

INNOVATIONS IN AGRICULTURE IN CONTEXT TO RAJASTHAN

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Abstract

The article observes the current state of innovative agricultural development in India and determines the role of state in the region of innovative development of the agricultural composition. It considers the factors of the slowdown of innovative development and the problematic characteristics of agricultural enterprises. And, also the initiatives that would promote the innovative developments in agricultural enterprises. So, it is important to seek the answer to questions, how India considers innovations in Agriculture practises to sustainably deal with changing life. For this attempt has been made through explorative study and thematic review. In altogether, 5 case studies were selected from internet on recent innovation in Rajasthan and were analysed to get the factors accountable for innovation in agriculture. The findings suggest that innovations must be designed locally by keeping the market linkage in view and capacity building must be promoted.

(Key Words: Innovation, Agriculture, Capacity Building)

Introduction

Agriculture is the world's largest industry. Today's world intensive agriculture practises are more focused upon the better production and yield. But along with this it depletes the soil and pollutes the environment, loss of diversity, greenhouse gas emissions, etc because of the use of pesticides. The focus is always on sustainable development of agricultural enterprises. For instance, solar energy is used as solar dripper which is an optimized drip irrigation system for gardens and indoor plants. Instead of being a dry desert state, Rajasthan is the leading producer of oilseeds and food grains. It is the third largest producer of pulses and wheat, and the largest producer of moth beans. Rajasthan is second largest producer of milk in the country. The main objective of this report- How India considers innovations in Agriculture practises sustainably deal with changing life?

As groundwater availability is highly variable in Rajasthan, depending upon the hydrological conditions. The limited groundwater resources are increasingly being exploited of irrigation, industrial and domestic works in Rajasthan. Soil testing is also an important factor related to agriculture, in around 33 districts in Rajasthan there is availability of soil testing labs. Organic farming is important as it helps in the procurement of chemical and pesticides free agricultural products with low cost technologies. We shall be talking about **Dragon fruit farming, Palm farming** and **Custard apple** a new variety in Rajasthan.

Special initiatives taken by government

Over the past decade, the Government of Rajasthan has coordinated their efforts to systematically develop agriculture in the state. The government has concerned over diversification of agriculture through a balanced use of land, water and other resources for promoting sustainable agriculture. The detail of the initiatives taken by the government:

Golden Rays Project

This program was first introduced in two tribal districts- Udaipur and Banswara of the state during kharif- 2009 and keeping the success in view the program was extended to five more districts during kharif – 2010 i.e. Udaipur, Banswara, Dungarpur, Pratapgarh and Sirohi. Under this programme, all the tribal and non-tribal BPL farmers were covered and have been given 5 kg high yielding seeds of maize crop.

It has always questioned why there is need for high maize production instead of what data shows something else. Why is the larger picture showing that 51% of maize is utilized for the poultry feed, 11% animal feed, 11% for starch, 1% for seed, 1% for breweries and 25% as food in India? These cultivars were not suitable for consumption but used for other ways. These cultivars can be stored maximum for 2-3 months, why should the government do something to increase this stocking practise.

Udaipur & Banswara have a high population of Tribals.

Maize is staple food of tribal and its present productivity is 8-10 qtl/ ha.

Comprehensive area approach programme taken up with Monsanto India Ltd. on PPP Mode.

Hybrid maize seed of 165 MT was distributed to 30449 Tribal farmers in kharif and rabi season.

Besides, hybrid seed extension support in form of training programme and POP on hybrid maize also provided to cultivators.

Productivity increased by almost two times even under drought condition in both the districts with productivity ranging to 30-33 qtl/ ha in Banswara district

157 lac expenditure done on the activity.

Water Management

For proper utilization of the available water, water storage structures like construction of Diggi's, pipelines, construction of farmlands and water storage tanks are being promoted.

Diggis and Diggi cum sprinklers- In the canal areas like IGNP, Ganag Bhakhra and Sidhmukh Nohar irrigation project, the diggis are being made to store water and is used to irrigate land when the Canal is not in operation. It improves the water efficiency as it uses the sprinkler which improves the water holding capacity of the land. Under this programme, the individual beneficiaries were provided subsidy as 50% of the total unit cost or Rs. 2,00,000/- per Diggi whichever is less.





