

Title of the Paper:

**Sustainable Development in Agribusiness in Indian Market:
Use of Communicative Tool/ Informational Communication
Technologies (ICT) and digital tools among different
category of Indian farmers.**

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Author Declaration:

It is being dispatched for exclusive consideration by the journal and has not been sent elsewhere
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Abstract

Purpose:

The objective of the research is to measure the usage of Information Communication Technologies (ICT) and digital instruments in different category of Indian Farmers, to facilitate agribusiness and making it sustainable. The research article also laid emphasis on on the various digital tools and facility available for Indian farmers.

Approach and Methodology:

The extensive literature review was done before the study to find out what all digital tools and instruments are available for agriculturist in India provided by the regime of the nation or the individual identity. An effort has been made by the researcher to analyse the usage of digital instruments and apps applied by agriculturist in India and also to understand the influence of the same on them. For the same the researcher used questionnaire format. To gather the evidences the scholar selected 509 respondents from Rajasthan territory. The nucleus of the study was whether the different category of farmers is using the digital instruments and apps or not. The scholar used SPSS & ANNOVA or analysis.

Findings:

As per the evidences of the physical survey, interaction with farmers and outcome of statistical tools, it was found that there is no significant difference in penetration of usage of digital equipment's and technologies among distinct category of farmers and it has to be uplifted in all level of farmers for the sustainable development in the Agribusinesses.

Value and Originality:

Digital instruments and applications are the utmost cost saving and time saving gear and provides a different approach for sustainable development. The present study provides a picture of accessible digital instruments and their usage within different category of agrarians. The research paper primarily laid emphasis on the facets which can encourage farmers for the use of digital technologies and helps them in viable agribusiness. The results of the paper will also supports the regime of the nation to find out fissures in the digital program as well as may help in drafting the IT guidelines for sustainable agribusiness.

Limitations of the research: It is a non-funded study done by the researcher. Owing to time limitations, the data is being composed from Rajasthan region. Where agriculture and allied services are the major chunk of the economy of the state..

Keywords: Sustainable Agribusiness, Information Communication Technologies, Digital Technologies, Digital Tools, Digitalization, Category of Farmers, etc.

Paper Type: Research Paper

1. Introduction

Farming plays a cardinal role in the wealth of Indian economy. A study by government says in Indian 58 per cent of rural population rest on agriculture as it is the principal source of earning. In line to Central Statistics Office (CSO) second advanced evaluation predicted that the agriculture and its allied division contributes 17.3 % of GDP.

Because of the accelerating growth rates and advancement in the manufacturing and other service zones the growth rate of cultivation in India has been declined to less than 15%.

The India's economic and social stratum is largely depend on agriculture sector and can be proven through the succeeding parameters:

1. Just about three quarter of Indian lineage depends on rural wages.
2. Likewise approximately 770 million individuals /70% cogent part of India's deprived hang on countryside range.
3. Currently, food security of India bank on cereal yield as well as the regular harvest of fruits, milk and vegetables to encounter the burdens of swelling populace (Biswas & Shailini R. 2012)

In present scenario it is a need of the hour to equip the agriculture fields and farmers with latest technologies at ground level. Consequently, farming experts should develop a need based strategic methodology and offer technical facts to each cultivator by practical teaching and drill by facilitating suitable provisions in IT setup and establishments for cultivation and selling of Agro yields.

To compete with the food security, developing country like India needs to focus viable growth of agribusiness in terms of technical, ecologically, economically, and on a social basis. The above said will eradicate the bleeding of growers, mainly marginal & small category and auxiliary enhance their earnings and improve the affordability of cultivation yields at international marketplace.

The article narrates numerous digital instruments & devices applied in agribusiness by different category of farmers through exploratory review. The intent of writing the paper is to find out the penetration of use of digital tools and communicative tools by marginal, small, medium and large agrarians. The research also highlights the existing development in digital devices and the concerns hindering the usage of digital tools amongst distinct category of agrarians.

To address the penetration of application of ICT/ Communication tools and digital tools by different category of farmers, the scholar designed the study in the succeeding method:

1. It focuses on the category of farmers,
2. Types of tools available for farmers,
3. The assessment done by this study is to understand the penetration of usage of digital devices by different level of farmers.
4. The researcher did statistical analysis using statistical tools.

