DIRECT PURCHASE BEHAVIOUR OF URBAN CONSUMERS FOR AGRICULTURAL PRODUCE IN NORTH BENGAL

THESIS SUBMITTED TO THE
ICAR- NATIONAL DAIRY RESEARCH INSTITUTE
(DEEMED UNIVERSITY)
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE
IN
AGRICULTURAL EXTENSION EDUCATION

BY

DEBANJAN DAS
B.Sc. (Agriculture)

DIVISION OF DAIRY EXTENSION
ICAR- NATIONAL DAIRY RESEARCH INSTITUTE
(DEEMED UNIVERSITY)
KARNAL - 132001 (HARYANA), INDIA

2021

Reg. No. 19-M-DX-10

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DIVISION OF DAIRY EXTENSION
ICAR- NATIONAL DAIRY RESEARCH INSTITUTE
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CERTIFICATE

This is to certify that the thesis entitled **"DIRECT PURCHASE BEHAVIOUR OF URBAN CONSUMERS FOR AGRICULTURAL PRODUCE IN NORTH BENGAL" submitted** by **Mr. DEBANJAN DAS,** Regn. No. **19-M-DX-10** towards the partial fulfilment of the award of the degree of **MASTER OF SCIENCE IN AGRICULTURAL EXTENSION EDUCATION** of the **ICAR- National Dairy Research Institute (Deemed University),** Karnal, Haryana, India, a bona fide research work was carried out by him under my supervision and part of this has not been submitted for any other degree or diploma.

Place: Karnal
Date: 23/09/2021

(H. R. MEENA)
Major Advisor
&
Chairman of Advisory Committee

GRACIOUSLY DEDICATED TO my MAA & BABA

&

Respected guide

ACKNOWLEDGEMENT

It is my pleasure to glance back and recall the path once travelled during the days of hard work and perseverance. Interdependence is more valuable than independence. This thesis is the result of two years of work whereby I have been accompanied, supported and guided by many people. I would thus like to thank everyone who, knowingly or otherwise, has provided support, encouragement and assistance along the way.

First and foremost, I would like to praise and thank God, the Almighty, who has granted countless blessing, knowledge, and opportunity to the writer, so that I have been finally able to accomplish the thesis.

I sincerely express my esteem and a deep sense of gratitude to the chairman of my advisory committee, ***Dr. H.R. Meena****, Principal Scientist, Division of Dairy Extension, National Dairy Research Institute, Karnal, Haryana for his meticulous and exemplary guidance, steadfast inspiration, insightful comments and timely help with care and love bestowed throughout the investigation and in the preparation of the manuscript. Without him, I would never be able to present this piece of work.*

It gives me immense pleasure to express my heartfelt thanks to the members of my advisory committee ***Dr. K.S. Kadian,*** *Principal Scientist & H.O.D, Dairy Extension Division,* ***Dr. Sanjit Maiti,*** *Sr. Scientist, Dairy Extension Division,* ***Dr. Gunjan Bhandari****, Scientist, DES&M Division and* ***Dr. R.K. Meena****, Scientist, Agronomy Section for their valuable counsel, note-worthy guidance, helpful suggestions and cordial co-operation during the course of investigation.*

I am very much thankful to ***Dr. M.S. Chauhan****, Hon'ble Director and Vice-Chancellor, ICAR-National Dairy Research Institute, Karnal, Haryana for providing facilities, financial support and encouragement for the research work.*

I am overwhelmed with sincere feeling of indebtedness to all the faculty members of Dairy Extension Division, ***Dr. S. K. Jha****,* ***Dr. Gopal Sankhala****,* ***Dr. K. Ponnusamy****,****Dr. B. S. Meena****,* ***Dr (Mrs.) Ritu Chakravarty and Dr. Sanchita Garai****, for their co-operation and encouragement during the entire M.Sc. Degree Programme.*

I convey my heartiest thanks to all the Dairy Extension Division staff for their help during the entire span of study.

I take the opportunity to express my heartful thanks to my all M.Sc. and PhD seniors for their love and affection during this tenure.

Vikash Sir *and* ***Priyajoy da*** *are the ones without whom it would not be possible to complete the study. Thanks to them to guide me as big brothers.*

My special thanks go to my beloved batch mates ***Karthik, Vijay, Saurabh, Awadhesh, Waris, Amandeeep, Vipin, Sweety, Manjushree, Chimi, Aneesha, Olive*** *for their unwavering support during my difficult time. I always cherish the time spent with all of them during these two years. It gives me great pleasure in thanking my dear juniors.*

I am overwhelmed with gratitude to my Karnal Bengali family for their endurance, abundant love and affection and moral support during the academic career. I convey my heartiest thanks to ***Susanta da, Shamim da, Prasanna da, Subhradip da, Subham da*** *for their help and make me feel like away from home during the entire span of study.*

I would pay my special gratitude to roommate ***Subhankar*** *hostel mate* ***Tamal, Amrita and Indranil*** *for their limitless help and support during this tenure and research. I thank to them for staying beside me in every problem.*

Selfless life is the dearest one on this planet. I can't express more word of thanks to my dearest father ***Shri. Ranjan Das,*** *beloved* ***mother Mrs. Shikha Das****, elder sister* ***Mrs. Pamli Das*** *and my sweetest mampochu* ***Ishaan*** *for their boundless love, abundant affection and continuous encouragement. I sustain myself, and gratitude can't be repaid through words. I wish to express my deep sense of gratitude and heartfelt thanks to my* ***Shri Haripada Das (Sejho jethu), Mr. Asim Das (Moni Kaku), Mr. Anirban Das (Borda) ,Bunai di (Malini Das)*** *for their constant encouragement and help during the entire study period. I would like to express my deep and sincere gratitude to the respondents of selected districts.*

I would like to give heartfelt thanks to ***Rajoshree, Pritam, Rituraj, Dipanjan, Subhankar, Sudip*** *for staying beside me in every problem since childhood.*

Finally, I am obliged to NDRI for awarding me the Institute Fellowship during the course of study and research work.

Place: Karnal
Date: 23/09/2021

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Abstract

With the social development and the improvement of people's living standards, consumers are gradually paying higher attention to the issue of food safety and environmental protection while purchasing the food items. Direct marketing can help to ensure the sustainability of agriculture and food systems by increasing farmers profitability, promoting the local economy and providing consumers with higher-quality and healthier products. The desirable characteristics for consumers were price, concerning appearance, taste, quality, value, and traceability. At the same time Blockchain Management offers food traceability, food safety and promote direct interaction between producers and consumer in many ways. There lies the support of direct purchase of agriculture produces through Blockchain perspective. Keeping this view in the mind, a study entitled **''Direct Purchase behaviour of Urban Consumers for Agricultural produce in North Bengal"** was conducted in purposively selected Darjeeling and Jalpaiguri districts of North Bengal. Total 60 Urban Consumers and 15 farmers were selected using snowball sampling. Thus, a total of 150 respondents were selected for the present investigation. Results show that most of the respondents (43.33%) belongs to middle age group followed by young (31.67%) and old age (25.00%). Majority of the respondents purchased vegetables (72.00%), fresh fruits (67.33%), meat (48.67%) and milk products (33.33%) from primary producers and consumers strongly perceived that food products purchased from farmer fields were healthy (48.00%), nutritious (47.33%) and free from chemical residues. This indicated that urban consumers had favourable behaviour towards direct purchase of agricultural produce from farmer's field. From the path coefficients, it is clear that the path from subjective norms to behavioural intentions failed to achieve statistical significance. Hence, the path from perceived behavioural control and attitude to behavioural intentions is also significant with a p-value less than 0.05. Subjective norm has a negative non-significant effect on behavioural intention whereas Attitude and Perceived behavioural control have a positive significant effect on the direct purchase intention of agricultural produces. Most important factor for symbiotic relation between farmers and consumers was financial benefit to both sellers and consumers (85.33%). Majority (54.66%) of the respondents heard about the Blockchain Technology and 46.00% respondents were willing to accept the Blockchain Technology. Consumers were not ready to pay more than 50 percent for Blockchain Technology. It was found that 27.33 percent, of the respondents would accept Blockchain Technology if price goes from 0 to 10 percent over and above to normal price. Efforts should be directed towards the improvement of knowledge towards direct purchase of agricultural produces and Blockchain Technology so that consumers and producers can use it in a beneficial way in future.