Farm ponds (khet talai earthen)- this is to ensure lifesaving irrigation in the area of heavy soil region like Kota, Baran, Sawai Madhopur, Jaipur, Bundi, Karoli and Chittorgarh. Farm ponds are used as lifesaving at critical cropping stage. The runoff's are collected in these farm ponds and will not only be utilized for irrigation but also help in recharging the ground water level. Under this programme, 50% of the total unit cost or Rs. 40,000/- per pond whichever is less.



Water Storage Tanks (Jal Hauz cemented)- Jal Hauz is also called "as and when required" irrigation facility. The water can be stored at the night-time when the electricity is available, and fields can be irrigated during the daytime as per requirement. Under this programme, individual beneficiaries were provided with subsidy of 50% of the total unit cost or Rs. 40,000/- per tank whichever is less.

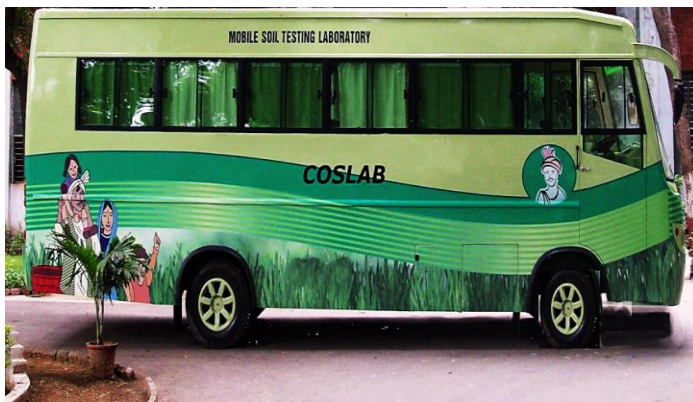


Pipeline Irrigation- Kaccha irrigation causes great loss of water during the process. To reduce this conveyance loss subsidy is provided on P.V.C. pipelines so that water can be saved and be used much for irrigation. Subsidy is payable at @ 18.75 per meter of running length of pipe up to maximum length of 800 meter per farmer.



Soil testing facility

The state agricultural department has now soil testing labs in all 33 districts. To further strengthen the soil testing facilities and to provide soil health cards to the farmers. NGOs are being involved in running the 12 mobile soil testing labs recently sanctioned by Government of India. These Mobile Labs loaded with latest soil testing equipment will be used for macro and micronutrient analysis of soil. In addition to this, these Mobile Labs are also equipped with Audio-Video system to educate farmers on various agricultural topics.



Organic Farming

It is defined by the use of fertilizers of organic origin such as compost manure, green manure, and bone meal and places emphasis on techniques such as crop rotation and companion planting. Biological pest control, mixed cropping and the fostering of insect predators are encouraged.