Information Communication Technology has major part in economy of emerging nations. According to the specialists and statician's of a number of nations, the digital strategy is augmenting the GDP of the evolving nations swiftly. Such as, the Digital India plan may speed up the GDP of India by equipping to \$ 1,000,000,000,000 by the year 2025. A study predicts 10 per cent augmentation in application of cellphone and broadband dispersion escalates per capita GDP by 0.81 per cent and 1.31 per cent respectively in emerging nations. (World Bank Report 2020)

Digitalization has five founding columns which may spawn progress of emerging nations.

1. Consciousness: Commencement of Digitalization, statistics and figures approachability has improved many folds.

2. Connectivity: It has wandered the fissure across the sphere and has connected persons in accord from poles apart of the world. The city and the countryside presence have been collapsed; per capita is now at on a par with consistency as of this sole mediocre.
3. Compliant: It has eased over and done with web technologies which hold stress free monitoring and pursuing all operations and actions and translate into grievance.
4. Collaborative: It has consolidated utilities as well as tasks. It has eased individual's life resembling individuals. It has accomplished the objective of workable growth.
5. Contended: All this secures in a embellish involvement of everybody as there is fairness, improved services, area and accord, and linkage among the civic which support them nurture as individual for a healthier supportable forthcoming.

2. Review of Literature

The researcher, where the comprehensive conducted the elaborative review for evaluation of the terms used like - Digitalisation, Information Communication Technologies (ICT), Small Farmers, Medium Famers, Marginal Farmers, Large Farmers, Digitalization in Agriculture and Agribusiness, One fold Communication Tools, Two fold Communication Tools, Conclusion building Tools.

Few of the definitions of the words used in the study.

Digitalization: Digitization is portrait of an photograph, record, audio, thing, or sign wave creating a sequence of numbers that describes a numerous unique plugs. (Bloomberg J., 2018)

It is the unification of digital mechanization hooked on all zones of enterprises, for understanding the client's requisite and placing the valuable needs of client.

Information Communication Technologies (ICT): It comprises of communiqué devices and their implementations such as television, laptop, radio, networking, cell phones, software and hardware, satellite systems and various utility, like as vodcast, webinar and webisode.

Digitalization in Agriculture: Digitalization in farming is cohesive procedure that initiate from information gathering, cultivation inputs which embrace instruments such as portable data collection, barcodes, RFID pursuing system and instruments needed at ground for gathering such as gauges and weigh channels. Such instruments arrange data & statistics, they reveals a piece of transaction at every level of farming. For instance, any material passing through the value chain comprises of pursuing of material, pursuing of expenditures, pursuing of handling of material in plants, sharing precise data memo to agriculturalists, humanizing information board. (Foster, 2017).

Digital Agriculture: Digital Agriculture is a blend of digital devices along with records habitat' to auxiliarate the progression and prompt supply, precise and requisite particular facility to form cultivation favourable and realistic for agrarians. (Giovannucci – Wheeler et al., 2012)

It is precise data usability to make conclusions within critical path of agriculture. It may utelize numerous data roots to have concrete information. In line to Mark's team, the significant element

of digitalisation is associating the purchaser and food grower. It is connection in agrarian, end user, and additional critical path method patrons. Digital platform suggest the end user the required facts & figures about the agri making, and also helps the agriculturalist in cultivation choices built on the customer prerequisite. (Giovannucci – Wheeler et al., 2012).

Sustainable development: Progression that musters the urge of the current and the capability of succeeding propagations to encounter there peculiar essentials.

As per the Rajasthan Agriculture Statistics report (DOA, OR) agrarians categorised into majorly four classes, i.e, Marginal Farmers, Small Farmers, Medium Farmers and Large Farmers.

Marginal Farmers: In context to Indian agriculture the agrarians who have landholding less than one hectare are Marginal Farmers.

Small Farmers: In context to Indian agriculture the agrarians who have landholding between one to two hectares are known as Small Farmers.

Medium Farmers: In context to Indian agriculture the agrarians who have landholding of over two hectares and less than ten hectares are called as Medium Farmer

Large Farmers: In context to Indian agriculture the agrarians who have landholding of over ten hectares are referred as Large Farmers.

