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Examining Factors Influencing the Smart Farming through AFVC and SFT: Indian Perspectives and Contexts

Gitansh Sardana[1] and Dr. K. Rangarajan[2]

[1]Research Scholar, Indian Institute of Foreign Trade, India

[2]Professor, Head - Kolkata Campus, Indian Institute of Foreign Trade, India

Abstract

Agriculture is the backbone of Indian economy. It is the lifeline of rural India. The majority of the sectors such as education, automobile, real estate, insurance, banking, information technology, food processing etc. is dependent on the agricultural growth in India in a particular year. It has also major contribution in providing employment for more than 60% of total population in India. The country has rich heritage and tradition of farming right from Sindhu civilization till date. The Indian agriculture witnessed revolutionary changes in due course of time. However, it couldn't make satisfactory progress even after 70 years of independence in India. One hand, technology transformed the businesses, societies, institutions and enterprises. On the other hand, agriculture has been struggling for existence instead of growth in India. The increasing number of farmer's suicides and strikes support the view in this regard. There are various socio-economic, psychological, geographical factors influencing the agriculture in India. The various scientists, tech-experts, research institutions have been proactively working towards improvement, simplification, automation of farming challenges. The term 'Smart farming' has gained the momentum. The present article aims to examine the major factors influencing while adopting smart farming. It considers the challenges and opportunities while converting Indian farming from 'traditional farming' to 'smart farming' within Indian context. Globalization, information and communication technology (ICT), government support, farmer education, farm management, farmers' awareness/ training program, market updates, networking are some of the factors taken into consideration. The study is significant as it deals with the sustainable agriculture in India. It is an attempt to explore the areas in order to regain the lost glory of Indian farming and ensure food safety across the globe.

Keywords: *Smart Farming, Indian Farming, Sustainable Agriculture, Agri-Tech, Agriculture Value Chain System (AFVS), Smart Farming Technologies (SFT)*

1. INTRODUCTION

Agriculture has historically been one of the most crucial sectors for supporting human existence because it provides essential resources including food, medicine, energy, and fibre. As a result, the majority of nations (including industrialized ones) have continued to emphasize how important the agricultural sector and related technologies are to agricultural productivity even after the industrial revolution. For instance, the use of heavy machinery and agricultural planes was able to significantly boost agricultural productivity while reducing the need for human labor.

The agriculture sector has been accelerating its development by heavily utilizing information and communication technologies, similar to how advancements in other industries have done (ICT). In particular, automated farm systems with a variety of wireless actuators and sensor devices can monitor the environment and manage the deployed devices in accordance with the data gathered using wired and wireless access networks. Farmers can monitor and manage a remotely controlled farm using cell phones or tablets without physically being there, as indicated by Lin and Liu. A comparative work was likewise presented by Akshay et al. A pig ranch observing framework that Lee and Yeo formulated may productively deal with the homestead by checking ecological information utilizing temperature/mugginess sensors and camcorders, and controlling ranch utilities like humidifiers and forced air systems in understanding. A remote sensor network-based robotization framework for checking the farming climate was presented by Kaewmard et al. To assemble ecological information and permit cell phone controller, they additionally made a water system framework (IFAD, 2018).

Ranch the executive's data frameworks, accuracy agribusiness frameworks, and horticultural computerization and advanced mechanics are the three essential subcategories of shrewd cultivating innovations. Programming frameworks for social event, handling, putting away, and conveying information in the configuration important to complete a homestead's tasks and works are what FMISs basically address. Since there has been a great deal of examination done

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in this handle throughout recent years, there are presently a ton of business products accessible that, by and large, have extensive monetary, natural, and social advantages.

