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Sustainability of farming: Revisiting Resource Dependency Theory in analysing challenges with special reference to Bangalore Rural District.

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Purpose:
The purpose of this research is to understand the resource-based view of the resource consumption of farmers. In farming sector there is a resource scarcity in terms of labor, seeds, electricity, water etc. The labor scarcity can be managed by own family members, but the other resources are expensive and not easy to substitute. Hence, this study tries to understand the difficulties faced by farmers in overcoming resource scarcity.

Design/methodology/approach:

It is a descriptive analysis based on demographic data collected from farmers using a structured questionnaire, confirmed after a pilot study. Crombec alpha was used to test the validity and it is more than 0.725. The consistency was tested by using test-reset method and t- test is used to test the consistency of data. This statistically insignificant ($p>0.05$). Convenient sampling is used for data collection.

Findings:

The Research Dependency Theory helps farmers in classifying the controllable and uncontrollable variables affecting agriculture and crop production. The examination of Research Based View Model helps farmers in acumen on crop production and sustainable development.

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Research limitations/implications

Only one District is examined and wider research is essential, both of a qualitative and quantitative nature.

Originality/value

The research provides empirical support for the Resource Dependency Theory and extends the kind of its implication for farmers in facing the challenges of sustainable farming.
Keywords: Resource Dependency Theory, Sustainability of farming, Research Based View, Crop Production.

Introduction:

Developing a sustainability in agriculture is very important for the future generations. The resources required for agriculture are controllable and uncontrollable. Selecting the most suitable resources at the right time by the farmers is very important. Sometimes selecting wrong resources brings many problems to the farmers. Resource Dependency theory is very much capable in selecting efficient resources required for sustainable farming, crop production and competitive advantage. A large number of sustainability assessment tools have been developed to gain insight into the sustainability performance of farms (Evelien M. de Olde 1, 2016). These tools generally integrate a wide range of themes and indicators to develop a holistic view on farm-level sustainability and are used for different purposes, such as monitoring, certification, consumer information, farm advice and research (Schader, 2014). This sector also contributes much to sustainable economic development of the country. The sustainable agriculture development of every country depends upon the judicious mix of their available natural resources. The big objective for the improvement of agriculture sector can be realize through rapid growth of agriculture which depends upon increasing the area of cultivation, cropping intensity and productivity (Chahal & Mukesh, 2015).

Population has drastically increased by 6.5 billion over the past 120 years (Max Roser, 2013). Due to this population growth, there is a question of maintaining sustainability. In terms of food availability and supply for adequate demand, land availability for cultivation, water resources requirement for agriculture, use of pesticides and chemicals for increasing soil fertility, urbanization, Lack of Government support etc.