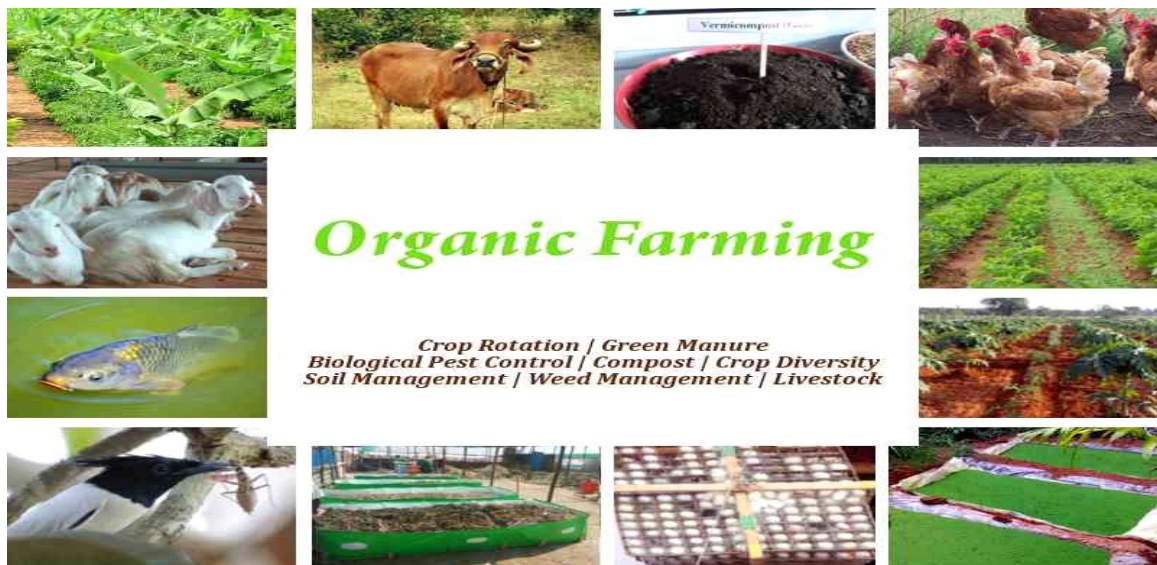
The main objective is the Production of agricultural products free from chemicals and pesticides residues by adopting eco-friendly low-cost technologies. An integrated farming system that strives for sustainability, the enhancement of soil fertility and biological diversity while, with rare exceptions, prohibiting synthetic pesticides, antibiotics, synthetic fertilizers, genetically modified organisms, and growth hormones.

Eligibility

Farmer should have land in his own name.

Land from 0.4 ha. to 1.0 ha.

Assistant will be provided for three years for selected farmers.



Olive cultivation

Olive's fruit has much importance as it is the main source of olive oil in Mediterranean region. Olive is the crop which can sustain the temperature ranging from 5 to 48 degree Celsius. This technique is been taken from Israel, 1.12 lac nos. Plants have been imported from Israel and been planted at various sites starting from March 2008. Irrigation is done through drip irrigation process. And farms are equipped with Hi-tech control fertigation (fertilizer or manure mixed with water and together used through drip irrigation technology), plant protection and Agronomical practices are being used by the farmers.

Studies also claimed that the product from olive the Nutraceutical olive wine also offers the same benefits as the olive oil including improving heart health and lowering cholesterol. It is also believed that this beverage could bring a remedy to skin cancer. Polyphenols found in the leaves are believed

to protect against cancer and other inflammation related diseases. It also provides high level of antioxidants which is considered beneficial in protecting from Diabetes and also delaying cell aging. Future prospects in Rajasthan's olive pipeline includes the manufacture of olive vinegar and cosmetics produced from vitamin E and Oleuropein-rich olive leaves to increase value.



Pradhan Mantri Fasal Bima Yojana (PMFBY)

PMFBY was restructured by combining the Weather based crop insurance scheme (WBCIS) and National Agricultural Insurance Scheme (NAIS) in the year 2016-17, during the kharif 2016 the scheme was implemented. It focuses on:-

It provides financial support to farmers suffering crop/damage arising out of unforeseen events.

It helps in stabilizing the income of farmers to ensure continuance in farming.

To encourage farmers to adopt innovative and modern agricultural practises.

By ensuring flow of credit to agriculture sector which will contribute to food security.

Protects farmers from production risks.

Service tax is not applied to this scheme.

The farmers who have not taken any loan had to submit documentary evidence of land records in the state such as Records of Right (ROR), land possession certificate (LPC), etc.

Coverage of risks:

Prevented sowing/planting risks: If more than 75% of the notified insured area remains unsown or if there is germination failure during sowing due adverse climatic conditions, then farmers are eligible for preventing sowing failure risk. The compensation will be 25% of the sum insured and then the insurance cover will be terminated.

Standing crop (Sowing to Harvesting): Insurance in this case will provide favour to cover yield losses due to non-preventable risk like Drought, dry spells, floods, Natural fire and Lightning, Pests and diseases, typhoon, storm, hailstorm.