1.1. SMART AGRICULTURE'S TRANSFORMATION FROM TRADITIONAL AGRICULTURE

Food grains and other basic commodities come mostly from farms, making agriculture an important part of the global economy and a rock-solid basis for human life. The agriculture sector of a country's economy can contribute significantly to economic growth. It's important for the country's economy and a key source of revenue. Farmers have historically been unable to detect most illnesses due to ignorance and a lack of access to local professionals. The most fundamental criteria for agricultural development are the integration of internet technologies and future-oriented technologies for usage as smart items. Data-driven agriculture management could be used to fix the production problems. Managed data is required for data analysis that may then be used to enhance production. This plan assumes that agricultural robots will play a crucial role in the industry's future growth (M. V. Schönfeld, 2018). Modern technological improvements have been very helpful in fostering the growth of the agricultural sector. The application of innovative tools like image processing, GIS, and unmanned aerial vehicles (UAVs), as well as forward-thinking farming practises like precision agriculture and land management, will boost agronomic productivity. In digital agriculture, farmers have access to up-to-date market and crop information via remote means of communication. The term "GeoFarmer" refers to a type of project tracking and evaluation software used in agricultural advancement. They will be better able to manage their farms and harvests if they are able to share their expertise with specialists and each other, both the good and the bad. As shown in Fig. 1, with some tweaks to the current setup, conventional farming methods can be upgraded to "smart agriculture."

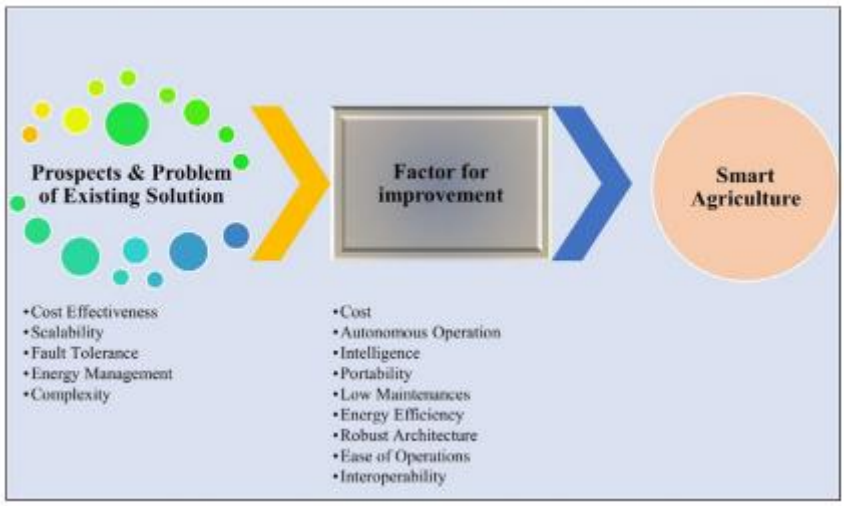

Fig. 1 Agriculture's shift from conventional to smart agriculture

1.2. CHALLENGES IN SMART FARMING

The greatest obstacle to the adoption of new technologies in agriculture is the extremely tiny land holdings, which limit long-term productivity increases. Despite the fact that 48% of our seeded area is on dry soils, all of our technology, like high yielding seeds, are designed for irrigated lands.

According to the 2016 Agricultural Census, just 45% of the entire area is cultivated, and 80% of all land ownership is less than 2 hectares. Farmers in close to 90% of cases are marginal and small. Currently, a farm only occupies 1.15 hectares on average (Biradar, 2018). On farms larger than 4 hectares, only 5% of farmers are engaged. The earliest winners have been farmers who have been able to pool their holdings and expand their farms to at least 100–200 acres. Comparatively, just 5% of farmers work on lots that are bigger than 4 hectares.

Large agribusinesses rather than individual farmers are frequently the ones utilizing smart technologies. Farm-loan firms employ some of these strategies for risk management; the sector must address growing water limitations, restricted land availability, and expensive fertility of lands. Additionally, the obstacles cannot be overcome with the current tactics. Small embedded device environments require security challenges that are both affordable and simple to achieve.

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1.3. OBJECTIVES

1. To investigate the variables that affects the adoption of smart farming**.**
2. To research AFVS and smart farming technology used by smart farmers.

1.4. HYPOTHESIS OF THE STUDY

H1: There is a positive relationship between the levels of Smart farmers by using AVFC.

H2: There is a positive relationship between the globalization and the adoption of smart farming.

