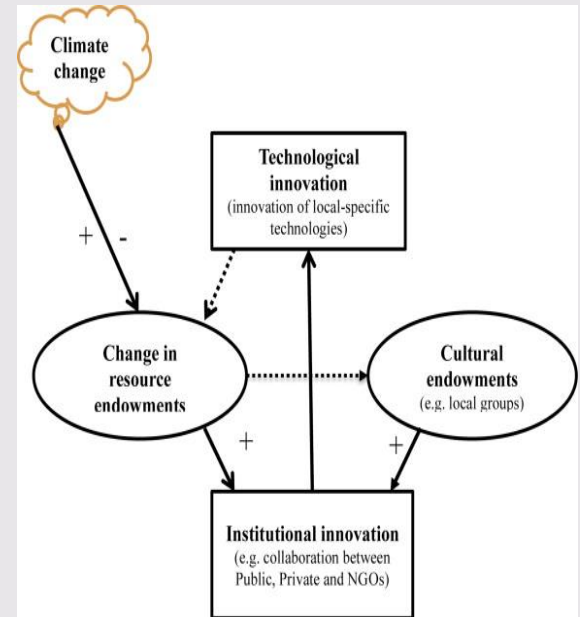


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INSTITUTIONAL INNOVATION

Institutionalization of contract farming
Farmer producer organizations
Private markets
Direct purchase centers
Farmer's market
ICTs for market intelligence





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LIMITATIONS OF INNOVATION

Mismatch between micro-irrigation system and existing cropping patterns.

High opportunity costs of pumping ground water.

Poor knowledge due to weak extension services.

Fragmented and small size of land holdings.

Farmer and extension worker ratio in India is 1100:1

In many of remote areas marginal farmers can't afford ICT gadgets.

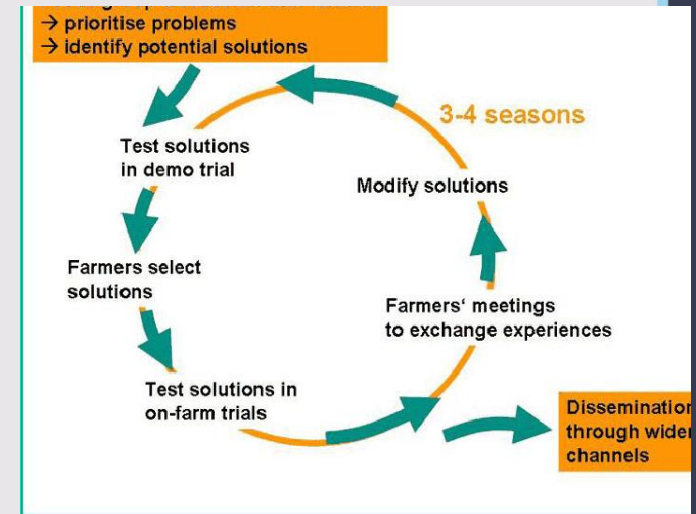


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PARTICIPATORY TECHNOLOGY DEVELOPMENT

Participatory technology development (PTD) is an approach to learning and innovation that is used in [international development](#) as part of projects and programmes relating to [sustainable agriculture](#). The approach involves collaboration between researchers and farmers in the analysis of agricultural problems and testing of alternative farming practices.





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DIFFERENT PARTICIPATORY APPROACHES

Rapid Rural Appraisal
Participatory Rural Appraisal
Participatory Action And Learning Methods
Argo Ecosystem Analysis
Participatory Action Research
Farming System Research
Participatory Rural Appraisal And Planning
indigenous Technical Knowledge



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KEY FEATURES OF PTD

Decentralized research/technology development.

Devolution of more responsibility to farmers for adaptive testing
Accountability sharing.

Focuses on farmer-led experimentation .

Tests the relevance of farmers' problem solving measures.

Takes in to account the local resources.

Is often based on indigenous technical knowledge and native wisdom of farmers .

Emphasizes use of low cost and locally available resources.



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GOALS OF PARTICIPATORY APPROACH IN AGRICULTURAL RESEARCH

One goal of encouraging stakeholder participation in research and technology development and transfer is to improve the functional efficiency of formal research.

Another objective is to empower the stakeholders, especially the marginalized ones, on their own decision making so that their research capacity to make effective demands on research and extension organizations is strengthened.

cost effectiveness is a key indicator for functional participation while indicators of capacity are central for empowering participation.



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ADVANTAGES TO FARMERS FROM PTD

- Farmers produce their own technologies -
- Appropriate to farm situations - Based on problems experienced by farmers
- Encourage community participation.
- Use local materials and local expertise.
- Technologies are cheap and flexible.
- These are culturally supportive .
- Reduce time lag in large scale adoption .
- More sustainable and productive .
- Within the resources and capability of farmers.
- These have options rather than fixed packages for production.



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OBSTACLES IN PTD

Scientists are afraid of exposing farmers to too many uncertainties, in terms of economic, health and environmental damages.

Lack of participatory theory in the practice of analytical research

Lack of skills and experience in PTD.

Scientists may lack time, motivation, and the communication skills to approach farmers.

They are concerned that results could be spoiled by mismanagement of factors outside the researchers' control.