“उत्तर बंगाल में कृषि उत्पादों के लिए शहरी उपभोक्ताओं का प्रत्यक्ष खरीद व्यवहार”

सारांश

सामाजिक विकास और लोगों के जीवन स्तर में सुधार के साथ, उपभोक्ता धीरे-धीरे भोजन खरीदते समय खाद्य सुरक्षा और पर्यावरण संरक्षण के मुद्दे पर अधिक से अधिक ध्यान दे रहे हैं। भारत सरकार के खाद्य और सार्वजनिक वितरण विभाग के एक हालिया अनुमान के अनुसार, खाद्यान्नों की कुल रोके जाने योग्य पोस्ट हार्वेस्ट कुल उत्पादन का 10% है। संशोधित कृषि उत्पाद बाजार विनियमन (एपीएमआर) अधिनियम, देश का मुख्य कृषि विपणन अधिनियम, जिसे भारत के विभिन्न राज्यों द्वारा लागू किया गया है, में अनुबंध खेती को बढ़ावा देने और उत्पादक और उपभोक्ता के बीच प्रत्यक्ष विपणन की अनुमति देने वाला प्रावधान शामिल है। कृषि प्रत्यक्ष विपणन देश के किसानों और उपभोक्ताओं की लंबे समय से महसूस की जाने वाली आवश्यकता है क्योंकि यह किसानों को उच्च पारिश्रमिक सुनिश्चित करता है और उपभोक्ताओं के संतुष्टि स्तर को पूरा करता है। प्रत्यक्ष विपणन किसानों की लाभप्रदता बढ़ाने, स्थानीय अर्थव्यवस्था को बढ़ावा देने और उपभोक्ताओं को उच्च गुणवत्ता वाले, स्वस्थ उत्पाद प्रदान करके कृषि और खाद्य प्रणालियों की स्थिरता सुनिश्चित करने में मदद कर सकता है। उपभोक्ताओं के लिए सबसे वांछनीय विशेषताएं हैं मूल्य, उपस्थिति, स्वाद, गुणवत्ता, मूल्य और पता लगाने की क्षमता से संबंधित। साथ ही ब्लॉकचैन प्रबंधन खाद्य ट्रेसबिलिटी, खाद्य सुरक्षा प्रदान करता है और कई तरह से उत्पादकों और उपभोक्ताओं के बीच सीधे संपर्क को बढ़ावा देता है। ब्लॉकचैन परिप्रेक्ष्य के माध्यम से कृषि उत्पादों की प्रत्यक्ष खरीद का समर्थन निहित है। इस दृष्टिकोण को ध्यान में रखते हुए, उत्तर बंगाल के दार्जिलिंग और जलपाईगुड़ी जिले में उद्देश्यपूर्ण रूप से चयनित दार्जिलिंग और जलपाईगुड़ी जिले में "उत्तर बंगाल में कृषि उत्पादों के लिए शहरी उपभोक्ताओं का प्रत्यक्ष खरीद व्यवहार" नामक एक अध्ययन किया गया था। स्नोबॉल सैंपलिंग का उपयोग करके 60 शहरी उपभोक्ताओं और 15 किसानों का चयन किया गया। इस प्रकार, वर्तमान जांच के लिए कुल 150 उत्तरदाताओं का चयन किया गया था। परिणामों से पता चलता है कि उत्तरदाताओं का बहुमत (43.33%) मध्यम आयु वर्ग का है जिसके बाद युवा (31.67%) और वृद्धावस्था (25.00%) आते हैं। अधिकांश उत्तरदाताओं ने प्राथमिक उत्पादकों और उपभोक्ताओं से सब्जियां (72.00%), ताजे फल (67.33%), मांस (48.67%) और दुग्ध उत्पाद (33.33%) खरीदे थे, यह दृढ़ता से माना जाता था कि किसान के खेतों से खरीदे गए खाद्य उत्पाद स्वस्थ थे (48.00%)), पौष्टिक (47.33%) और रासायनिक अवशेषों से मुक्त। यह दर्शाता है कि शहरी उपभोक्ताओं का किसान के खेत से कृषि उत्पाद की सीधी खरीद के प्रति अनुकूल व्यवहार थे। पथ गुणांकों से, यह स्पष्ट है कि व्यक्तिपरक मानदंडों से व्यवहारिक इरादों तक का मार्ग सांख्यिकीय महत्व को प्राप्त करने में विफल रहा। इसलिए, कथित व्यवहार नियंत्रण और व्यवहार संबंधी इरादों के दृष्टिकोण से पथ भी 0.05 से कम पी-मूल्य के साथ महत्वपूर्ण है। व्यक्तिपरक मानदंड का व्यवहारिक इरादे पर नकारात्मक गैर-महत्वपूर्ण प्रभाव पड़ता है जबकि रवैया और कथित व्यवहार नियंत्रण का कृषि उत्पादों की प्रत्यक्ष खरीद के इरादे पर सकारात्मक महत्वपूर्ण प्रभाव पड़ता है। सहजीवी संबंध के लिए सबसे महत्वपूर्ण कारक जिसने किसान और उपभोक्ता दोनों को सूचित किया है, वह है विक्रेता और उपभोक्ता दोनों को वित्तीय लाभ (85.33%)। उत्तरदाताओं के बहुमत (54.66%) ने ब्लॉकचैन टेक्नोलॉजी के बारे में सुना और 46.00% उत्तरदाताओं ने ब्लॉकचैन टेक्नोलॉजी को स्वीकार करने के इच्छुक थे। उपभोक्ता ब्लॉकचेन तकनीक के लिए 50% से अधिक भुगतान करने के लिए सहमत नहीं थे। यह पाया गया कि अगर नियमित कीमत के अलावा कीमत "0 से 10% तक" जाती है, तो 27.33% लोग ब्लॉकचेन तकनीक को स्वीकार करेंगे। प्रत्यक्ष खरीद कृषि उत्पादों और ब्लॉकचेन प्रौद्योगिकी की दिशा में ज्ञान के सुधार की दिशा में प्रयास करना चाहिए ताकि उपभोक्ता और उत्पादक निकट भविष्य में इसका लाभकारी तरीके से उपयोग कर सकें।

1. INTRODUCTION

The number of people living in urban areas worldwide is over three billion, or 55 percent of the world population and it is projected that 68 percent of the world's population will be living in urban areas by 2050 (United Nations, 2018). In India, 34.93 percent of the population currently lives in urban areas (World Bank, 2020). The continued expansion of cities nationwide places a heavy toll on the demand for resources, such as sustainable infrastructure and affordable food retail options, to meet the basic needs of households living within city limits. Within the food sector, the accelerating rate of migration into cities coupled with a growing population imposes the challenge of producing sufficient quantities of food (Satterthwaite *et al.*, 2010). This challenge needs to be addressed to ensure that everyone has access to high-quality, nutrient-dense food. Simultaneously, it raises the question of how to provide satisfactory nourishment while consumers are increasingly asking for fresh and local foods (Grebitus *et al.*, 2017). With the social development and the improvement of people's living standards, consumers are gradually paying more and more attention to the issue of food safety and environmental protection. Safety and quality are two most important issues for consumers when choosing food products, especially agricultural products. An abundance of agricultural products is currently offered on the market, many of which are products of unknown origin and production processes that are not controlled. Such products may harm the environment, may not meet food hygiene and safety standards and may adversely affect consumers' health. Food safety plays an essential role in modern life. More and more citizens are concerned about their health in connection to food purchases, especially agricultural foods, Therefore, urban consumers looking for director purchasing of agriculture products from their producers. The share of agriculture in gross domestic product (GDP) has reached almost 20 percent for the first time in the last 17 years, making it the sole bright spot in GDP performance during 2020-21, according to the Economic Survey 2020-2021.The share of agriculture in GDP increased to 19.9 percent in 2020-21 from 17.8 per cent in 2019-20. The last time the contribution of the agriculture sector in GDP was at 20 per cent was in 2003-04. India accounts for 7.68 percent of total global agricultural output, seventh largest agricultural food exporter worldwide, currently more than 52 percent of India's population is involved in agriculture, yet it contributes just 13.7 percent to GDP. Despite the fact farmers are facing many challenges, the agricultural sector is characterized by financial instability due to various types of market, production and pricing risks involved. Main reason behind that is financial distress followed by decreasing size of land holding, unsatisfactory realization of prices, inadequate storage facility and indebtedness. Although the technological revolution increased yield, it also

drove labour off the farm. The indiscriminate use of chemical fertilizers and pesticides resulted in environmental hazards, health hazards and a slew of other issues, eventually reaching a tipping point. Food industries in developed countries are driven by consumer demand, which is generally concerned with more nutritious and sustainable foods. New technologies in food production are a hot topic in many countries around the world, with many supporters pointing to the potential to improve human life and the environment. While new technologies refer to a variety of economic benefits not only for food production but also for other industries, the community engages in a lively debate about health concerns, social, economic and political preferences.