H3: There is a positive relationship between awareness and farmer education.

2. LITERATURE REVIEW

The later circumstance of falling water tables, waning streams and capacity tanks, and eccentric weather conditions shows the pressing requirement for suitable water the executives. Utilization of temperature and dampness sensors at proper areas for crop observing is an answer for this issue. In shrewd cultivating, a microcontroller-based entryway that controls water amount can be set with temperature and soil dampness limit values. The framework can incorporate a bidirectional correspondence connect in view of a cell Web interface that empowers information examination and water system booking to be modified through a site page. It is fueled by photovoltaic boards (T. N. Gia, 2019).

Precision agriculture can now monitor and manage greenhouse parameters because to advancements in wireless sensor networks technology. Researchers discovered that agriculture's productivity is deteriorating daily. However, the use of technology in agriculture plays a significant role in both raising production and lowering the need for more manpower. Some research initiatives are made to benefit farmers by giving them access to technologies that help increase agricultural yields (M. Gupta, 2019). Many efforts have been made in the field of agriculture using wireless sensor networks, which is considered a mature technology.

Chi et al. investigate the hardships of utilizing Remote Sensor Organizations in computerized virtual homesteads and propose a structure for network safety strategies in accuracy horticulture. They likewise offer a construction for safe information assortment. The agri-food industry's security issues have been extensively studied. An overview of cutting-edge farming technologies is given in the report. When it comes to automating agricultural processes, making decisions, and making forecasts, the majority of smart farms are data-driven. It also raises crucial considerations about how crucial data security is. How is risk assessment carried out with the supply chain as a whole in mind? Who should be accountable, and who should participate? The purpose of the paper is to increase public understanding of the value of cyber security in the agri-food industry.

The creators give an expansive survey of network protection in the food and rural areas. They likewise discuss plans, strategies, and cyberterrorism. The requirement for teaching ranchers about different digital protection concerns is portrayed exhaustively by Spaulding and Wolf. Through recreations utilizing the NETA with OMNET++ structure, the creators of exhibit the effect of digital assaults on the framework of brilliant cultivating. A system was developed by Huning et al. to allow crowd sourcing methods that protect privacy to estimate various smart farming parameters. Farmers and owners of agribusinesses are also adjusting their views on cyber security.

An evaluation of the agricultural sector's cyber security procedures was carried out by Geil et al. Their exploration has uncovered that the greater part of the respondents have encountered a PC security occasion, demonstrating that even individuals who work in horticulture can be impacted by these sorts of mishaps. Network safety, biosecurity, and digital actual security make up the multidisciplinary field known as cyberbiosecurity. It investigates how the digital protection of a huge area of the U.S. economy that depends on food and horticulture is affected by present and new computerized innovation (for example Bio-economy). As examined by Peccoud et al., the food and farming enterprises are very enhanced, request state of the art innovation and efficiencies, and rely upon enormous information, cloud-based information capacity, and web availability while being defenseless to network safety occurrences (Bothe, 2019).

3. MATERIAL AND METHODOLOGY

3.1. Modern Items

(Monetarily Accessible Items and Administrations) for the assortment of industry results, a call was declared through the Smart-AFVC project bulletin (www.smart-akis.com), too through the European Relationship of Farming Hardware (CEMA) to become known by the organization of SFT organizations under its umbrella or connected with the

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affiliation. A web search gave understanding into the organizations that are perhaps engaged with the improvement of SFTs. We looked for organizations with significant accreditations for shrewd cultivating, for example, association in the creation of cultivating hardware and apparatus or partners associated with the improvement of agronomic programming (Jahn, 2019). The pertinent organizations of FIWARE FRACTALS and Brilliant Agrifood II were counseled. Besides, we utilized all Smart- AFVC accomplices' organization of guides to contact important partners, and the last step was for the creators of this work to lead a work area search however web to find more business SFTs. The survey was replied by the SFT suppliers with the help of the creators of this work. For the situation that the survey was deficiently filled in, the SFT suppliers were reached once more (the poll requested their agreement to do as such) to give the absent or conflicting data. On the off chance that the poll was as yet not completely filled in, then, at that point, the SFT was barred from the hunt.