In India, the digital technologies accessible for agriculturalists are a number of web sites for example agriculture.rajasthan.gov.in, farmer.gov.in, mkissan.gov.in run by State and Central Government. Smart Phone Apps for instance Facebook pages, WhatsApp group, YouTube channels and blogs related to farming and sustainable agribusiness, apps related to farming for example Crop Insurance Mobile App, eNAM - National Agriculture Market (NAM), Farmer Portal, Kisan Suvidha, Pusha Krishi, Fertilizer Monitoring System, AgMart- Mandi Rates, Bajarbhav etc.

‘Kisan Call Centre’ utility (1551) It is two-fold platform, where agrarians may call on the number and speak to the officer and my acquire resolutions of their issues. Other than these state government telecast TV Programmes on farming related subjects for instance “Kheti Badi”, “DD Kisan Krishi Darshan” etc. Government also releases Radio Program for agrarians such as “Kheti Ri Bata”. There are E-news papers released by Regime and Personal sector such as “Krishi Goldline”, “Haladhar times”, “Kheti Ri batan”, “Krishak Jagat” and E-magazines such as “Kheti”, “Fal-phool”, “Krishi jagran” etc.

The digital Tools and Technologies are ghettoized under three domes

1. One fold Communication,
2. Two fold Communication
3. Conclusion building Communication Tools and technologies.

Under systematic review of literature the researcher identified the government initiatives such as Info Kiosks, Kisan SMS Portal, Call Centers, Community Information Center, Gyandoot, Krishi Darshan, LokvaniFRIENDS, e-Mitra, Village Resource Centers, Krishi Vani, Krishi Gyan Sagar, *Kisan Vikas Kendras*, *Mera Gaon Mera Gaurav* M-Kisan Portal, *Kisan Suvidha Pusa-*

Krishi, Bhuvan Hailstorm App, Crop Insurance App, Agri-Market, *Pashu Poshan*, , eKrishi, e-agri kiosk, Digital Mandi etc

3. Objectives & Methodology

The objective is to study is to understand the usage of digital devices and communication devices within distinct category of agrarians. The questionnaire was sketched to gather the figures in line with subject experts and government department and education experts. The principal aim of the research is to gauge the use of applications of One fold, Two fold and Conclusion building technologies among the different category of the farmers i.e. marginal farmer, small farmer, medium farmer and large farmers. For the same objective questionnaire was framed by the researcher. Researchers designed the questionnaire in line with the officials from Department of Agriculture and university academicians. Also researcher incorporated the suggestions from different Agriculture Extension Officials in the questionnaire. Thereafter, the researcher did the probe on fifty six respondents.

The researcher conducted the survey on distinct agrarians of Rajasthan region i.e. Marginal Farmers, Small Farmers, Medium Farmers and Large Farmers.

After having pilot study, the questionnaire was modified with minor corrections as suggestion received by Agriculture Experts, Professors of the Agriculture Universities.

The experimenter recognized farmers from district Jaipur of Rajasthan state of India which is prominently agriculture state, whose four- fifth of the entire residents resides in the rural area, and largely dependent on farming and its allied as the base of living.

Firstly the researcher recognized the numerous digital tools in outlook to the farming of emerging nations and accompanied study about usage of digital devices and communication devices by distinct category of agrarians. Then the survey in 13 Tehsils of Jaipur region was performed. 509 respondents were identified. 39 agriculturists were identified from every tehsil of the district. The random sampling technique was used for sample selection. The study conducted was one to one interview with farmer of various Tehsils. The 13 Tehsils falls under Jaipur district are as mentioned:

1. Amber
2. Bassi
3. Chaksu
4. Dudu
5. Govindgarh
6. Jamwa Ramgarh
7. Jotwara- Jaipur
8. Kotputali
9. Phagi
10. Sambhar
11. Saganer
12. Shahpura
13. Viratnagar

For the study Rajasthan zone was identified by the researcher as the farming sector adds twenty seven percent of the Gross State Domestic Product (GSDP) in the state economy which means one fourth share of the Gross State Domestic Product is from farming industry which is the major chunk for the state health.

The digital instruments & apps are scattered under 3 chief umbrellas i.e. One fold Communication devices, Two fold Communication devices and Conclusion Building Digital devices. The researcher identified digital and communication devices and technology for the study as follows.