Rashtriya Krishi Vikas Yojana (RKVY)

The Rashtriya Krishi Vikas Yojana was introduced with an aim to provide support to the agricultural sector in achieving 4% annual agriculture growth. RKVY scheme was launched in the year 2007 which was later rebranded as Remunerative Approaches for Agriculture and Allied sector Rejuvenation (RAFTAAR) to be implemented for three years till 2019-20 with a budget allocation of Rs 15,722 crore.

Objectives of RKVY RAFTAAR:

Risk mitigation, strengthening the efforts of the farmers along with promoting agri-business entrepreneurship through the creation of Agro-infrastructure.

Providing all the states with autonomy and flexibility in making plans as per their local needs.

Helping farmers in increasing their income by encouraging productivity and promoting value chain addition linked production models.

To reduce the risk of farmers by focusing on increasing the income generation through mushroom cultivation, integrated farming, floriculture, etc.

Empowering the youth through various skill development, innovation and agri-business models.

Significance of RKVY scheme:

Incentivising all the states of India in enhancing more allocation to agricultural and allied sectors.

RKVY helps in creating the post-harvest infrastructure required for the growth of agriculture along with strengthening the efforts of the farmers by providing market facilities.

It will help in the promotion of private investment in the farm sector across the nation.

Dragon Fruit or Pitaya

Dragon fruit is native to Mexico, now this fruit will be grown on the experimental basis at the agricultural department's centre of excellence at Bassi and Deorawas near Tonk, if the project is successful then it will be replicated in the western Rajasthan. Rajasthan has started cultivation of three varieties Cassia Tora (medicinal plant), Dragon Fruit (Pitaya) and Pistachio (Pista). While Dragon fruit would be cultivated in 5,000 sqm of Rajasthan, steps have been taken for the cultivation of pista. India was importing pista (Pistachio) from the foreign land but part of Rajasthan like Hanumangarh and Sriganganagar has the better climate for the cultivation of Pista.



Custard Apple

Custard apple, a rich source of vitamin C or an antioxidant is widely grown in the tribal belt of Rajasthan which includes Udaipur, Dungarpur, Chittorgarh, Banswara, Rajsamand and Jhalawar.

Features-

New variety is pulpier with smaller seeds.

Outer layer of the fruit is much thinner in comparison to other fruits found in Rajasthan.

Conditions required for growing Custard Apple:

It grows best in dry and hot climate and requires light soils along the slope of hills.

Plants are raised from seeds and bear the fruit in about 3-4 years.



Date palm farming

In 2007-08, the state government had started date Palm cultivation on a trial basis in 135 hectares of its own farmland in Jaisalmer and Bikaner and had imported around 21,000 tissue culture raised saplings from the UAE. Later in 2008-09, Rajasthan government started promoting the palm farming on farmers' land in 12 districts - Jaisalmer, Barmer, Jodhpur, Bikaner, Hanumangarh, Sri Ganganagar, Nagaur, Pali, Jalore, Jhunjhunu, Sirohi and Churu. Farmers have planted date palm crop in 813 hectares.

Date palms take 4 to 8 years after planting before they bear fruit. Yields improve as trees grow older and the tree has a lifespan of 15 years with maximum fruits from 10th year onwards. The first harvests for date palms have started in Rajasthan and the state is expecting an output of around 800 tonnes. The state grows date palms varieties like Barhee, Khuneji, Khalas, Medjool, Khadravi, Jamli and Sagai.



Rajasthan Government Support for Date Palm Cultivation:

The state government is prominent date farming in arid desert regions of north-western Rajasthan and giving tissue culture raised sapling to farmers at a subsidised rate under the centrally sponsored scheme Rashtrtiya Krishi Vikas yojana (RKVY).

The state government has also tied up with a private company Atul Ltd for cultivating fine quality tissue cultured date palm saplings for distribution to farmers at a subsidised rate.

A single sapling of date palm Rs 2,000- 2,500 but Rajasthan Government is giving subsidy up to 75 percent provided farmers use drip irrigation.

The agriculture sector working on Indo-Israeli collaboration, started the date research at Sagra-Bhojka farm and after its success, efforts are being made to start a centre of excellence to develop date using Israeli techniques.