3.2. Typology of SFTs

It was decided to adopt Schwarz and Herold's classification to better comprehend the SFT environment. SFTs were classified by these creators as recording, answering, or directing advances. Notwithstanding these classes, "FMIS" and "mechanical/mechanization framework" were used in this work since late years have seen a flood in revenue in the examination, development, and market execution of these SFT classifications. The five classes recorded above are not fundamentally unrelated; subsequently a specific SFT might be recording and responding all the while. Normally utilizing a direction innovation of some kind or another, a mechanical SFT will either record or respond, or possibly do both. In our examination, the essential capability was utilized (Biswas, 2019).

3.3. Field Operation

led while involving the SFT The essential field tasks for each SFT were recorded in the survey to be utilized, and they were as per the following: Globalization, data and correspondence innovation (ICT), government support, rancher schooling, ranch the board, ranchers' mindfulness/preparing program, market refreshes, organizing, for instance in the circumstance of field information recovery. Adding one extra field operation was conceivable (Kamilaris, 2019).

3.4. SFT Adoption Was Simple

There were queries regarding SFT adoption ease in addition to SFT qualities that relate to the difficulties that farmers encounter. The Rogers method was used to assess the innovation; this technique prompts potential adopters to think about the innovation's relative advantage (the perceived efficiencies gained in comparison to existing tools or procedures), system compatibility, complexity or learning curve, testability, potential for reinvention (using the tool for initially unintended purposes), and observed effects (T. N. Gia L. Q., 2019). Respondents were presented with the seven statements below and a five-point Likert scale (strongly disagrees, disagree, no opinion, agree, and strongly agree).

A device or innovation that is as of now being used gets supplanted by the SFT. The SFT is an enhancement for the ongoing apparatus. This request is principally aimed at SFTs that need to develop current instruments.

1. The SFT can be applied without requiring significant system modifications. More changes to the current system are anticipated for some SFTs than for others.
2. The farmer can utilize the SFT immediately with minimal training. This assertion can assist with contrasting the fluctuation in learning necessities among SFTs and can give a mark of the learning exertion that the rancher needs to make.
3. The SFT can be put to use in ways that the inventor didn't anticipate. Some SFTs may have several functions that are effective for achieving a wide variety of quite distinct effects.
4. The farmer may see the impacts of the SFT firsthand. Directly observable impacts are deemed advantageous because they increase the likelihood that farmers will find the SFT applicable to their circumstances.
5. The farmer must devote a lot of time to using the SFT. The amount of time required from the farmer to utilize the SFT will be indicated by this statement, which will have an impact on how appealing the SFT is to use.
6. The SFT creates data that is effortlessly figured out (illustration of the inverse: the SFT produces a vegetation file yet no one understands how to manage it). The outcomes ought to be introduced such that simplifies them to comprehend. This increases end users' interest in the results and ensures uniformity in their interpretation.

3.5. Effect of Using the AFVC

The definition of each SFT's impact on agricultural production was a crucial component of this endeavour. The effect on ranch financial matters, the climate, and homestead work were undeniably estimated utilizing the KPIs not set in

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stone as the principles. Impacts were expected for these 26 urgent elements, of which five are emphatically affected by SFTs, expanding them (Globalization, data and correspondence innovation (ICT), government support), and 21 are decidedly influenced by SFTs, diminishing them (rancher instruction, ranch the board, ranchers' mindfulness/preparing program, market refreshes, organizing), Five degrees of progress on the Likert scale could be utilized to communicate impacts (enormous abatement, some decline, no impact, some increment, and huge increment) (M. Wazid, 2018). At the point when it was conceivable, the respondent could add to this scale by giving relevant rates or a much more unambiguous outline of the results of the SFT.

A precise survey was made in light of the writing to gather the essential information expected to evaluate the linkages reflected in the calculated model and, thusly, to decide the factors influencing the impression of the viability of rural worth chain finance in Chandigarh. The study included 60 articulations or things connected with the variables that influence the adequacy of subsidizing for the farming worth chain. Respondents were approached to rate their understanding or conflict with every assertion on a scale with 8 being the most immovably in arrangement.