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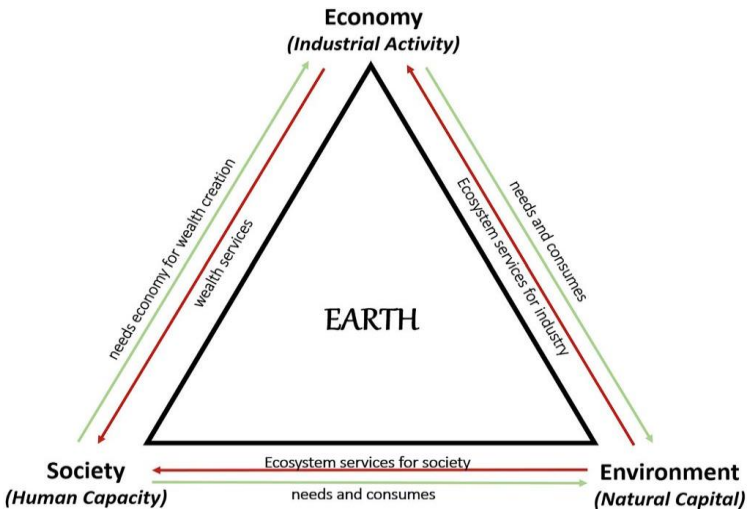
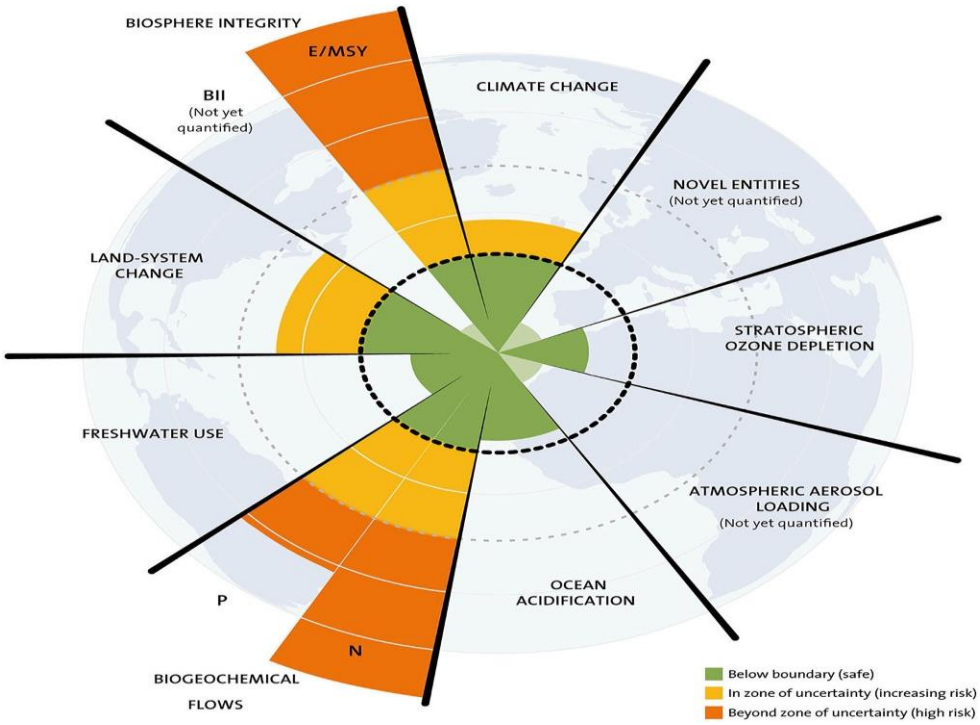
Fig.No 1: Wealth Creation Interdependency Triangle (Feiel, 2020)



The human-driven influence even achieved an entirely new geological age called the Anthropocene, an age in which human-driven movement has become vaster than geological force in driving ecologic and planetary change (Steffen, 2015).

Fig. No: 2 The Planetary Boundaries of Stockholm Resilience Center (Feiel, 2020)



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Theoretical background:

Sustainability development theory:

Sustainability development of the community is very important in terms of economic, social and environmental factors.

Sustainability can be maintained by end of poverty, Achieve food security and end hunger, maintain adequate nutrition level and promote sustainable agriculture, Achieve healthy life at all ages, Provide quality education and learning opportunities, Accomplish gender equality and empower women and girl, Secure water sustainability, Promote industrial sustainability, Provide positive link between urban and rural areas, Address climate change and its effects on community, Reduce inequality among countries, Maintain supply and consumption sustainability, Implantation of global partnership with sustainable development, Forge unity in diversity through demographic practices.

Resource Dependency Theory:

Pfeffer and Salancik (1978) devised the Resource Dependency Theory to provide an explanation for how individual's behavior is laid low with the external assets they possess. The sustainable farming system will exist only if the availability of both natural and artificial resources are balanced. In natural resources climate, water supply, natural manures and natural assistance for pollination. Artificial resources include irrigation, controlled pollination, artificial environments and fund recrement. Farmers have to depend on traditional resources especially for money that local pawn brokers and money lenders support them in absence of support of formal financial sources like banks. Information asymmetry and inconsistent income cause denial of funds from formal resources. Financial sustainability is the first solution expected from managements and governments. Van Weele (2018) believes that that is, in truth, extra crucial than their inner assets.