Before entering the market, agricultural commodities must go through a series of operations such as harvesting, threshing, winnowing, bagging, transport, storage, processing, and exchange. Several studies across the country have shown that crop production suffers significant losses at all stages. According to a recent estimate by the Ministry of Food and Civil Supplies of the Government of India, total preventable post-harvest losses of food grains amount to 10 percent of total production, or approximately 20 million tonnes (MT), which is equivalent to the total food grains produced in Australia each year. Supply chain management (SCM) is the management of the entire collection of manufacturing, distribution and marketing processes that supply the desired product to the customer. The integrated process of producing value for the end user or ultimate consumer is referred to as supply chain management. The amended Agricultural Produce Market Regulation (APMR) Act, the country's main agricultural marketing act, which has been enforced by the various states of India, now includes a provision allowing the promotion of contract farming, direct marketing and the establishment (previously prohibited) of private markets. Such initiatives would go a long way towards providing smaller firms with economies of scale in order to create direct links between farmers, processors / exporters / retailers, etc. The measure would therefore include both backward and forward linkages in order to establish integrated supply chains for the country's various agricultural products. Agricultural markets in India, in particular the supply chain management and business models, are inefficient. (Wu *et al.* 2018) reviewed that the agricultural marketing sector is characterized by a fragmented supply chain, massive post-harvest losses, multiple market intermediaries; some of the acute problems facing Indian agriculture are higher transaction costs, lack of knowledge and several other socio- economic factors. To address this issue contract farming could be a solution. Contract farming is one of the most significant and powerful means by which farmers are integrated into national and inter-national commodity markets or directly to consumer. Another solution would be direct purchase of agricultural produces by the consumer. Farm direct marketing is a long felt need of the farmers and consumers of the country as it goes a long way in ensuring higher remuneration

to the farmers and meeting the satisfaction level of the consumers through direct sale of the agricultural commodity by the farmers to the consumer at affordable prices. Direct marketing of agricultural produce helps in reduction of middlemen and commission agents who charge high level of commission fee from the agriculturists/farmers coming to the market yards for selling their produce and then artificially inflate the retail prices. The delicate balance of production and distribution involves mastering all effective farming operations. Many farmers prefer to sell their goods directly compared to wholesalers because it allows for higher future profit margins. The advantages realised by cutting out the middleman and gaining direct consumer input will make these marketing avenues worth the labour needed to sell directly. Farm direct marketing means selling directly to customers a product from the farm. The farmer also receives a price similar to what is charged by the grocery store. This marketing approach is more entrepreneurial or more business-like than wholesale marketing, the farmer using this method grows a "product" rather than a crop in a way of speaking. The opportunity to interact with growers is one of the reasons consumers like to purchase this way. Direct marketing can help to ensure the sustainability of agriculture and food systems by increasing farmer profitability, promoting the local economy, and providing consumers with higher-quality, healthier products. Alternative marketing options are viable options for farmers with a small production scale who want to increase their profitability. The purchasing experience is also part of the product. In order to play a role in a sustainable food system, direct marketing must provide farmers economic benefits sufficient to maintain their farms and lifestyle. Small to mid-scale growers are more likely to engage in direct marketing options due to potential inaccessibility of wholesale markets. For agricultural produces direct marketing channel comprises of roadside stands, pick-your-own, farmer's markets, community supported agriculture (CSA) and mobile marketing.

- Roadside Stands: Roadside stands allow for direct market sales without transport costs from off-farm, although some stands are situated off the farm to get closer to the volume of traffic or population centres. An investment in facilities, directional signage, marketing, and staffing is required for a more significant roadside stand. Product quality is still important, but it can be dependent on an appealing environment and a positive customer experience.
- Pick-Your-Own (PYO) Operations: Pick-your-own sales, where customers come to the farm and harvest produce directly is most common at fruit and vegetable farm. PYO customers also buy amounts than other retail customers because they plan to process and store some of their purchases, get caught up in the experience of picking.
- Community supported agriculture (CSA): It involves subscription or membership sales, where individuals purchase ‘shares’ in a farm in exchange for items worth a season. Economic

security includes the advantages for farmers also pre-plant costs are solved. Since there are no middle men, profitability and potentially low cost of capital are also more important in terms of processing, packaging and transport.

- Farmer's market: Farmer's markets offer a great way to direct market with low overhead and minimal long-term marketing investment. These markets allow customers to support their local farms while also forming personal connections with the farmers. Growers benefit from low start-up or initiation costs, as well as control over quality standards, packaging, and some post-harvest handling decisions. Farmers can also delegate the time-consuming task of physically selling at the market to other workers.
- Mobile marketing: It entails bringing the product to the customers. Farmer's markets do this on behalf of a group of farms, but individual growers can also load up a truck and travel to a desirable direct marketing location.

Although there is evidence that consumers are increasingly buying food directly from local producers, little is known about which market-specific, intrinsic, extrinsic and demographic factors influence the likelihood of preferring to buy fresh produce through direct-market channels. Factor influences purchase decision are availability of fresh, superior, vitamin-rich, and locally-grown produce at market locations (Bond *et al*., 2009). Primary reasons for consumer to choose direct marketing channel for agricultural products are: high-quality products, good value for the money, specialty items, buy directly from farmers, to socialize, for entertainment, to shop area stores, and purchase organic produce. The most desirable characteristics for consumers are those concerning appearance, taste, quality, value, and price. Inexpensive, locally grown, good for the environment, and traceable to the processor and grower are the moderately desirable produce characteristics. Produce with slightly desirable characteristics is irradiated to kill bacteria and organically grown (Wolf *et al*., 2005). At the same time Blockchain Management offers food traceability, food safety and direct interaction between producers and consumer in many ways. An increasing demand in society for more information on food reflects the need for greater transparency and lack of confidence. At the same time, more and more food products and beverages are being branded and accompanied by a variety of certification schemes, with an increasing risk of fraud (sale of unqualified product with high-quality labels or claims) and adulteration. There lies the support of direct purchase of agriculture produces through Blockchain perspective. From the last few years, people have often heard the term 'Blockchain echnology,' probably regarding cryptocurrencies like Bitcoin. Blockchain was invented by a person (or group of people) using the name or pseudo name Satoshi Nakamoto in 2008. Blockchain is the core technology behinds cryptocurrencies like bitcoin. NITI Aayog, the think tank of the government,

was given the task of studying the use-cases of Blockchain Technology and of developing viable prototypes. Currently they are working on developing nation's own Blockchain, *India Chain*. The reason behind establishment of *India Chain* with a view to reduce frauds, speed up enforcement of contracts, increase transparency of transactions, and boost the agriculture economy of the country.

- **What is Blockchain Technology (B.C.T)?**

Blockchain is a digital, public ledger that records online transactions. Blockchain is a technology that can allow individuals and companies to make instantaneous transactions on a network without any middlemen (if they are decentralized). Transactions made on Blockchain are completely secure and kept as a record of what happened. Cryptographic encryption algorithms ensure that no record of a transaction on Blockchain can be altered after the fact. It's important to note that Blockchain is still emerging, which means many of its use cases are still being tested. Technically, the Blockchain is a back-end database that maintains a distributed ledgerthat can be inspected openly. Business-wise, the Blockchain is an exchange network for moving transactions, value, assets between peers, without the assistance of intermediaries.

- **Application of Blockchain Management in Agriculture and allied sector:**

Blockchain Technology is still considered to be in its infancy when compared with traditional global financial systems. The superior features that Blockchain has can potentially disrupt existing solutions not only in industry and commerce but in almost every aspect of daily lives. While the Blockchain Technology is gaining success and proving its functionality in many cryptocurrencies, various organizations and other entities aim to harness its transparency and fault tolerance to solve problems in scenarios where numerous untrustworthy actors are involved in the distribution of some resource (Kamilaris *et al*., 2019). Two important and relevant areas are agriculture and food supply chain. Agriculture and food supply chains are well interlinked, as agricultural products are almost always used as inputs in some multi-actor distributed supply chain, where consumers are usually the end-customer. However, agriculture is one little-explored industry that has the potential to totally revolutionize Blockchain. The supply chain management Blockchain is expected to grow at an annual growth rate of 87 percent, from $45 million in 2018 to $3314.6 million by 2023. Blockchain Technology has several usefulness in different aspects of agricultural sector i.e., Crop and Food production, Improving Food Supply chain, Managing Agriculture finance, Improved quality control and food safety, Increased traceability in supply chain and E-commerce of agricultural products.

Effect of Blockchain Technology (B.C.T) in Dairy industry:

India has huge potential in dairy industry, as India ranks first in milk production in the world. At the same time dairy sector is facing several challenges such as the lack of nutritious fodder, poor storage facilities, lack of technological support and to name a few, So, the major challenge faced by the dairy industry is supply chain organization and logistics. Challenges are nothing but disguised opportunities and proactive steps need to be taken to educate farmers and provide them with a stronger supply chain to rely on in order to face this challenge head-on. Milk production data for last 10 years is given in Table 1.1

Table 1.1 Milk production of India in the past 10 years.