Exploratory component examination (EFA) was utilized to decide the discriminant legitimacy of the review instrument and to decide if the information really contained the components that the hypothetical model expressed would be important to characterize the apparent viability of farming worth chain finance. After the estimation gadget's steadfastness was laid out, measurable examination was performed on the applied model. To look at the organization of connections between the chose set of parts (H. Li, 2018), underlying condition displaying (SEM) was utilized. It was chosen since it consolidates a few free and subordinate factors, as well as the potential inactive builds that gatherings of noticed information could represent, and is reasonable for speculation testing. The links between the variables that affect how Chandigarh's agricultural value chain finance is considered to be working were examined using the software programme SPSS 25.0.

In this study, snowball sampling was used because it is appropriate when it is challenging to find individuals of a special population. Agricultural producers (clients of credit), loaning experts utilized by credit suppliers in the Chandigarh agricultural area, and financial analysts who give guidance to the area were assigned as the populace for this review. 220 individuals partook in the example assortment for this review.

4. RESULT AND DISCUSSION

Hair et al (2006) advocated combining a number of criteria to establish how many elements should be extracted. In this review, the quantity of parts to be still up in the air by considering Eigen esteems, the level of variety made sense of, and individual component loadings. Two elements ought to be utilized as the mediating factors and eight elements as free factors, as per the Eigen values (> 1.0) displayed in Tables 1 and 2. Things having loadings of under 0.4 were completely taken out.

Table: 1 Rotated factor loadings: Dependent variables

Items	Factor	
	Smart Farming	AFVC
Globalization	0.826	0.0163
Information and communication technology	0.863	0.0167
Government Support	0.672	0.183
Farmer education	0.735	0.027
Farm Management	0.826	0.725
Training Program	0.072	0.467
Market Updates	0.274	0.485
Networking	0.782	0.625

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A Value Chain Perspective on Agricultural Production

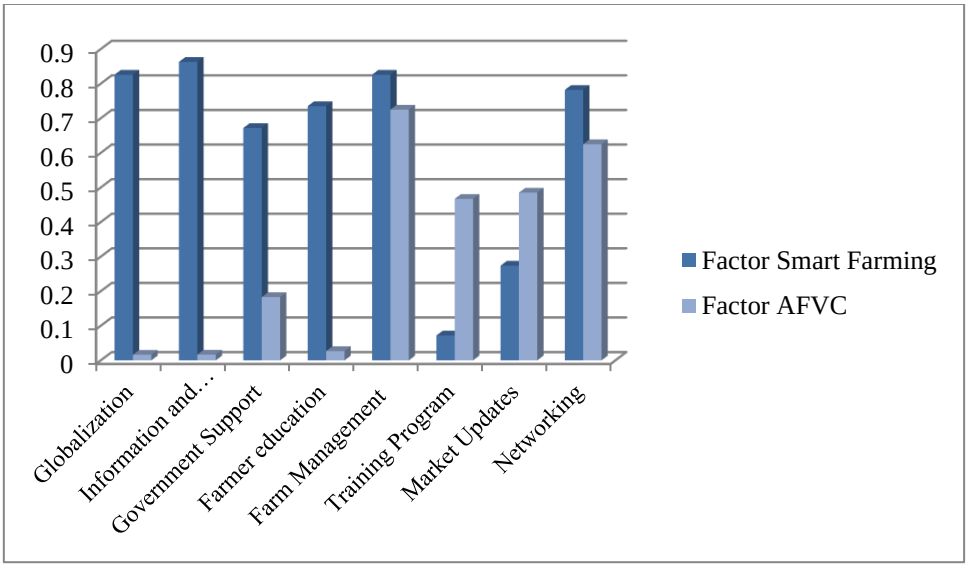

Fig.1. Dependent Variables

Table: 2 Rotated factor loadings: Independent variables.