Review of Literature:

Environmental change impacts crop yield opposite crop creation positively in nations like Nepal where agribusiness relies generally upon normal conditions. Conceivable situations of environmental change like higher temperatures and changes in precipitation will straightforwardly influence crop yields. Consequently, this study evaluates the impact of noticed environment factors on yield of significant food-crops in Nepal, in particular rice, wheat, maize, millet, grain and potato in view of relapse model for authentic (1978-2008) climatic information and yield information for the food-crops. The yield development pace of all the food crops is positive. Nonetheless, the development rate for all yields, aside from potato and wheat, is beneath populace development rate during the period. Environment factors like temperature and precipitation are the significant determinants of harvest yields. Pattern of precipitation is neither expanding nor diminishing fundamentally during this period. In any case, temperature is expanding by 0.7 °C during the period. Environment factors show a few impacts on the yield of these significant food-crops in Nepal. Expansion in summer downpour and most extreme

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temperature has contributed decidedly to rice yield. Additionally, expansion in summer downpour and least temperature decidedly affects potato yield. Be that as it may, expansion in summer downpour and greatest temperature antagonistically impacted the yield of maize and millet. Expansion in wheat and grain yield is contributed by latest thing of winter downpour and temperature. Thought of spatial variety in comparative kind of concentrate in Nepal that will be useful in distinguishing the district more powerless against environmental change as far as harvest yield is strongly suggested (Maharjan, 2011).

Tending to ecological and social effects on rural turn of events and food security is a worldwide need since expanded food creation of 60-70% is assessed to be expected by 2050 to take care of the developing total populace. In non-industrial countries, the circumstance is more intense since less friendly, mechanical and monetary assets are accessible to battle environmental change, as most would consider to be normal to adversely affect rural creation, and there are different limitations to accomplishing food security. This part investigates the social and natural issues influencing agrarian creation confronting ranchers and other farming professionals, strategy producers, establishments and partners in the creating scene. It will likewise address how progress in research in arising economies can be put to greatest advantage despite these current social and ecological difficulties. A durable procedure to address these difficulties is introduced (Bekele, 2017).

This paper assesses the effect of horticultural augmentation administrations in the Dominican Republic. Specifically, we examine the immediate effect of the Program for Mechanical Help in the Horticultural Area (PATCA). The examination depends on an extraordinary dataset assembled by PATCA's executing unit in 2008. The study included 1,572 ranchers working in crop developing, reproducing or milk creation. Utilizing an inclination score matching method, we found that the innovations funded through PATCA successfully worked on the efficiency of rice makers and reproducers. Nonetheless, we tracked down no huge effect on different makers. These heterogeneous effects could be because of the different degree of adequacy of the advanced advancements in the short run, where land leveling and field preservation could be the quickest in showing huge impacts. At long last, we found no obvious proof that the program altogether affected the nature of creation that was thought about costs revealed by landowners (González, Ibarraran, Maffioli, & Rozo, 2009).

The three pillars model is a very popular and widely known model of sustainability. This model was known as pillars, overlapping circles or a triangle. These three pillars of the model take three dimensions like environmental, economic and social resources. These three dimensions are very important for sustainable development. The research shows that sustainability can be achieved when all these pillars of the model work in unison. Some authors argue that sustainability is independent and some authors argue that sustainability is dependent on the four pillars of this model. This model is viewed in different consensus related to the content of the pillar. The main drawback of this model is it does not consider the time dimension of sustainable development. (Thatcher, 2019)

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In similarity to the three pillars model the prism model specifies four pillars. It stipulates a set of interlinked components. The four pillars specified in this model are environmental, ecological, political and cultural. The four-pillar model also experienced the criticism faced by three pillars model. Such as time dimension and all the components of the model are independent. (Thatcher, 2019)

Nested circles of sustainability also known as egg of wellbeing or concentric circles model. This model represents different dimensions as concentric ovals with one oval. The message of this model is eco system supporting people surrounded by it. This model is essential like three pillar and four pillar model considering multiple components like health and population wellbeing, wealth, community, knowledge and culture). This model is entirely dependent on healthy eco system. The nested egg model concentrates on interdependence between the subsystems, but this model does not address the issue of time dimension. (Thatcher, 2019)