- I. One fold Communication devices:
 1. Webpages
 2. Online newspaper particularly for farming
 3. E- Magazines particularly for farming
 4. TV programs particularly for farming
 5. Radio programs particularly for farming
 6. Short Message Services particularly for farming
- II. Two fold Communication devices:
 1. Application on Smart Cellphones
 2. Broadcasting
 3. Civic Hubs
 4. Blogs on farming
 5. Video Conferencing
 6. Audio Message/ Audio Conferencing
 7. Farmer tech support (1551)
 8. Chatgroup to support farming for example whatsapp group
 9. Facebook Folios or clusters to strengthen farming
 10. E-Mitra
- III. Conclusion building Digital devices:
 1. Global Positioning System (GPS) for agrarians
 2. Air & Soil Sensor equipment's used by agrarians
 3. Agriculture Automatons
 4. Use of Optical Feelers by farmers
 5. Use of Drone Feelers by farmers
 6. Use of Geographic Information System (GIS)
 7. Radio Frequency Identification Device (RFID)

4. Descriptive Analysis

Once the literature review done and gathering all the tools and technologies the researcher did the survey on usage of Digital Tools and technologies at said locations.

The hypotheses framed for the study are:

H_{01} : There is no significant difference in penetration of implementation of Information Communication devices & its applications among different levels of farmers in agriculture sector.

H_{a1} : There is significant difference in penetration of implementation of Information Communication devices & its applications among different levels of farmers in agriculture sector.

The Table No. 1, describes the descriptive study of four category of farmers i.e. Marginal, Small, Medium and Large farmers and three kind of digital tools i.e. one fold communication, two fold communication and conclusion building digital devices available. The mean, Standard deviation and standard Error has been derived on the basis of the results of the respondent.

Table No. 1: **Descriptive**

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
One fold Implementat ion	Marginal Farmer	120	.4750	.12452	.01137	.4525	.4975
	Small Farmer	147	.4721	.14419	.01189	.4486	.4956
	Medium Farmer	122	.4836	.10234	.00927	.4653	.5019
	Large Farmer	120	.4700	.11782	.01076	.4487	.4913
	Total	509	.4750	.12402	.00550	.4642	.4858
Two fold Implementat ion	Marginal Farmer	120	.2500	.74825	.06831	.1147	.3853
	Small Farmer	147	.5000	1.0004 3	.08251	.3369	.6631
	Medium Farmer	122	.5055	.94908	.08593	.3354	.6756
	Large Farmer	120	.5500	1.0313 4	.09415	.3636	.7364
	Total	509	.4542	.94645	.04195	.3717	.5366
Conclusion building Implementat ion	Marginal Farmer	120	.0417	.20066	.01832	.0054	.0779
	Small Farmer	147	.0272	.16325	.01346	.0006	.0538
	Medium Farmer	122	.1148	1.0057 4	.09106	-.0655	.2950

Large Farmer	120	.0250	.15678	.01431	-.0033	.0533
Total	509	.0511	.51488	.02282	.0062	.0959

Table No. 2: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
One fold Implementation	Between Groups	.013	3	.004	.286	.835
	Within Groups	7.800	505	.015		
	Total	7.813	508			
Two fold Implementation	Between Groups	6.734	3	2.245	2.529	.057
	Within Groups	448.315	505	.888		
	Total	455.050	508			
Conclusion building Implementation	Between Groups	.671	3	.224	.842	.471
	Within Groups	134.001	505	.265		
	Total	134.672	508			

The significant values in Table No. 2 is greater than .05 in One fold Implementation, Two fold Implementation and Conclusion building Implementation, hence Null hypothesis is accepted. There is no significant difference in penetration of implementation of Information Communication Technologies & its applications among different category of farmers in farming.

5. Discussion

On the basis of the study and conclusion of the study the evident causes of dilemma in usage of the digital instruments and applications among agrarians are:

1. The Regime and private entities along with media dedicated towards farming progress and countryside civic missed how to hit the practicality and usage of digital tools and technologies and their benefits to the community adequately.

2. The communication system used for dissemination of knowledge is non-malleable among the corpus of agrarian's civilisations.
3. Advertisement is considered to be the most accomplished method of reaching the mass across the shpere for boosting of all kinds of crops / facilities/ platforms. But it is not being used properly to guide farmers how to use digital technology for sustainable agribusiness.
4. The fallouts display that absence of ally and coverage among agrarians and their humanity about altered program associated with farming enrichment and also awareness and confrère around digital farming applications. Seth (2017).