Items	Factor	
	Smart Farming	AFVC
Smart farmer	0.828	0.0163

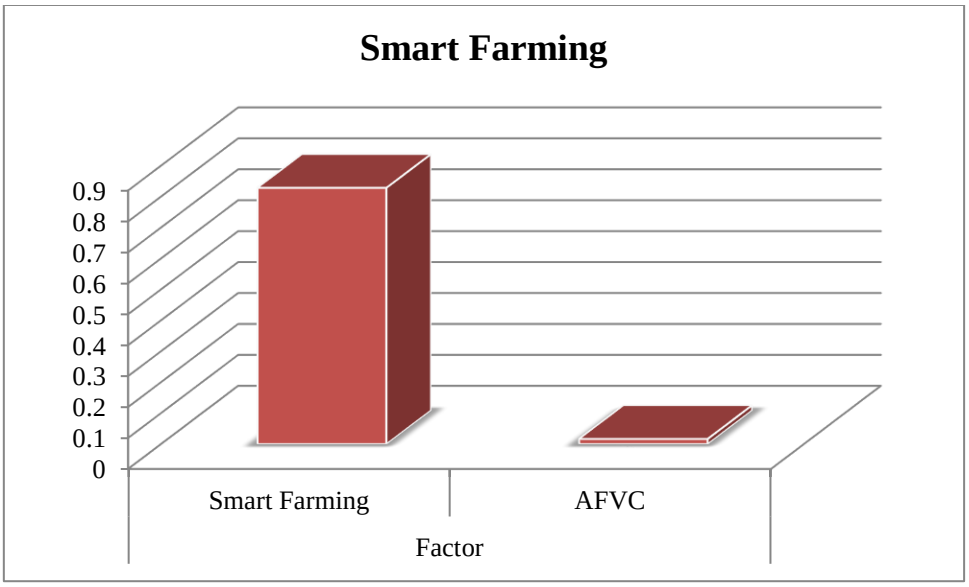

Fig.2. Independent Variables

Discriminant and develop legitimacy evaluation and unwavering quality appraisal

Subordinate variables: Value chain intensity and saw progress of the agricultural worth chain were the two parts that were recuperated with Eigenvalues bigger than 1.0. According to Table 1, a total of 8 items were loaded on these two separate factors, and this structural explanation accounts for 55.8% of the data's variance. Significant loadings are indicated by underlining (p 0.5). Therefore, sufficient proof of discriminatory validity is offered.

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Factor 1: The perception of the agricultural value chain's success.

One item was used to quantify the component "smart farming," which accounts for 46.5% of the data's variance. The eight items used to measure this construct had a satisfactory Cronbach-alpha coefficient of 0.826, showing the validity of the method (C. Lin, 2018).

Factor: 2. eight items were used to measure the factor AVFC, which accounts for 11.5% of the data variation. Table 1 shows the Eigenvalue that the AVFC returned, which was 1.067. The acceptable Cronbach-alpha coefficient of 0.819 was obtained from the five items measuring AVFC. Thus, one intervening variable took the role of the original conceptual model's variables feasibility and viability. It was decided to rename the component as worth chain intensity in light of the things stacked. Esteem chain seriousness, for the motivations behind this review, alludes to the degree to which agricultural worth chains can assist producers with satisfying rising buyer need economically. Thusly, esteem chains can extend and help the area's worldwide seriousness, and simultaneously, monetary administrations suppliers get the opportunity to build the productivity of loaning exercises to the agricultural area (D. He, 2018).

Independent variables: Then, at that point, utilizing the Vital Part extraction technique with a Varimax pivot, the free factors — chain coordination, globalization, data and correspondence innovation, government support, rancher instruction, ranch the board, preparing program, market refreshes, and organizing measures — were assessed for separate legitimacy. Table 2 presents the discoveries of the element investigation for the autonomous factors. Chain reconciliation, vital coordinated effort, risk the executives, supporting administrations, economical assembling, business direction, item reach, and outer subsidizing were the eight parts that were recuperated with Eigen values bigger than 1.0. As per Table 2, 1 thing altogether stacked on 8 unique variables, representing 56.4% of the fluctuation in the information. In this way, adequate evidence of discriminant legitimacy is advertised.