Two-tiered sustainability equilibria model of sustainable development is highly anthropocentric and economic system is placed at its Centre. In this model three circles are overlapped. In the model there is interdependencies at a single point and also time dimension is included depicting as a perfect cylinder. To achieve sustainability in long term it is important to recognize what is to be done for achieving sustainability in the present. It represents that the decisions on sustainable development in present, forms the availability of sustainable development in future. To date, there are no critiques of two-tiered sustainability equilibria model. (Thatcher, 2019)

Research Problem

The Resource dependency theory is used to analyse the various challenges faced by farmers in crop production. Usually, farmers face many challenges in every stage of crop production, this research paper identifies what are those challenges and how do the farmers face those challenges related to various resources required for crop production and sustainable farming.

Objectives

1. To assess the effect of climatic variables on crop production.
2. To examine the effect of controllable variables on crop production.
3. To study the results of farming acumen on crop production.
4. To analyse effect of technology adoptability of farmers on crop production.

Methodology:

This research practices survey method. In this exploration plan, the survey was utilized as an information assortment device for farmers as members in the feasible cultivating. The data was also collected from direct interactions with farmers regarding the challenges faced by them.

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To draw representative samples representing population, simple random sampling is carried out. Data collection techniques used were questionnaires and observation. After all research data has been collected, data analysis is performed with statistical tests on hypotheses. In this research paper cross tabulation methos is used for data analysis. Chi square test is used to analyze the data collected through random sampling technique. Chi square test is used for data analysis on the basis of random observations on a set of variables.

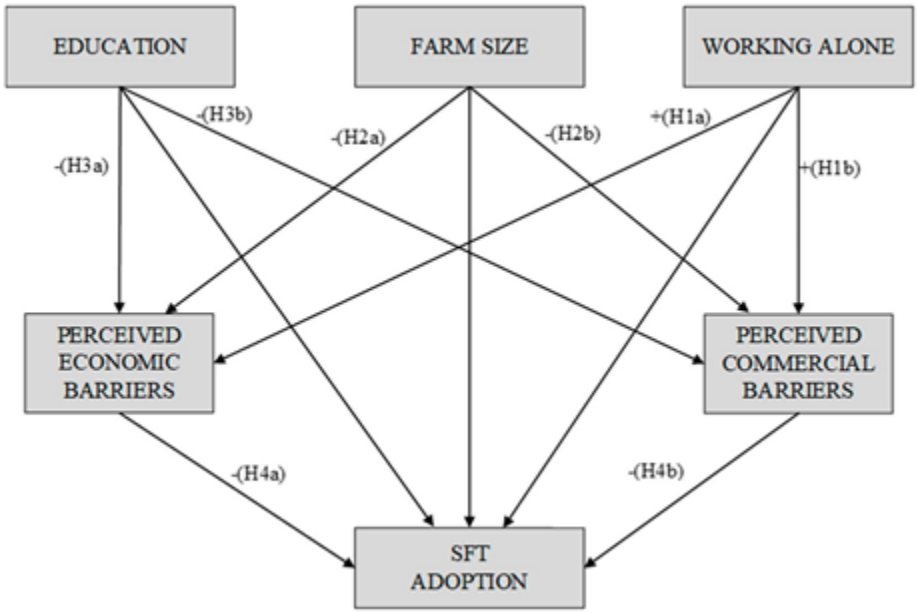
Challenges faced by farmers in identifying external resources and sustainable farming:

1.1: Climate:

The average annual rainfall received in the district is 834 mm with 50 rainy days in a bi-modal pattern from April to June and again September to November. This pattern helps the farmers to grow two crops in a year in both kharif and rabi season due to good distribution of rainfall. However, occurrence 20 of drought and dry spells are observed during the cropping season. The mean maximum temperature ranges from 29 to 320 C and mean minimum temperature ranges from 18 to 200 C. However, in the recent years the maximum temperatures have reached up to 380 C in summer months and reached below 120 C in winter months. The humidity ranges from 50 to 75% (GOVERNMENT OF KARNATAKA, Agriculture Department, 2016).