Year	Production (million tonnes)	Per capita availability (gm/day)
2009-10	116.4	273
2010-11	121.8	281
2011-12	127.9	290
2012-13	132.4	299
2013-14	137.7	307
2014-15	146.3	322
2015-16	155.5	337
2016-17	165.4	355
2017-18	176.3	375
2018-19	187.7	394
2019-20	198.4	411
2020-21	208	428
Source: Basic Animal Husbandry Statistics, DAHD&F, GoI		

But in the present time because of Malpractice of the processing involved, Milk handling and transportation, the dairy consumption available on the market can cause harm to human health. The recent decades have seen an increase in Milk-related scandals happening all over the world. A study conducted by the Food Safety and Standard Authority of India (FSSAI) showed that 68.4 Percent of the milk in the country is not as per the legal standard (Shingh *et al.* 2020). The traceability of milk can be defined as the capacity to trace how milk and milk products are moved from its production through different routes until it's reached at final consumption. Unlike past, there has been a decrease in the link between dairy farmers, processors/manufacturer, distributors and consumers, very few or no information passes to consumers from preceding members of the

dairy supply chain. In addition to the globalization of the dairy industry, the lack of communication between producers and consumers has demanded a better traceability system for milk and milk products. Application of Blockchain Technology and the internet of things (IoT) is presented in the recent scientific literature as the potential solution for improving traceability in the Dairy supply chain system. Present consumers are much more discerning, have a higher willingness to pay for food safety, sustainability, and ethically produced food. Blockchain Technology has great potential for transforming the dairy sector, as it can address various challenges in the dairy supply chain system that prevent transparency and traceability. All the associated members should be registered in the Blockchain network for this purpose; they will have a unique digital identity and profile in the network. Farmers can update the whereabouts of Farm, breed, vaccinations, medicines and special treatments, where appropriate. Farmers can allocate RFID devices or any other sensors to track animal movement and health, which can be updated to the Blockchain network. Similarly, data can be captured and recorded during the animals milking process, which can be done using sophisticated available machines. They were ready to be sent to chilling centers, milk collection centers, processors, or food manufacturers as the milk is milked. All stakeholder's (Producer, certified agency, logistics agency, wholesalers, retailers, consumer) in dairy industries could be linked together through Blockchain.

Directly purchased agricultural products are generally preferred more by the consumers for their freshness, High Nutritional Value, Environment friendliness, free from chemical pesticides and fertilizers products. Marketers involved in sales of directly purchase agricultural produces have to segment their market scientifically in order to maximize the market share. People who believe in health benefits, taste and protection of environment are believed to improve their life style can be the potential consumers of organic food. Moreover, consumers are willing to pay for fresh agricultural produces.

Keeping this view in the mind, a study entitled **''Direct Purchase Behaviour of Urban Consumers for Agricultural Produce in North Bengal"** was undertaken, which focus to highlight the consumer behaviours, symbiotic relation and willingness to accept agricultural produces with following specific objectives

1) To appraise behaviour of urban Consumers towards direct purchase of agricultural produce

2) To explore the symbiotic relationship of rural and urban linkages and its determinants for direct purchase of agricultural produces.

3) To estimate the willingness to accept farm produces as per the block chain management.

Researchable issues:

1. What intentions lead consumer to go for directly purchased agricultural produces?
2. What is established symbiotic relation between urban and rural people?
3. What factors influences symbiotic relation between urban and rural people?
4. Are consumers being willingness to accept farm produces as per the Blockchain Technology?

Scope of the study

This study explored a realistic picture of directly purchase behaviour of consumer for agricultural products in North Bengal and its various prospects. It has thrown light on knowledge level of urban people regarding Blockchain Technology. This study established symbiotic linkage between urban and rural people and factors influencing it. This study explained the perception and intentions of urban people regarding direct Purchase behaviour of Urban Consumers for Agricultural produce. Finally, the study highlights the pros of direct purchase of agricultural produces for different stakeholders including administrators and policy makers in deciding future policy for strengthening the direct marketing channels with Blockchain enabled.

Limitation of the study

- Despite every effort to make this study as comprehensive as possible, it is limited by the constraints of a single researcher project. Some of the limitations are as follows:
- As the area of the research is new, answers by the respondents without an adequate knowledge and thinking may encounter possibility of mistakes.
- The study has its own constraints in terms of the number of respondents, time, money, and other resources available to the single student researcher.
- This study is not without its limitations, which provide avenues for further research. The research is undertaken in a specific setting; hence, any generalizability of its findings to different contexts should be treated with caution.
- Study does however provide the opportunity for the analysis to be replicated in other areas to ascertain whether consumers behave similarly.
- The study's findings are based on the respondents' expressed responses, which may or may not be free of personal and cultural biases and prejudices.
- In spite of the above limitations, due attention was given to make this investigation more useful, deeper and systematic as possible.

Organization of thesis:

The study conducted has been presented in five chapters and each chapter is devoted to a clear exposition of various aspects of the main theme. The Chapter 1 Introduction gives a brief picture of study title and specific objectives as well as scope and limitations of the study. This is followed by Chapter 2 Review of Literature, which deals with past studies relevant to the present study. The chapter 3 Research Methodology described the locale of the study, criteria for respondent selection and measurement of variables, data collection and statistical tools used. Chapter 4 presents the Results and Discussion and the chapter 5 gives the brief Summary and Conclusion of the present study. The literature consulted and cited in the body of presentation has been enlisted in the section under Bibliography. Relevant appendices have also been adequately included.

The term "review of literature" refers to a comprehensive list of summaries of previous research on a specific topic. It is compiled via a review of pertinent research articles, thesis, dissertations, conference proceedings, books, and other sources in a certain field of study. A review of the literature provides a foundation of knowledge about a particular subject. The literature review is very important for any research, because it gives the researcher an idea of previous work in this field. A literature review is a compilation of studies that are all focused on the same subject or area. Fleishman (1969) said "Better ways are needed to generalize research findings from laboratory studies to operational settings, from experimental study to another and from one operational setting to another". It identifies past research to prevent duplication, to provide recognition to another researcher and to investigate the lacquer in previous research, conflicts and questions left for other scientists in previous studies. This chapter consists of salient research findings drawn from the review of literature pertaining to the research problem under investigation. As far as possible, only the most recent reviews are incorporated. The review of literature has been organized and presented under the following sub-heads:

2.1: Purchase intention for agricultural products directly from producers

2.2: Attitudes of consumers toward Buying Directly from Farmers

2.3 : Symbiotic relationship between urban and rural people

2.4 : Willingness to accept farm produces as per Blockchain management

2.1 : Purchase intention of agricultural products directly from producers:

Purchase intention is basically the sum total of the products, services, ideas or certain Behaviours in terms of cognitive, affective and behavioural acceptance, purchase and use. Purchase intention also can be defined as buyer's willingness to buy a product or service in a certain condition. Trobe (2001) interviewed to investigate the reasons for their attendance at the market, and their attitudes towards a number of food issues including local growing and seasonal food and concerns they may have over the way their food is produced. Customer surveys in farmers markets in America have been showed that the quality and freshness of the produce was one of the prime motivations for shopping from the farmers' field. He also reported that 96.00 percent customers

were agreed to buy more food produced locally. The most frequently cited reaction (35.00%) was that the local community and economy would like to be able to be supported. Product freshness (29.00%) and the provision of support to local producers (23.00%) were also important reasons for purchased more food produced locally.

Manalo et al. (2003) conducted a survey among 435 food shoppers from New Hampshire and observed that 75.00 percent were female, typically the principal food shopper of a household, they also measured the attitude toward local farm products and farm-to-consumer direct markets and found that during the summer, 60.00 percent of the respondents bought products from a farm stand, 27.00 percent were purchased from a U-pick farm and 20.00 percent from a farmers' market. First and most important reason or motivating factor for buying products from all three markets was "Freshness of products". In addition to freshness, convenience and help of local farmer were cited as important to their purchasing choice by buyers of farm stands and farmers markets. For those buying at U-pick farms, 'atmosphere' was important. Farm stands and market shoppers for farmers tend to buy from farmers close to home. About 73 percent of farm stand customers and 67.00 percent of farm market customers travelled five miles or less to the most frequently purchased location. Shoppers travel further to U-pick farms, although less frequently. In order to buy from a U-pick farm, only 40.00 percent travelled up to five miles.

Middleton and Smith (2011) investigated the factors that influence senior farmer market purchases. The study discovered that all three factors, namely attitude, subjective norm, and perceived Behaviour control, were significant in influencing purchasing intention, with attitude being the most influential.

Memery *et al.,* (2015) conducted a study in England through online survey it aims to investigate how local food related attributes (intrinsic product quality; local support) motivate, Improve or enhance purchase intention. Three-stage analysis is used, using structural equation modelling. Shoppers purchase local food more frequently as a consequence of local support rather than intrinsic product quality. Unpicking these relationships reveal that local support has an amplified effect when local identity is higher, and when the shopper is either female or of an older age (55 years plus). Surprisingly, the influence of intrinsic product quality is equivalent by gender, age and location (rural/urban).