4.1. Evaluation of the goodness of fit

The decency of-fit records of the proposed model were assessed to decide how much it mirrors a satisfactory guess of the information. The following theories were developed in order to address this:

4.2. Chain integration

4.2.1. Farmer Education

The findings show a positive correlation between strategic partnering and agricultural value chain competitiveness (point estimate 0.21; t-value = 1.69; p 0.05). (One-tailed). The H2 assumption is affirmed. The discoveries suggest that monetary foundations will actually want to extend the progression of funding to the horticulture area and, in doing as such, work on the seriousness of agricultural worth chains, through the arrangement of key organizations with key worth chain entertainers.

4.2.2. Risk management

The findings show a statistically significant association between risk management practices and competitiveness of the agricultural value chain (point estimate -0.36; t-value = -3.66; p 0.01). The hypothesis H3 is disproved because the association is negative. The discoveries in this way highlight the need for outer gatherings, like auxiliary agribusinesses, to give risk the board measures on the grounds that agricultural producers don't have the ability to deal with all parts of chance in the agricultural area proficiently alone (Janssen, 2018). Subsequently, it is laid out that an element influencing esteem chain intensity and, at last, the view of the viability of agricultural worth chain finance is the arrangement of hazard the executives estimates by outside parties.

Table: 3 Synopses of the New Model's Tested Hypotheses

Hypothesis	Decision
There is a positive relationship between the level of Smart farming by using AVFC	Supported
There is a positive relationship between the globalization and adoption of smart farming	Supported
There is a positive relationship between awareness and farmer education	Supported

The findings show a correlation between the perceived performance of agricultural value chain finance and the level of value chain competitiveness. The assumption H2 is affirmed. As per the discoveries, more elevated levels of significant worth chain intensity won't just assist ranchers with fulfilling rising customer need reasonably, yet in addition allow monetary specialist organizations the opportunity to upgrade funding levels for the horticulture area (Tyagi, 2018).

Table 3 gives a rundown of the speculations. This study kicks off something new since it shows that coordinated agricultural worth chains give monetary specialist organizations in Chandigarh the opportunity to bring down expenses and dangers related with agricultural supporting while additionally effectively coordinating agricultural ranchers into contemporary worth chains. Eight variables, including esteem chain joining Globalization, data and correspondence innovation (ICT), government support, rancher instruction, ranch the board, ranchers' mindfulness/preparing program, market refreshes, and organizing, were recognized after legitimacy and dependability appraisals. These elements might affect the reliant variable, which is the apparent progress of agricultural worth chain supporting in Chandigarh (Jahn, 2019). The realistic features the essential job of the chain entertainer or auxiliary agribusiness as well as how the progression of acknowledge shifts for the proposed esteem chain finance model. It likewise exhibits how vital partnerships between monetary foundations and worth chain members in a specific agricultural worth chain can diminish the distance between the loaning establishment and the borrower.

5. CONCLUSION

There was positive and significant relationships between supporting administrations, the agricultural worth chain, outside funding, and agricultural worth cultivating innovation likewise rose up out of the observational information, despite the fact that they were upheld by the writing. The absence of enough concentrate on the great commitments that different partners, including those beyond agricultural worth chains, may make to upgrading advance accessibility, especially with regards to the Chandigarh agricultural area, may represent these unexpected outcomes. Further review is fundamental as a result of these two components as well as the beneficial outcomes of various partner contributions (Bothe, 2019).

All in all, the examination offers a system on which industry job players and lenders can pinpoint basic factors that influence the progress of novel and imaginative supporting answers for the business, with the underlying model that can work as an important guide in this regard. The methodology can be a compelling apparatus for tending to the authentic impeding impacts of politically-sanctioned racial segregation in Chandigarh as well as the contemporary overdependence and strain on the business farming area for food security, given the groundbreaking capability of agricultural extension. Subsequently, esteem chains likewise offers a system for development that can empower a reconnection between monetary foundations and limited scope agricultural producers.