1.2: Controllable Variables:

Fig no.3:



(Cavallo, 23 May 2019)

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1.3: Farming Acumen:

The agriculture is a very good occupation fetching farmers a good income if the farmers use their acumen in a productive way. The knowledge and strategies used by farmers are very important to overcome the challenges faced by them in agricultural growth. Hence farmers have to be more smart in using new technologies and strategies in their cultivation to overcome the possible problems and risk of agriculture.

1.4: Technology Adoptability:

While we broke down the primary rationale of the program, we found that the program capability of accomplishing its expected goals might have been essentially limited by utilizing a couple of irregularities among the design and functional principles. Specifically, the program transformed into at first designated to handle the unnecessary neediness cost of the provincial populace in the Dominican Republic. Nonetheless, the qualification principles of the program rejected every one of the farmers who couldn't show crime ownership of land. This alleged aside from farmers put in around 40% of the US of America's territories and, most no doubt, the least fortunate portion of the Dominican provincial population (erónica González, 2009).

Data Analysis:

Descriptive analysis:

Table No:1

Demographic Variables	Mean	Std. Deviation	Skewness	Factors
Residence	1	0		
Gender	1.02	0.15	6.86	1:male 2: Female
Marriage	1.09	0.28	3.07	1: Married 2: Un married
Age	1.81	0.77	0.05	0: less than 20 1: 20-40 2: 40-60 3: more than 60
Occupation	1.26	0.49	1.73	1: yes 2: No

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Education	3.23	1.72	0.07	1 = Illiterate, 2 = Lower secondary, 3 = Upper secondary, 4 = PUC, 5 = Graduate, 6 = Post Graduate
Other Work	1.49	0.51	0.04	1: Yes 2: No
Alone doing farming	1.81	0.40	-1.62	1: Yes 2: No
Number of People	1.28	0.45	1.03	1 = 0-3, 2 = 4-6
Years of farming	1.89	1.37	0.20	0 = "0-5", 1 = "5-15", 2 = "15-30", 3 = "30-45", 4 = "45-60"
Source of income	1.43	0.90	1.81	1 = "Agricultutre", 2 = "Service", 3 = "Business", 4 = "others"

In the research paper the descriptive analysis is done by using the statistical tools like mean, standard deviation and skewness.

Some of the demographic factors are compared with controllable factors of agriculture to analyse its impact on farmers.

1. **Residence**: The demographic factor residence is analyzed to know how many farmers are following farming. From the study it found that farming is followed as occupation from the people who are resided in the same place from many years or following it because of ancestral occupation.
2. **Gender**: The mean value for gender is 1.02. From this it is found that most of the farmers doing farming are male. Very a smaller number of women are doing farming.
3. **Marriage**: The value of mean for marriage is 1.09. It shows that most of the people engage in farming are married. Agriculture has been adopted by farmers after marriage. From the survey it is found that most of farmers are from the age of 30 and above. Hence, they are all married.

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4. **Age**: The mean value for age is 1.81. Majority of the farmers are above 40 to 60 because young generation people does not like to do farming due to their higher education and interest towards other professions.
5. **Occupation**: The mean value for occupation is 1.26. From the study it is found that farmers follow agriculture as their occupation because of their ancestral occupation or passion towards it and also because they have land for farming which they do not want to let it waste.
6. **Education:** The variable education got 3.23 mean value. It shows that most of the people accepting agriculture as profession will have minimum upper secondary or PUC as their educational qualification,
7. **Other work:** The mean value for the demographic factor other work is 1.49. Majority of farmers doing farming are having agriculture as their occupation. They don't want to do any other work along with agriculture.
8. **Alone doing farming:** The mean value for alone doing farming is 1.81. It clearly shows that farmers are not doing farming alone. They take the help of their family members or labors for cultivation.
9. **Number of People:** This demographic variable has got the mean value of 1.28. In agriculture at least 3 members are involved by farmers for cultivation. It may the family members or other labors. A single farmer cannot manage whole process of agriculture alone. Hence, every farmer requires minimum number of people support for cultivation.
10. **Years of farming:** The mean value for this variable is 1.89**.** From the survey it is found that most of the farmers having minimum farming experience of 15 to 30 years which leads them to get good yield on their production.
11. **Source of income:** The demographic factor source of income has got the mean value of 1.43. It shows that majority of farmers having agriculture as their main source of income.