Seo *et al.,* (2011) attempted to investigate the factors that influence fast food consumption in middle school students in Seoul, South Korea. It was revealed that Behavioural intention and perceived Behavioural control (b =0.61 & 0.19) were significantly related to fast food consumption (p 0.001). Subjective norm and perceived Behavioural control were also found to be significantly related to Behavioural intention, with b= 0.15 and 0.56, respectively, at p 0.001. There was

no relationship found between attitude and Behavioural intention in fast food consumption.

Singla et al., (2011) conducted a study in Punjab to investing from farm to fork to buy fruits and vegetables directly from farmers and sell them to retail buyers. as 'Easy Day' retail chain of Bharti's for two major crops, viz. cauliflower and okra. They have compared the profile and efficiency of the retail chain supplying farmers and the traditional market supplying farmers. From farm to fork, the fresh food retail chains invest in buying fruit, vegetables or milk directly from farmers and selling them to retail buyers.

Chen and Hung (2016) explore the intention to buy a green product using additional variables in the original theory of planned behaviour. It was found that two factors of original theory viz. attitude and perceived behaviour were positively significant in determining intention, except subjective norm, although have a positive association with intention, it was not found significantly affecting it. Among additional variable environmental ethics and belief and environmental consciousness were positively significant, except social consciousness. It was positively associated but not as significant as the subjective norm.

Yadav and Pathak (2017) conducted a study among 620 respondents to understand the consumer behaviour of buying green products. The study used the Planned Behaviour Theory (TPB) and measured its appropriateness in determining purchase intention of consumer green purchase. Study revealed that the TPB (behavioural belief, normative belief, and control belief) prominent belief constructs identified from the focus group have been found to have a significant positive impact on their respective predictor construct (attitude, subjective norm, and perceived behavioural control). In addition, all the predictor constructs have significantly affected the purchase intention of the consumer to buy a green product, which in turn influences their buying behaviour.

Holt and Telg (2018) conducted a study in Florida, U.S.A, The Theory of Planned Behaviour was used as a way to potentially predict consumer behaviour towards buying locally grown blueberries in order to better understand what motivates customers to buy local food. The variables of past experience and self-identity / moral obligation to purchase local food were also introduced to the model, as both variables in certain food-related Behaviours may increase the predictability of the Planned Behaviour Theory model. The interaction between the past experience of the respondents and behavioural attitude was found to be a major contributor to their intention to buy locally grown blueberries, The data were analyzed using a general linear model as an analysis of covariance. The interaction of both past experience and self-identity/ moral obligation with the attitude had significant influence on the purchase intention for buying blueberries.

Kumar (2018) conducted a study in Varanasi, aimed at measuring the consumer's intention to

purchase fresh vegetables using an extended planned behaviour model theory (TBP) by analysing attitude of the consumer, subjective standards, perceived behavioural control, environmental concern, knowledge and purchasing intent towards fresh vegetables. Study used a Structural Equation Model (SEM) to improve the role of socio-demographic characteristics in the TBP model. The consumer's understanding of the intention to purchase had a positive effect on the intention to purchase with 0.535, followed by subjective standards with 0.509, attitude with 0.366, environmental concern with 0.305, and perceived behavioural control with 0.137. The results showed that the attitude of the consumer, subjective norms, perceived behavioural control, environmental concern and knowledge are positively correlated with the intent of the consumer to buy fresh vegetables.

Kar *et al.,* (2018) conducted a study in ICAR-NDRI, Karnal and GADVASU, Ludhiana milk parlour. A total of 200 respondents, 100 each from the two study locations were selected for the study. Study revealed that the intention to buy organic and cloned animal food products had a significant impact on the perceived quality and perceived risk compared to the perceived price and packaging. In the purchase intention, significant mean differences were observed according to the gender, age, income level, education level and residential area of the respondent. The perception of the consumer towards organic and cloned animal food products will affect their intended purchase and then lead to the actual purchase of the products.

Vantamay (2018) investigated young Thai people's sustainable consumption Behaviour. It was discovered that all three factors in the original framework of theory can predict sustainable consumption intention and Behaviour. The study found that perceived Behavioural control, attitude, and subjective norm had the greatest influence on intention and consumption Behaviour, in that order. The author proposed that all three variables be used in intervention to improve sustainable consumption.

Kar and Meena (2019) conducted a study in Haryana and Punjab states by using theory of planned behaviour which included Perceived Price, Perceived packaging, Perceived quality, Perceived risk. They have reported that in general, nutritional labelling has a major impact on consumer purchasing decisions. More than half of the consumers read the initial purchase information on the labels. The use of food label information varies with the age, residential area (urban/rural) and food item purchasing pattern of the consumer.

Gu and Wu (2019) conducted a study in accordance with the theory of planned behaviour, tests the online purchasing intent of consumers. In testing the online buying intention of consumers according to the planned behaviour theory, a survey was distributed with 200 undergraduates' students. Research results show that there is a statistically significant correlation between

perceived Behavioural control and the intention to use online shopping. Therefore, the young respondents indicates that this group of cohorts have substantial experience with the internet and online shopping behaviour and are persuaded by their peers to shop online.

Tan (2021) conducted a study in Vietnam and found that there are eight factors, which have significant positive impacts on the consumer decisions to purchase organic agricultural products, including (i) the quality of products; (ii) trademarks, product labels; (iii) advertising, media, cultural factors; (iv) the understanding of the consumers about products of organic agriculture; (v) the convenience of the point of sale; (vi) income of consumers; (vii) psychological factors (attitudes, interests, taste, age, gender, etc.); (viii) the consumer's career. The research also found two factors negatively affecting consumer decision, including (i) the value-added tax for the import of organic agricultural products; (ii) the age of the consumer.

2.2 : Attitudes of consumer toward Buying Directly from Farmers:

An attitude in psychology refers to a set of feelings, beliefs, and behaviours towards a specific object, individual, thing, or event. Thurstone (1928) states that attitude denotes "the total sum of the inclinations and feelings of a man, prejudice or bias, pre-conceived notions, thoughts, fears, threats, and beliefs about any given subject." It is a degree of feelings towards direct purchase of farm produces. Attitude generally differs person to person regarding direct purchase of farm produces. The determinants of change in attitude and behavioural correspondence focused on the study of behavioural and social psychology, with emphasis on changing attitudes to motivate consumer choices, resolve conflicts, and alter maladaptive behaviour. Attitudes can be positive, negative, undecided or mixed and can be explicit or implicit. Attitudes are expected to predict and explain human behaviour.

Ajzen and Fishbein (1977) conducted empirical research in light of the correspondence between attitudinal and behavioural entities, research on the relationship between attitude and behaviour is examined. They have stated that belief about an object creates an attitude toward that object, which then transforms into an object related intention. Finally, the purpose can turn into a behaviour towards that object or he/she may go for particular object. Attitude and behavioural entities included four different elements namely, the action, the goal for which the action is directed, the context in which the action is carried out, and the time at which it is performed. A review of empirical research supports the argument that strong relationships between attitude and behaviour are only achieved through high correspondence between at least the target and action components of attitudinal and behavioural entities.

Lockeretz (1986) conducted a study in eastern Massachusetts including the cities in New England (Boston and Worcester) where he interviewed more than 600 consumers in six urban and sub

urban communities basically at farmers market or supermarket. This study suggests that while urban customers are predisposed to locally grown produce, this predisposition is not converted into action unless a suitable site, like a farmers' market, is provided. As a notion the preference for local products is not, the determining factor in the buying habits of consumers. In this study, the specific supermarkets featured locally grown produce in their advertising, which seems to have had little effect on buying habit. On the other hand, consumers' highly favourable views of farmers' markets have involved a number of factors in the purely geographical sense, in addition to the locality of the produce. It included the pleasant environment, the (presumed) short time since the product was selected, and the opportunity to buy in a face-to-face transaction directly from the producer.

Gracia and De-Magistris (2007) conducted a survey in Naples, Italy among 200 urban consumers. There were two variables measuring the attitudes towards organic food products namely Health benefit and quality of products. Results indicate that consumers who are more willing to buy organic food products are more likely to buy a larger amount of those products. The intention to purchase depends on attitudes and organic product knowledge. Consumer attitude on health and environmental benefit of organic food are foremost important factor explaining purchase intention and final decision behaviour. Lastly, income and knowledge of organic food positive attitude and final decision to buy organic food products were observed to be significant.

Tsakiridou *et al.,* (2008) conducted a study among 660 respondents to explore the attitudes towards organic food products of Greek consumers. Results show that majority have positive attitude towards organic food, more than 65 percent of the respondents say they are interested, and 50 percent of them say they prefer to buy organic food. Environmental and health concerns are strong motives which creates positive attitude in customers and seem to influence the consumption of organic food. Nearly all respondents (94.5%) are concerned about the safety of food and 87.6 percent of them consider organic products to be healthier. It is found that education is a significant determinant of attitudes towards Organic food, as compared to elementary and high school graduates, consumers with a higher education believe in the value of organic food. Attitudes have positive correlation with levels of income, higher-income consumers have a positive attitude towards organic food as compared to low- and medium-income group consumers. Family size (no. of member in a family) have a little effect on attitude towards organic foods.