REFERENCES

1. Bothe, J. Bauer, and N. Aschenbruck, ‘‘RFID-assisted continuous user authentication for IoT-based smart farming,’’ in Proc. IEEE Int. Conf. RFID Technol. Appl. (RFID-TA), Sep. 2019, pp. 505–510
2. Ding, Y. & Janssen, M. (2018).‘‘Opportunities for applications using 5G networks: Requirements, challenges, and outlook,’’ in Proc. 7th Int. Conf. Telecommun. Remote Sens. (ICTRS), pp. 27–34.
3. Gia, T. N., Qingqing, L. , Queralta, J. P. , Zou, Z., Tenhunen, H. and Westerlund, T. (Sept, 2019). ‘‘Edge AI in smart farming IoT: CNNs at the edge and fog computing with LoRa,’’ in Proc. IEEE AFRICON, 2(3).
4. Gia, T. N., Qingqing, L., Queralta, J. P., Zou, Z., Tenhunen, H. & Westerlund, T. (Sept. 2019). ‘‘Edge AI in smart farming IoT: CNNs at the edge and fog computing with LoRa,’’ in Proc. IEEE AFRICON, Vol. 2(1).
5. Gupta, M., Benson, J., Patwa, F. & Sandhu, R. (2019). ‘‘Dynamic groups and attribute-based access control for next-generation smart cars,’’ in Proc. 9th ACM Conf. Data Appl. Secur. Privacy (CODASPY), pp. 61–72.
6. He, D., Qiao, Y., Chan, S. & Guizani, N. (May 2018). ‘‘Flight security and safety of drones in airborne fog computing systems,’’ IEEE Commun. Mag., vol. 56, no. 5, pp. 66–71.
7. IFAD. (2018). Supervision report. High Value Agriculture Project in Hill and Mountain Areas, May 2018.
8. Jahn, M. M. (2019). Cyber Risk and Security Implications in Smart Agriculture and Food Systems. Accessed: January 23, 2023. [Online]. Available: https://jahnresearchgroup.webhosting.cals.wisc.edu/wpcontent/uploads/sites/223/2019/01/Agricultural-Cyber-Risk-andSecurity.pdf
9. Kamilaris, A., Fonts, and F. X. Prenafeta-Boldú (Sep. 2019). The rise of blockchain technology in agriculture and food supply chains. Trends Food Sci. Technol., vol. 91, pp. 640–652.
10. Li, H., Lu, R., Misic, J. and Mahmoud, M. (May 2018). ‘‘Security and privacy of connected vehicular cloud computing,’’ IEEE Netw., vol. 32, no. 3, pp. 4–6.

11. Lin, C., He, D., Kumar, N., Choo, K.-K.-R., Vinel, A. & Huang, X. ‘‘Security and privacy for the Internet of drones: Challenges and solutions,’’ IEEE Commun. Mag., vol. 56, no. 1, pp. 64–69, Jan. 2018.
12. Santhana P. and Biswas, A. (2017). Blockchain Risk Management– Risk Functions Need to Play an Active Role in Shaping Blockchain Strategy. Accessed: January 23, 2023. [Online]. Available: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/usfsi-blockchain-risk-management.pdf
13. Schönfeld, M. V., Heil, R. & Bittner, L. (2018). ‘Big data on a farm—Smart farming. Big Data Context, pp. 109–120,.
14. Shabadi, L. S. and Biradar, H. B. (2018). Design and implementation of IOT based smart security and monitoring for connected smart farming. Int. J. Comput. Appl., vol. 179, no. 11, pp. 1–4.
15. Tyagi, T. (2018). ‘‘Botnet of things: Menace to Internet of Things,’’ in Proc. 3rd Int. Conf. Comput., Commun., Netw. Secur., pp. 1–5.
16. Wazid, M., Das, A. K., Odelu, V., Kumar, N., Conti, M. & Jo, M. (Feb, 2018). ‘‘Design of secure user authenticated key management protocol for generic IoT networks,’’ IEEE Internet Things J., vol. 5, no. 1, pp. 269–282.