Table No: 2

	Gender	Marriage	Age	Education	Other work	Alone doing farming	Number of people	Years of farming	Source of income
Variable	Chi								
like	0.07	2.356	5.279	**11.705**	3.071	0.759	0.052	3.071	**7.994**

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Reason for liking	1.506	0.669	21.444	**36.791**	**11.164**	3.996	9.846	17.458	17.631
Reason for disliking	1.379	5.669	**40.36**	53.899	10.784	10.183	8.434	**40.598**	14.003
Land	0.022	8.899	1.98	8.589	0.979	0.242	0.391	4.981	0.242
Areas of land	2.98	0.095		24.681	4.071	5.456	2.02	13.611	2.103
Land used	0.15	**11.947**	12.875	12.606	1.399	1.629	0.777	11.854	1.629
Crop grown	6.982	1.016	25.854	44.759	**13.118**	5.454	5.876	31.511	12.373
ideal crop	6.982	8.471	18.783	21.393	4.765	6.473	8.194	17.69	8.029
Number of cultivation	**10.984**	2.238	2.473	13.658	1.223	2.727	3.454	5.055	3.336
Climate	0.693	1.966	1.886	6.492	2.61	**6.862**	**6.42**	14.032	0.91
Water availability	0.095	0.511	0.304	4.822	0.002	0.097	0.015	3.859	0.504
Temperature	0.391	0.407	4.718	4.383	0.789	0.179	1.353	3.448	1.682
Information	0.202	0.015	6.41	9.518	0.538	1.621	3.686	12.28	3.498
Accept technology	0.692	2.873	**22.375**	**21.272**	**9.373**	2.877	1.29	**22.169**	12.995
Satisfaction	0.24	0.465	1.863	7.526	0.09	0.465	1.524	5.247	0.67
ideal production	3.78	1.035	5.512	12.41	0.72	6.631	2.361	5.724	2.277
Actual production	2.18	5.435	4.814	11.712	0.757	**11.116**	2.867	10.37	8.415
Positive aspects	4.98	3.762	15.435	8.355	2.947	4.316	**8.392**	11.591	2.356
Negative aspects	3.78	2.049	14.606	13.982	6.149	10.069	2.48	11.944	1.383

Cross Tab analysis results:

From the above statistical analysis table, the demographic factors are compared with controllable and uncontrollable factors of agriculture.

1. **Gender**: The very important demographic factor gender has a significant impact on number of cultivations up to the chi square value of 10.984. Because most of the farmers do farming are male. Since the male farmers can do cultivation for most of the time on field rather than women. Because women not so much exposed to field compare to men due to different climatic conditions.
2. **Marriage**: The demographic variable marriage has chi square value impact of 11.947 on land used for agriculture. Usually after marriage the properties are divided among family members. When it is divided their land availability for farming becomes less. In this regard marriage effects the land usage for cultivation.
3. **Age**: Age is a very important variable having significant impact of chi square of 40.36 on reason for disliking farming. The present generation, i.e., young generation does not like to do farming because its uneven income, risk and uncertainty. Due to these reasons the age group from 20 to 30 will not like farming as their main profession. In this way age becomes a variable which is impacting agriculture. Age has an importance in deciding the crop grown(29.84), and ideal crop (18.783). Age is a factor for differentiating both positive aspects (15.834) and negative aspects (14.606)