SWOT Analysis of sustainable agriculture in India

Agriculture based economy is very important in context to India, but the large geographical variation brings lots of Challenge for innovation. In context to the above case studies and innovations piloted in Rajasthan has brought significant changes in the GDP of the state. These are as Agriculture sector still contributing 14% of Gross Domestic Product and it still employs over 52% of labour force of the country and over 70% of Indian rural work force. Further, we have achieved a fourfold increase in food grains production as compared to threefold increase in population (from 50 million tons in 1950 to 230 million tons in 2010). Not only this, the country has the second largest area under cultivation and highest area under irrigation (55.8 million hectare) and is now first in production of Pulses (Masood et al, 2009) second in production of cereals like Wheat, second in production of vegetables next only to China, first in livestock population with 18% of world's cattle population with and 13% of world's total milk production is contributed by India. TH country ranked third in terms of farm mechanization.

But it has also some demerits such as more or less stagnant yields that are lower than most of other countries. The yield is far less than the yield of most of developed countries. Indian wheat yield stagnated at 28 q/ha while those of most wheat producing countries was 64 q/ha. Further, due to low processing levels in the country there is a considerable amount of wastage of agricultural and horticultural produce. Another factor is food wastage. Literature shows that food grains worth crores of rupees had to be sold to the farmers as manure for just 14 paisa par Kg. The reason, water from river Ghaggar in Haryana had entered the grains which were stored in open and spoiled the grains. This is the height of things, a country having record production of food grains have millions of peoples going to bed without two square meals a day. Again, it was also seen that lack of accessibility to modern technology sixty percent of the country's population has no access to modern technology. They still rely on the traditional methods of agriculture having no linkages with any institution or industry. We talk of green revolution, evergreen revolution but what we need is a trickledown revolution so that innovations reach the farming community. The technology is of no use unless and until it reaches those for whom it is intended.

The threats to innovations are size of the land holdings, land degradation, loss of crops due to lack of disease management, and climate change. It was seen in the literature that the arable land has shrunk from 0.94 acre per person in 1970 to 0.56 acre per person in 2000 and going by the rate the population is increasing it is projected to decrease to 0.15 acre per person. Such small holdings create problems in performing farm mechanization operations and make farming non remunerative. Second, more than 5 billion tonnes of soil are washed every year taking with it 6 million tonnes of nutrients. Land Degradation is a big problem, presently 93.7 million hectares of land is under threat of water erosion, 9.5 m ha under wind erosion, 14.3 m ha under water logging, 5.9 m ha from soil salinity, 16 m ha from soil acidity and 7.4 m ha from other types of threats. This puts the total area under land degradation to 146.8 m ha i.e. more than the total cultivable land. Third, considerable portion of the production is lost due to weeds, insects and other diseases. Weeds account for 37% of total loss, insects account for 29% of total loss, Diseases account for 225 of the loss whereas other

factors such as temperature humidity account for 12% of total loss. Fourth, Climate change is also another important threat hanging like a domicile's sword over Indian agriculture. Climate change is expected to increase dry lands by 11%. Due to Global warming the average temperature has increased. It has affected the yield of major crops. A 10c increase in the temperature will reduce the duration of wheat and rice in north and western India by a week. Like that change in temperature,

Discussion and conclusion

As in above we have talked about the sustainable practises of farming. As in Golden Rays Project has fine role in fulfilling different needs of our living like food for Birds, Animals and also has application in Breweries preparation and food for humans in India. Rajasthan is the place where there is shortage of water, so these innovations like Diggis, Farm ponds, water storage tanks & Pipelines have so far solved the issues of water scarcity & made available when required. We have seen how the government helped the farmers in the production of agricultural products through eco-friendly means by providing subsidy in case of high cost technologies. In the current phase of life when there are suffering due to high cholesterol level in blood vessels which causes heart problems. As the Olives have the nutritious effect, as it is helpful in lowering the cholesterol level, and it provides antioxidants, and thus protects from Diabetes, also have anti-ageing properties.