Gunden and Thomas (2012) conducted a study in three states of the United States among 412 customers. It was aimed to evaluate consumer attitudes towards purchase decisions of fresh fruit and vegetables, according to five characteristics: nutritional value, hygiene, taste, affordable price and freshness, among three distinct consumer groups: young professionals, older employed

workers and the oldest unemployed. The results showed that their preferences for the freshness attribute of fruits and vegetables were statistically significantly different among the groups. Young professionals have higher priority to freshness than the remaining groups. Multidimensional scaling (MDS) analysis shows that customers perceive freshness as a separate food attribute that is quite distinct from taste, hygiene, nutritional value and affordable price. The findings indicate that consumers perceive freshness as a distinct food attribute distinct from nutrition value, hygiene, taste, and affordable price. Furthermore, consumers tend to give the same level of priority to hygiene and nutritional value, as well as taste and price.

Kapoor and Kumar (2015) conducted a study in the state of Odisha understand selected attitude towards direct purchase of fruit and vegetable**.** They have reported that Consumer purchasing behaviour was assessed on the basis of the frequency of purchases, transaction volume, marketplace, and form of purchase. According to the findings, vegetables are consumed in greater quantities and purchased more frequently than fruits. When making purchase decisions, consumers placed a higher value on credibility attributes than on search and experience attributes. Consumer willingness to pay for graded and packaged products was found to be significantly influenced by family income and education.

2.3 : Symbiotic relationship between urban and rural people:

Symbiosis may be defined as a relationship between people or organizations that depend on each other equally in which both positive and negative effects include. Symbiotic relationship marketing strategy in which one manufacturer sells its finished product to another for resale under the label of the second manufacturer where, through a well-established distribution system, that manufacturer already has access to the market. Symbiotic marketing is “an alliance of resources or programs between two or more independent organizations designed to increase the market potential of each”. One of the direct farm marketing channels is Community Supported Agriculture, or CSA, is a hyper-local food system built on a symbiotic relationship between consumers with local farmers. CSAs are part of a food system with almost no middlemen or moving parts. That means fewer people touching, packaging, and hauling around your food. In a CSA, consumers buy shares in a local farm and in return get direct access to goods from that farm, often in the form of agricultural produces, weekly boxes of meat, produce or dairy. It is also possible in roadside stand, U-pick farm, Farmer’s market. Symbiotic relationship between food producer and consumer in the quality food market is conceptualized as a ‘trusting relationship’.

Therefore, economically, if direct selling is to grow its market share, consumers would want something from direct selling that supermarkets cannot have. The most likely client criteria are

quality and value for money. Marsden (1998) has argued that consumers and farmers are being 'reconnected' as consumers become more conscious of the types of food they eat and also its status of origin and transfer. Watts and Goodman (1997) also point out that the food system is distinctive, in that it depends on organic properties at both ends of the chain. Therefore, it makes sense to reconnect them more directly.

Gilg and Battershill (2000) explored the potential for direct selling to offer a substantial alternative to the Agri-industrial food system and the degree to which direct selling may or may not be more environmentally friendly than the Agri-industrial model. They have reported that Direct selling by producers offers an alternative in which producers and consumers can form a symbiotic relationship depending on their individual desires. This may include a desire for a more environmentally friendly form of farming.

Hunt (2007) surveyed of 216 shoppers in eight farmers' markets at Maine, U.S.A. Vendors at these markets were also surveyed, with 65 of the 81 vendors being farmers. Consumers ranked freshness as the most important reason to shop at a farmers' market out of eight possible choices. Quality, availability of specialty products, helping the farmer and farmer contact were the next most important reasons and were statistically greater for the Lifestyle cluster compared to the Seasonal Shoppers, using a t-test ($P>0.05$ for each reason). Price was consistently the lowest or next to lowest reason to shop at the markets. They have found that social factors, such as having fun at the market and interacting with farmers, are important aspects of shopping at farmers' markets. Nearly all respondents (98%) had fun at the farmers' markets. More than half of the survey respondents (59%) make the farmers' market a family event. Also, about half of respondents (48%) indicated that they had visited a farm from where they had bought products, while four-fifths (82%) would like to do so. Nearly all market farmers (95%) feel more involved with the community since they began selling at the farmers' market. Interaction with customers was the greatest source of this interaction (91%). More than half (58%) found that the interaction improved their overall product visibility. Two-fifths of farmers (41%) changed their products due to consumer demand, demonstrating that there is direct customer feedback for farmers. By examining the linkages between producers and consumers at a direct market—often embedded with a sense of local identity—there is the potential to better understand social interactions that can support the economic and environmental sustainability of local agriculture.

Darolt and Constanty (2008) conducted a study on 41 organic horticultural farms in 16 municipalities in Brazil. They have found farmers who sell directly to customer used more than

3 marketing networks, their production processes are diversified (more than 20 products), management is complex, the farm is flexible (inn, restaurant, pick-and-pay, rural tourism) and

there is a broader producer / consumer relationship. Integrated farmers (indirect sales) have only one sales channel. Farmers follow production plans from the buying companies and the output is marketed through supermarket chains. Farming systems are simple and relationship with consumers is insignificant. Events such as visits to organic farms, advanced purchase, direct credit for producers / consumers and organic farming courses or field days have improved the partnership between producers / consumers and provided the network of organic farms with customer support.

Gmbh (2016) explored the nature of the relationship between producers and retailers in the food market in Germany. It is noticed that relation between producer and retailers is a symbiotic relationship which lies somewhere between a market-governed relationship and a hierarchy and which is not really covered by any of the standard legal arrangements. Manufacturers and retailers will therefore have to create a relationship culture and develop techniques of relationship management which permit an efficient coordination of production and distribution under difficult conditions; In any case, the symbiotic relationship between manufacturers and retailers will probably become even more precarious than it already is.

Fadairo and Olutegbe (2018) conducted four focus group discussions involving a total of 42 sellers and key informant interviews with 15 buyers in two major markets of Nigeria. They reported that impact/gains of the rural-urban interrelationship in the study area were more beneficial to the rural economy and life than the urban. Rural-urban are not discrete entities as generally perceived by development planners. There exist varying degrees of symbiotic interrelationships between rural and urban areas which have positive socio-economic and cultural implications. the study concluded that the market centered rural-urban interactions is seen to be more skewed in terms of impacts/gains towards the rural people than the urban residents.

2.4 : Willingness to accept farm produces as per Blockchain Management

Willingness to accept (WTA) is the minimum amount of money that a producer (a seller) is willing to accept to sell a particular good or service. Ginsburgh, (2017) found that in economics, willingness to accept (WTA) is the minimum 11monetary amount that a person is willing to accept to sell a good or service, or to bear a negative externality. Willingness to accept (WTA)is contrast to Willingness to pay (WPA) which is a maximum amount of money purchasers willing to pay. In standard economic theory the willingness to pay (WTP) and willingness to accept (WTA) a monetary amount for an object are the same. If Willingness to pay (WTP) is less than

willingness to accept (WTA) a monetary amount for an object, a phenomenon called the endowment effect.

Shin *et al.,* (2012) involved in tests of the divergence of willingness to pay (WTP) and willingness to accept (WTA) for identical goods is driven by the degree of substitution between goods. Results indicates that there were no significant differences between the willingness to pay (WTP) and willingness to accept (WTA) measures of value for market good. Experimental results support his argument that the degree of substitutability between goods may drive the difference between WTA and WTP measures of value. For close-substitute market goods that are readily available in commercial outlets with minimum transaction costs. On the other hand, in the case of a non-market good without close substitutes the measure of value differs and persists, even with repeated participation in the market and full information on the nature of the good.

De-Magistris and Gracia (2016) reported that the consumers were willing to pay (WTP) a positive price premium for locally grown (travelled the shortest distance) and organically produced almonds, whereas they were not willing to pay (WTP) a price premium for longer distance travelled almonds.

Nyongesa *et al.,* (2016) analyzed the willingness to accept pay (WTA) as a proxy economic measure of the value of environmental service (ES) and identifies socio-economic factors that influence the farmers willingness to accept (WTA) for the conservation of watersheds in Kenya. They collected data from 200 farmers by face-to-face interview and applied Contingent Valuation (CV) method for assessing WTA. The results show that 97 percent of farmers were willing to continue implementing PES practices. The estimated annual lowest and highest WTA for PES farm practices were at Kshs. 8835 (US$88.35) for grass strip and Kshs. 21,847.500 (US$218.48) for fallowing. Significant WTA determinants were socio-economic variables, including education, occupation, acquired skills, land use practice, perception, income, and the interest of individuals in conservation.