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4. **Education**: Education as a demographic factor has significant impact of 11.705 on liking farming and 36.791 on reasons for liking. The people having education like graduation, higher secondary, primary and also illiterates follow agriculture as their occupation and they like to do it. That is how education becomes a demographic factor in deciding agriculture as an occupation. Education is a factor for the acceptance of technology (21.27) and crop grown (40.75)
5. **Other work:** There is 11.164 chi square effect on reason for liking farming. From the study it was found that the farmers doing other work along with agriculture like to continue agriculture. The reason is that farmers get good income from farming and that income is not taxable. Even if farmers are doing other work, they like to do farming along with it because agricultural income is exempted from tax.
6. **Alone doing farming:** There is a significant effect of alone doing farming on climate showing chi square value of 6.862 and 11.116 on actual production. Majority of farmers cannot do farming on their own or alone because the uncontrollable factor like climate is highly uncertain. And the agricultural production is highly dependent on the number of people involved in farming. If a greater number of people are involved, they can get actual production which is expected by farmers and vice versa.
7. **Number of people doing farming:** The number of people doing farming has a significant impact of chi square value of 6.42 on climate and 8.392 on positive aspects of agriculture. If in agriculture a greater number of people are involved, they can expect a good return and vice versa. The number of people involved also depends on the climatic conditions. If the climate is favorable the number of people involved will be less and the climate in unfavorable the number for people required for cultivation will be more. It also has significant impact on bringing positive aspects to the agriculture like water, irrigation availability, subsidy from government on seed and fertilizers availability.
8. **Years of farming:** Years of farming has a significant impact on accept technology of chi square value of 22.169. It depicts that farmer having more years of experience, they can expect good yield from agriculture because they know when to accept new technology and when not to accept. And also, they know which technology to be used for which type of production. This is how years of farming has direct impact on accept technology variable of farming.
9. **Source of income:** There is significant impact of source of income on liking farming up to a chi square value of 7.994. The reason is that the income from agriculture is good and they can expect growth in agriculture. The farmers who are illiterates and having less educational qualification opt for cultivation because it gives them income for living. Source of income is a factor for technology acceptance (12.99)

Factors for sustainable farming:

Sustainability of farming depends on three factors: Area availability, Irrigation and climatic changes.

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Table No: 3

Sl. No/ Ranking	Parameter	Mean	Standard Deviation
1	Conversion of agri land to real estate properties is a big challenge	4.38	0.49
2	Irrigation and water availability: During drought drying of ponds, falling of ground water level affects water availability	4.26	0.69
3	Irregular rainfall and reduction in water availability	4	4.19
4	Reduction in natural manures like cow dung, leafs etc., due to the fall in cattle growing and increased deforestation	3.8	0.81
5	Labor shortage due to increased urbanization and alternate high and continues income job.	3.5	0.9
6	Lack of fund availability due to information asymmetry from scheduled/National banks.	3.4	1.0
7	Undefined and inconsistent market demand and inadequate facilities for storing excess production	3.3	1.1
8	Inadequate information for availing government facilities/ support either due to inadequate Knowledge or inability to access them.	3.2	1.1
9	Inadequate transport facility and increased fuel prices	3.1	0.3
10	Insufficient training program from government and NGO on changes in market demand, managing climate changes, sources for fund at low cost etc.	3.0	0.4

Conclusion:

The study describes that the demographic variables has really a greater impact on different factors like climatic variables, controllable and technological factors, farming acumen. Diverse demographic variables have diverged impact on controllable and uncontrollable factors of agriculture. Age, years of farming and education variables has more significant impact on different controllable factors and other

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demographic factors has considerably less impact these factors. As per the table number 3, It is observed that there are many constraints for sustainable farming, especially due to high level of conversion of farm lands to real estate business. Though there are so many regulations for converting farm lands to other purposes the conversion is still high. Hence it is the need of the hour to train the farmers to use the area maximum in every year either through multiple cultivation or advanced technologies to use multi-layer space utilization which can increase area of farming. Though the dip irrigation and other high efficient water management techniques are used the experiments and attempts to enhance the available number of water resources other than traditional ponds or rivers is improving. Rain water harvesting is not that popular in farm fields as compared to the implementation level in real estate area. In local, state and central governments have to take initiative to enhance storage capacities and food processing units. So that spoilage of food, fruits, vegetables etc, can be reduced, these processes can be initiated at lower level through self-help groups etc. Sustainability of farming is one of the crucial factors in any economy for its growth, through eradicating poverty and promoting a health life for all income people.

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