Life requires being secure, so insurance is very important i.e. life insurance or insurance of the belongings. The harm caused by the natural calamities affects the crops which in turn affects the life's of people, so the government have important provisions like PMFBY, RKVY for the development of Agriculture & people. We always have good relations with Israel, and we can also see this in agriculture sector. We have brought the date seeds from there as gulf is famous for Date Palm cultivation. We live in 21st century, today plantation in Mexico, Iran are growing well so we can also adopt the means as we have the same climatic conditions & our nation has friendly relations with these countries, so we have asked for better experts from these countries & successful in growing the crop like Dragon fruit & Custard Apple. So, we have seen that innovative means in agriculture help us to sustainably develop our agriculture practises and helps to protect in a eco-friendly way.

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Social Norms, Social Changes

This is a course of social norms, the rules that glue societies together. It teaches how to diagnose social norms, and how to distinguish them from other social concepts, like customs or conventions. These distinctions are crucial for effective policy interventions aimed to create new, beneficial norms or eliminate harmful ones. It also teaches how to measure social norms and the expectations that support them, and how to decide whether they cause specific behaviours. This course includes many examples of norms that sustain behaviours like child marriage, gender violence and sanitation practises.

OBJECTIVE

Social norms are ideas shared by a group of people that encourage people in that group to behave in a certain way. Social norms describe what acceptable and desirable behaviour within society is and such as are an effective form of social control.

COURSE CONTENTS

- **Interdependent & Independent Behaviour**

The people do certain things because they think they need to do it. If a person uses an umbrella or a person indulge in open Defecation, they both are self motivated, people indulge in it because people want to do it and are completely independent.

Above mentioned are the examples of customs, social customs because it is a collective practise.

- habitual pattern of behaviour.
- such that individuals prefer to conform to it.
- because it meets their needs.

Certain people do the dietary function according to their dietary law, they may be Muslims, they may be of any other religious follower, they do it because it is the part of their religious code, not because other doesn't do it or do that.

Interdependent deeds-

In Cameroon, the mother's generally don't feed their babies with mother's milk instead of that they generally give them water, this is so because everyone is doing the same but if we see biologically they should give them mother's milk for first six months as it builds the immune system of children.

In America, in Restaurant the Waiters expect a respectful behaviour from their customers and also expect a tip in the end. The customer also expects a similar kind of behaviour.

Interdependent behaviours are motivated by expectation of other people's behaviour or beliefs.

Types of expectations

- What other people do.
- What other people think I should do.

For instance, people generally obey the traffic rules & give the way to others. This behaviour is interdependent as we have to do the things according to others.

Reference network- means people you care about when you make a particular decision. This is also very much connected with the social expectations, it matter which affects the behaviour.

A set of individuals who matters while making decisions. It varies from situation to situation.

- Usually local
- Social expectations about one's reference network influence one's choice.

Ex- Child Marriage, or in a Restaurant the reference network will be different.

Types of Reference Networks

- Centralized Network Structure.

Generally all the people are connected to a centre authority or a person, like religious leader- who dictates certain behaviour, & people just look at the religious leader who is at the centre & they don't look at each other.

- Decentralized Network Structure- Many sets of disperse networks but connected. In each disperse network there is a one leader & this leader have connections with other networks.
- Distributed Network Structure- alike, centralized network the people have different connections rather than single people or small set people dominating the network. In this the information could flow through many different channels.

Empirical Expectations

- Unidirectional
- Unilateral
- Multilateral

Some expectations are factual or empirical; they are beliefs about how other people are going to act or react in certain situations. We have the expectations that they

would continue to act in a way as in past. Now Empirical expectations influence our decisions. For example, drive on the left hand side of the road in England.

Multilateral Expectations

Traffic depends on multilateral expectations, the movements in traffic depends on the expectations of others.

Bribe- When we bribe a person we expect him to do the desired work, in return the person the service to briber in return of bribe. So there is a web of multilateral expectations, without it there wouldn't be any Bribing transaction.

Descriptive Norm

A pattern of behaviour that we prefer to engage in because we believe others follow it.

- The pattern of behaviour that people regularly engage in.

Christina Bicchieri's definition- A pattern of behaviour that is interdependent;

- Empirical expectations matter to choice.