Popper & Lohr (2017) state that in the example of IBM-Walmart a recording system based on Blockchain can be used to track in real time products and shipping containers. They reported that using this technology has made the tracking of the source of contamination in the case of a disease outbreak easier for the government and related authorities.

Xiong and Kong (2017) adopted the Contingent Valuation Method (CVM) and Ordinal Logistic Model to study the farmers willingness to accept and their environmental compensation factors for Poyang Lake Wetland. The farmers' WTA is used as the dependent variables, while household characteristics are used as the independent variables. Results show that 87.80 percent of farmers, with an average price of $858.81 / household per year, are willing to accept ecological compensation. Household education years, number of family members, source of income, residential location, emphasis on improving wetland resources, arable land area, and contracted water area are the influencing factors that significantly influence farmers' WTA.

Kim & Laskowski (2017) mentions that the application of Blockchain technology enables participants of the global food supply chain to get access to reliable food information, ultimately ensuring food safety.

Yin *et al.,* (2017) studied 1225 consumers in Shandong province in China who were chosen at random to investigate WTA for various attributes of Infant Milk Formula. It was discovered that traceability information was more important than brand or country of origin information. For higher WTA, grazing information was the most preferred traceability information among the various types of information.

Noel (2017) mentions the list of initiatives in food supply chain system across the globe, which have used Blockchain technology as the tool for tracking the food from farm to the consumers' plate.

Kamath (2018) presented the case study of Walmart using Blockchain to improve food traceability. The author claims that such an application of Blockchain in the food supply chain can be useful in tackling global food contamination scandals worldwide. The author mentions that Blockchain has the potential to reduce the time taken for tracking food products, improving food safety and decrease food safety.

Galvez *et al.,* (2018) examined the possible reliability and authenticity of the global food supply system through the Blockchain technology. Authors conclude that Blockchain is the new approach to food safety through the application of its data acquisition and management platform.

Yiannas (2018) found that food products can be traced by Blockchain technology very quickly as compared to the conventional tracking method. He claims that food information is only a matter of thought using Blockchain's technology food tracking platform.

Nam (2018) conducted a study in South Korea to estimate the additional (WTP) of the consumer and analyzing the relationship with the consumer's socio-economic features for Blockchain and smart contracts in the insurance sector. About 65 percent of sample respondents answered they are willing to pay some additional premium for Blockchain and smart contracts. For insurance policies using Blockchain and smart contracts, consumer with high incomes, high education, and more insurance contracts are more likely to pay extra. Age and marital status do not affect additional willingness to pay behaviour.

Yiannas (2018) mentions that Blockchain technology can track the food products in very less time than the conventional method of tracking. He claims that using Blockchain technology food

tracking platform, food information is just a matter of thought away.

Westerkamp *et al.,* (2018) purposed a decentralized Blockchain based system to record the transformation of the good in the manufacturing process using smart contract. They showed that each ingredient would be recorded as the token and they will be recorded as the next token when they are used in transformed during manufacturing. This system is claimed to track product transformation in the manufacturing process.

Zhu and Kouhizadeh (2019) undertook a study in integrating Blockchain technology in supply chain technology and understanding how it can help in product deletion management. The study presents that transparency, traceability, smart execution, security and accuracy assured by the Blockchain to supply chain information can contribute to making proper strategy product deletion and rationalization.

Grover *et al.,* (2019) revealed that users are attracted by security, privacy, transparency, trust and traceability aspects provided by Blockchain. They proposed framework for Blockchain Technology acceptance model with four variables: perceived usefulness, perceived ease of use, usage attitude, and external variables.

Miraz *et al*., (2020) conducted a study in Malaysia, it aims at implementing Blockchain in retail market for increasing customer benefits in order to improve the retail industrial supply chain activities. This study critically examined the variables in the current research Framework of Blockchain implementation in the retail market. As a result, the purpose of this research is to implement Blockchain in the retail market in order to increase customer benefits and improve the retail industrial supply chain activities. They proposed a conceptual framework that examines the relationship of Blockchain experience, Blockchain management and Blockchain transaction policy influence toward Blockchain implementation in retail market. This study investigates the influence of Blockchain experience, Blockchain management, and Blockchain transaction policy on Blockchain implementation in the retail market.

Collart (2021) reviewed the application of Blockchain across different aspects while focusing on how broad adoption of the technology might help address major challenges faced by the U.S. fresh produce industry. Applications of Blockchain in the food sector are growing and the adoption of farm-to-fork traceability systems is at the forefront. These challenges include food safety, food fraud, food loss and waste, and the general need for better traceability systems.

Tian (2016) examined the utilization and development situation of RFID (Radio-Frequency Identification) and Blockchain technology, and then we analyze the benefits and drawbacks of using RFID and Blockchain technology in building the agri-food supply chain traceability system; finally, we demonstrate the system's construction process. It can achieve traceability with trusted

information across the entire agri-food supply chain, effectively ensuring food safety, by gathering, transferring, and sharing authentic agri-food data in production, processing, warehousing, distribution, and selling.

3.RESEARCH METHODOLOGY

According to Kothari (2007), research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done systematically. In this study, the term methodology refers to the methods and principles, which were used to explain how the study was conducted to achieve the established objectives. The investigator has taken due care to point out the logical considerations for having adopted certain procedures and methodologies for the study. The goal of research is to conduct an empirical study of the subject, conduct a scientific analysis of the problems and circumstances in order to make appropriate conclusions, establish facts, or construct a theory through hypothesis testing. In this chapter, an attempt has been made to explain the various methods and procedures followed to investigate the problem with the following sub- heads:

3.1 Research design:

The overall strategy chosen to incorporate the various components of study in a systematic and logical manner, thus effectively addressing the selected research problem, is defined as research design. It contains the blueprint for data collection, measurement and analysis. Kerlinger (2004) defined research design as the plan, structure, and strategy of investigation devised to obtain answers to research questions while controlling variance. The primary goals of research design are to enable researchers to respond to research questions with validity, objectivity and accuracy, as well as to control variance. It is the blueprint for any research project. For the specific study, two different types of research designs (Ex-post facto, exploratory) have been used. The ex-post facto design is used when manifestations of variables are assumed to have already occurred. Ex-post facto research, according to Kerlinger (1964), is a systematic empirical investigation in which the researcher has no direct control

over the variables. In addition to ex-post facto research, an exploratory research design was used. Exploratory research, as the name implies, was used to investigate research questions and does not aim to provide final and certain solutions to existing problems. This type of research is typically conducted to investigate a problem that has not yet been clearly stated. The goal of exploratory research is not to provide final and conclusive answers to research questions, but rather to explore the research topic in varying depths.

3.2 Selection and description of the Locale of the study

East India is covered under four states namely Bihar, Jharkhand, West Bengal and Odisha. Level of urbanization (percentage of urban population among total population) of above mentioned 4 states are presented in the table 3.1.

Table-3.1: Urbanization rate of east Indian states.

State	% Of urban population	
	2001	2011
Bihar	10.46	11.29
Jharkhand	22.24	24.05
West Bengal	27.97	31.89
Odisha	14.99	16.68

Out of these four states, West Bengal was selected for the investigation due to highest urbanization rate in last decades. West Bengal's urbanization traces back to late 18th century when Kolkata, previously called Calcutta, emerged as the first port town and a commercial city. Urbanization was highly concentrated in the Calcutta region as British brought trade to Calcutta, which subsequently led to industrialization. Calcutta was the seat of colonial administration and the Centre of colonial trade. Most of the major labour movements from Bihar, Uttar Pradesh and Orissa (now Odisha) to the tea gardens in Assam and plantations in Africa took place through Calcutta. Industrial growth around Calcutta was primarily based on export-oriented jute industry and was fuelled with the availability of favourable factors like access to port facility, inland water transport via the river network supported by the Ganga and the railway infrastructure, thus covering a huge hinterland.

According to the Census 2011 (Census of India, 2011), West Bengal remains one of the highly urbanized states of the country with currently 32% of the state's population residing in urban areas and it ranks fourth highest urbanized states in the country. North Bengal consist of the eight northern districts of North Bengal viz. Darjeeling, Jalpaiguri, Cooch Behar, Uttar Dinajpur, Dakshin Dinajpur, Maldah, Murshidabad and Kalimpong. Located far away from the metropolitan influence of Kolkata, this region has historically remained one of the least

urbanized part of the state. However, from 2011 onwards the process of urbanization is rapidly gaining pace in most of the districts of North Bengal. This can be realized by looking into the various facets of urbanization unfolding in North Bengal during the period from 1991 to 2011.

Level of Urbanization in North Bengal

The level of urbanization is measured as the percentage of urban population to total population of a region. The level of urbanization is a very good indicator of the extent of urban development in a region. Historically, India being a developing country, the level of urbanization is less compared to any developed region. North Bengal i.e., the extreme north-eastern part of West Bengal being relatively backward exhibits a low level of urbanization.