In line to Maharashtra Remote Sensing Application Centre the key restraints in operative propagation of electronic uprising are:

1. Disorganised expansion: The regime started several edges to deliver IT-centred solution to the countryside civic. Nevertheless, numerous overlapping attempts have been on-going by Government of India to offer the facility. It is a massive piece of work, and for fortunate conclusion, it entails harmonization apparatus to achieve a full proof facility for the farmers and sustainable agribusiness.
2. Interface: The triumph of every IT devices hinge on its interface among the user. Here in India the agrarians are not that much upskilled regarding digital platform, it is essential to have the more picture illustration interface of the browser, so that progressively agrarians can link and use different IT interface.
3. Language: India, is full of culture and diversity where several languages is used for speaking. Therefore the font apparatus needed to be improved so that farmers can be comfortable while reading and understanding the matter.
4. Electrical Energy: In greater part of the countryside of the nation, the electricity is not accessible for long time. This is the biggest drawbacks of working on IT applications and utility. Hence, either regime makes sure of power supply in countryside or encourages renewable energy for the growth of sustainable agribusiness.
5. Connectivity: In spite of numerous drives by the regime, the countryside agriculturist is in need of web connection. The precondition for ICT tools is connectivity.
6. Bandwidth: In various zones dial up phone lines and other facilities are accessible, but then again the prevailing transmission capacity is a restriction. Since the Interface needs more image based graphics for easy understanding by farmer it requires more transmission capacity line.
7. Propagation centres: Corpus placing of Info Cubicles is needed for actual usage of web cited data & utility. In the current set-up, the Cubicles is the solitary information cradle; whereas, the cubicles should have other utilities and facilities for the agrarians.

The solution for the problem may be solved through focusing on the practical education of children of farmers for various apps and other digital tools. As they are the future of farming

specially the age group between fifteen to thirty bandwidth as they are eager to know about digital tools and technologies and they will grasp faster than the farmers above fifty years of age. And it is necessary for agriculture sector that the future farmers take more interest in farming and make new heights in agribusiness. This is only possible if the dissemination of digital knowledge kicks off at right place and person.

For sustainable development of agriculture it is the peak time when the young farmers and future generation seeks their future safe and secure in farming industry.

6. Future Research

The research paper may assist government department experts in finding fissures in usage of Information Communication Technologies by different category of farmers and help them in drafting IT procedures for the farming and its allied areas.

The study identifies that the ICT Model should have minimum two fold communication mechanism. In the course of action the researcher found that the farmers are more comfortable in using two fold technologies.

Use of application available either free of cost or at nominal charges by farmers will improve the agribusiness scenario in India and wellness of the community, which will lead to sustainable future of rural civic.

References-

1. Altalb, A. A. T., Filipek, T., & Skowron, P. (2015). The role of agricultural extension in the transfer and adoption of agricultural technologies. *Asian Journal of Agriculture and Food Sciences*, 3(5).
2. Ashok Dalwai (2018) Science for Doubling Farmers' Income (Feb 2018) Report of the Committee on Doubling Farmers' Income *Volume XII* Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture & Farmers' Welfare.
3. Baumüller, H. (2012). Facilitating agricultural technology adoption among the poor: The role of service delivery through mobile phones.
4. Biswas, S. R. D. M. WILL DIGITAL TECHNOLOGY TRANSFORM INDIAN AGRICULTURE?.
5. Bloomberg J. ,(2018) Digitization, Digitalization, And Digital Transformation: Confuse Them At Your Peril, Retrieved from <https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/#546834a62f2c>
6. Braun J., Denich M., Gerke S., Hornidge A., and Schetter C.,(May 2012), Facilitating agricultural technology adoption among the poor: The role of service delivery through mobile phones, econstor , pp. 1-58
7. Brundtland, V. C. (1987). Our Common Future, Chapter 2: Towards Sustainable Development. *UN Documents: http://www.un-documents.net/wced-ocf.htm,(geraadpleegd op 23-11-2011).*