A Descriptive norm

Is a	Pattern of Behaviour
Such that	Individual prefer to conform to it
On the condition that they believe that	Most people in their reference network conform to it(empirical expectation)

A Social Norm

Is a	Habitual pattern of behaviour
Such that	individual prefer to conform to it
Because	It meets their needs.

Normative Expectations

Expectation about what other people think we should do.

- Normative Expectation often accompanied by sanctions, i.e. if other people we ought , we should behave in a particular way, often they are prepared to sanction our transgressing this behaviour.

- It is difficult to distinguish Normative expectation from Personal Normative Beliefs, i.e. Normative expectation are beliefs what other people think we should do and Personal Normative Belief are our personal beliefs about what we think we should do.

For instance, In Sierra Leone, new mothers believe that their mother in law think they should avoid giving colostrums (first milk) to a new born. So they have that belief what mother in law belief should be done.

In Pakistani villages, families believe that other families think that they should marry off a girl immediately after puberty.

Normative expectations are the second order beliefs: What we believe people in our reference network believe we should do.

-I believe that most people think we ought to do.

-I believe that most people think the right thing to do is.....

Normative expectations are often paired with the expectation of sanctions.

Pakistani family may think our neighbour will ostracize us, will be very critical to us if we don't marry our daughters as soon as she reaches puberty or may I say my peers will admire me if I offer lot of money for particular charity. In both cases there are sanctions, one is positive and other is negative. This occurs in Normative expectation.

Social Expectation- are expectations about other people's behaviour or beliefs.

Empirical Expectations	Normative Expectations
What I believe other people do	What I believe other people think I ought to do.

In plateau region of Congo, young mother believe that people think that women should never disobey their mother in law.

Like Empirical expectation, normative expectations are dependent on reference network. Normative expectations do not matter to choose.

Personal Normative Belief- I believe that I ought to marry off my daughter as soon as possible.

Normative expectation- I believe my fellow villagers think that I ought to marry off my daughter as soon as possible.

Means they have Empirical Expectation about behaviour of people in their reference network & the expectations matters to their choice.

Descriptive norm are based on Empirical expectation.

Conditional Preferences- apply both to descriptive norm and social norm. When do expectations motivate behaviour? Empirical and Normative expectations do not necessarily motivate behaviour. One must prefer to act in a certain way given that certain expectations one holds.

Preference is a disposition to act in a specific way in a specific situation. If we have two choices A or B, When we choose A over B, then it must be the case all things considered I prefer A to B. So preference and choices are strictly connected.

People generally consider preference for something means one really like that particular thing. But preference and liking are two very different things.

For example, I adore chocolate but when I go to ice cream shop, their I love chocolate but I prefer some other taste in my ice cream.

Parents-

Prefer	Like
To marry off their young Daughters	To educate their young Daughters

So preference is something different from their liking & endorsing that behaviour.

Like, In Sierra Leone, young mother like to give mother milk to child but they prefer not to as they are dependent on the judgement of mother- in- law.

Preference is connected to choice, liking is not connected to choice

Conditional preference – One's choice will depend upon what one thinks others do or endorse.

Preferences are conditional on.....

Empirical expectation or Both Empirical and Normative expectation

The table below describes different kinds of preferences, using the simple example of preferring or not preferring to eat apples.

	Individual Preferences	Social Preferences
Unconditional	"I want apples."	"I want more apples than you."
Conditional	"I want apples if it is autumn."	"I want apples if my friends want apples."

What does this course teaches us

I have choose to do the course namely ' Social Norms, Social Changes' as it is related with day today life circumstances. It teaches us how these social norms make important changes in our lives & how does it effects the behaviour of an individual.

This course is being taught by Prof. Chrristina Biccheri, who has different way of teaching mainly through Audio- visual mode of teaching through videos. She has also given different readings to make us understand this theme in a more descriptive way.

To check the accountability of the person's doing the course, there is also short objective test series after every topic. To succeed in the course you have to pass every test series with minimum 70%.

I have done this course in COURSERA.ORG, which has pictorial teaching pattern. So I am very much rejoiced after doing this course.