8. Dar, W. D. (2007). What ICRISAT Thinks...: There is Hope and Prosperity in the Drylands.
9. De Schutter, O. (2014). UN Special Rapporteur on the right to food. *Report on agroecology and the right to food*.
10. De Schutter, O. (2010). Agro-ecology and the right to food. UN General Assembly. *Human Rights Council. Report submitted by the Special Rapporteur on the Right to Food, December, 20*.
11. Dua, S. (2017). Digital India: opportunities and challenges. *International journal of science technology and management*, 6(3), 61-67.
12. Foster, C. (2017). Digitalisation and trade: what hope for lower income countries?. *Background paper for the UNCTAD Information Economy Report*.
13. Giovannucci, D., Scherr, S. J., Nierenberg, D., Hebebrand, C., Shapiro, J., Milder, J., & Wheeler, K. (2012). Food and Agriculture: the future of sustainability. *The sustainable development in the 21st century (SD21) Report for Rio, 20*.
14. Jairath, M. S., & Yadav, H. (2012). Role of ICT in decision making in agricultural marketing—a case of Arid India. *Indian Journal of Agricultural Economics*, 67(902-2016-67841).
15. Jurich, S. (2000). The information revolution and the digital divide: a review of literature. *TeckKnowLogia*, 2, 42-44.
16. Kaka, N., Madgavkar, A., & Manyika, J. (2014). *India's technology opportunity: Transforming work, empowering people*. McKinsey Global Institute.
17. Mittal, S., Gandhi, S., & Tripathi, G. (2010). *Socio-economic impact of mobile phones on Indian agriculture* (No. 246). Working paper.
18. Rajasthan Agriculture Road Map Meeting of NITI Ayog (2016, Feb5) Road Map Meeting of NITI Ayog, Ahmedabad
19. Rao, N. H. (2007). A framework for implementing information and communication technologies in agricultural development in India. *Technological Forecasting and Social Change*, 74(4), 491-518.
20. Reytar, K., Hanson, C., & Henninger, N. O. R. B. E. R. T. (2014). Indicators of sustainable agriculture: a scoping analysis. *World Resources Institute: Washington, DC, USA*.
21. Sara S. D., Niernberg D., Charlottle S.J., Milder J., Wheeler K. , (2012, March) Food & Agriculture for future sustainability, UN Department of economics and social affairs, P.1-12

22. Seager C. (2014). Top Six Innovations Smallholder Farmer Technology, Retrieved from <https://www.theguardian.com/global-development-professionals-network/2014/jul/08/top-six-innovations-smallholder-farmers-technology> Charlotte Seager
23. Sengupta, P., & Puri, R. (2020). Exploration of relationship between FDI and GDP: A comparison between India and its neighbouring countries. *Global Business Review*, 21(2), 473-489.
24. Seth, A. N. K. U. R., & Ganguly, K. A. V. E. R. Y. (2017). Digital technologies transforming Indian agriculture. *The Global Innovation Index*, 105-111.
25. Seth A., (2017,Dec), Digital Technologies Transforming Indian Agriculture
26. Shalini, R., & Biswas, M. (2017). Will Digital Technology Transform Indian Agriculture?. *Adarsh Journal of Management Research*, 151-157.
27. Sharma, G. (2014). Kisaan Sms Portal: ICT tool for agricultural extension.
28. Sharma, P. (2011). Impact of information technology on the development of rural economy of India. *International Journal of Information Technology and Knowledge Management*, 4(1), 187-190.
29. Shepherd, M., Turner, J. A., Small, B., & Wheeler, D. (2020). Priorities for science to overcome hurdles thwarting the full promise of the ‘digital agriculture’ revolution. *Journal of the Science of Food and Agriculture*, 100(14), 5083-5092.
30. Singh, R., Priya, A., Singh, P., & Singh, M. (2011). Role of ICT in rural empowerment. *Research Journal of Social Science and Management*, 1, 52-65.
31. Statistics Times (2017, March 21) Sector-wise contribution of GDP of India from <http://statisticstimes.com> (Sources: [Ministry of Statistics and Programme Implementation](#), [Planning Commission, Government of India](#))United Nation,(2015, Oct 21)Transforming Our World: The 2030 Agenda For Sustainable Development, A/RES/70/1,p.1-41
32. What is digital transformation?, (2016), <https://enterprisersproject.com/what-is-digital-transformation>