Table 3.2: Level of Urbanization in Districts of North Bengal (in %)

District	1991	2001	2011
Darjeeling	30.47	32.34	39.42
Jalpaiguri	16.36	17.84	27.38
Koch Bihar	7.81	9.10	10.27
Uttar Dinajpur	13.34	12.06	12.05
Dakshin Dinajpur	13.35	13.10	14.10
Maldah	7.07	7.32	13.58
North Bengal	13.52	14.16	18.70
West Bengal	27.48	27.97	31.87
India	25.71	27.82	31.14

Table 3.2 shows the level of urbanization across various districts of North Bengal for the three-census year of 1991, 2001 and 2011. The level of urbanization in West Bengal and India has also been calculated to contextualize the actual figures for various districts of North Bengal. From the table it can be observed that in 1991, Darjeeling district has the highest level of urbanization in North Bengal, which was followed by Jalpaiguri, Dakshin Dinajpur, Uttar Dinajpur, Koch Bihar and Maldah. The situation in 2001also portrays the same picture. Darjeeling again is way ahead of other districts in terms of the level of urbanization, followed by Jalpaiguri, Dakshin Dinajpur, Uttar Dinajpur, Koch Bihar and Maldah. Similar to 1991, only Darjeeling district recorded a level of urbanization above that of West Bengal and India in 2001. In 2011 also Darjeeling district with a level of urbanization significantly above that of West Bengal and India occupied the first position, followed by Jalpaiguri and Dakshin Dinajpur. Maldah, which was earlier the least urbanized district of North Bengal, occupies the fourth position in 2011. The internal variation in the level of urbanization among the six districts of

North Bengal as measured by coefficient of variation was found to be 0.53 in 1991, 0.54 in 2001 and 0.54 in 2011, signifying a status quo during the period from 1991 to 2011.

The Darjeeling and Jalpaiguri the northern districts of West Bengal have been selected purposively due to following reasons:

- It has been clearly seen that among the 4 East Indian state West Bengal have highest level of Urbanization. According to 2011 census West Bengal have 31.89% urban population followed by Jharkhand (24.05%), Odisha (16.68%), Bihar (11.29%).
- Level of Urbanization of West Bengal (31.89%) is slightly higher than the average level of urbanization of India (31.14%).
- Siliguri is the third largest urban agglomeration in West Bengal, after Kolkata and Asansol. It lies within 35 kms west to its twin city, Jalpaiguri. The merging of the two cities makes them the largest metropolis of the Northern part of West Bengal.
- West Bengal already allows cash and carry retailers to buy directly from farmers under the model Agricultural Produce Market Committee (APMC) Act.
- Familiarity of the investigator with the area and investigator is well aware of the language, culture and behaviour of the respondents of study area.
- No systematic research has been conducted on direct purchase of agricultural produces in the northern region of West Bengal.

Fig. 3.1: Map of West Bengal

3.2.1 Brief description of study area: Darjeeling district of North Bengal

Darjeeling is the northern most district of West Bengal in eastern India, located in the Himalayan foothills. Darjeeling certainly includes 6 T's Tea, Teak, Tourism, Toy Train, Tiger Hill and Trekkers' paradise in the post-modern era, fondly called “Queen of the Hills”. The district is divided into two sections geographically: the hills and the plains. The Darjeeling District lies between 26.9287° N and 88.3628° E. The Gorkhaland territorial authority, a semi-autonomous administrative authority under the government of West Bengal, covers the entire hilly area of the district. This body covers the three hill subdivisions of Darjeeling, Kurseong and Mirik and the district of Kalimpong. The foot hills of Darjeeling Himalayas, which comes under the Siliguri subdivision, is known as the Terai. The district is bounded on the north by Sikkim, on the south by Bihar's Kishanganj district, on the southeast by Bangladesh's Panchagarh district, on the east by the districts of Kalimpong and Jalpaiguri, and on the west by Nepal. Darjeeling district is 18 miles (29 kilometers) long from north to south and 16 miles (29 kilometers) wide from east to west (26 km). Darjeeling Hill Area's primary economy is based on tea production, horticulture, agriculture, and forestry. The majority of the forests are now found at elevations of 2000 meters or higher. The land between 1000 and 2000 meters in elevation has been cleared for tea plantation or cultivation. GDP of Darjeeling district is ₹10,664.32 crore (equivalent to ₹260 billion). Total population of this district is approximately 1846800 and urban residents is 1123859, it means % of urban population is 38.99%. Sex ratio and literacy rate of Darjeeling district are 970 and 79.56%. As per data of department of agriculture total cultivable area of this district is 160.14 thousand hectare and Net sown area is 143.86 thousand hectares. Major field crops are rice, wheat, maize, mustard, linseed etc. production data is shown in table no 3.2. one of the most important horticultural crops is pineapple followed by mandarin, citrus, banana, litchi, Darjeeling district is already famous for its tea and ginger. As per latest livestock census data number of indigenous cattle, crossbred cattle, buffalo are respectively 118.1 thousand, 85.0 thousand and 6.4 thousand. Most prevalent breeds are Siri, Sahiwal indigenous cattle breed, HF and Jersey Crossbred and to some extent Murrah Buffalo. Milk production of this district is roughly 92 thousand MT. Siliguri is a most important city of West Bengal that spans the Darjeeling and Jalpaiguri districts, popularly is known as the "Gateway to Northeast India". It is situated on the banks of the Mahananda River in the Himalayan foothills (26.71°N 88.43°E.). Siliguri is West Bengal's third largest urban agglomeration, after Kolkata and Asansol. As per 2011 census population of Siliguri city is 701,489. Siliguri in West Bengal has great strategic significance as it is conveniently located, connecting four international borders: China, Nepal, Bangladesh,

and Bhutan. It also connects the North-East to the Indian mainland and all other districts in West Bengal. Siliguri, located at the foothills of the Eastern Himalaya, is a trading and transportation hub that has become commercial center over the time.

Table 3.3 Agricultural production data of Darjeeling district

Name of crop	**Kharif**		**Rabi**		**Summer**		**Total**	
	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
Rice	48.7	1673	9.3	1576	2.6	1625	60.7	4874
Maize	29.2	2300	-	-	-	-	29.2	2300
Wheat	-	-	4.7	1700	-	-	4.7	1700
Millet (Kodo millet)	0.8	1600	-	-	-	-	0.8	1600
Rapeseed	-	-	0.5	600	-	-	0.5	600
Vegetable (Cabbage, Cauliflower, Radish etc.)	2.0	7500	1.012	1000	1.40	7200	4.43	15700
Chilli	0.3	750	-	-	-	-	0.30	750
Ginger	0.6	3100	-	-	-	-	0.62	3100
Turmeric	0.2	1500	-	-	-	-	0.15	1500
Cardamum	-	245	-	-	-	-	-	245
Potato	-	-	113.10	15700	-	-	113.10	15700

Table 3.4: Basic information about Darjeeling district of West Bengal

Sl.No.	**Particulars**	**Values**
1.	Total geographical area	3,149 Km^2
2.	Location	27 Deg. 13 Min. N to 26 Deg. 27 Min. N Latitude
3.	Number of sub-divisions	4
4.	Number of blocks	9
5.	Number of Municipality	4
6.	Total Number of Tehsils	12
7.	Number of Villages	92
8.	Population Density (Number /Sq/KM	586
9.	Population growth	14.77%
10.	Total population Rural population Urban population Male population Female population	1846823 1118860 727963 937259 909564
11.	Livestock population (As per 19th livestock census 2012) (in thousands) Cattle Buffalo	 118.1 2.9
12.	Literacy rate (%) Male Literacy Female Literacy	79.56 85.61 73.33
13.	Sex Ratio	970

Fig 3.2: Map of Darjeeling district

3.2.2 Brief description of study area: Jalpaiguri district of North Bengal

The district is located at 26° 16'and 27° 0'North latitude, and 88° 4'and 89° 53'East longitude. The district is located on the banks of the Teesta River which is the second largest river in West Bengal after the Ganges. It is located in the northern part of the state of West Bengal. It shares the northeast and south international borders with Bhutan and Bangladesh. The other frontiers are divided into the district of Darjeeling in the west & northwest of the district Kalimpong in the north and Coochbehar in the southeast. 'Tea', 'Timber' and 'Tourism' form the backbone of the trade industry in this district. Agriculture and animal husbandry is also practiced extensively throughout the district. As per census, 2011, Jalpaiguri had population of 2381596 of which male and female were 1217532 and 1164064 respectively. Its population growth rate over the decade 2001-2011 was 33.77% and population density is 701 per sq.km. Sex ration and literacy of Jalpaiguri district are 956 and 73.25 % respectively. 27.38% of the total Jalpaiguri population lives in district urban areas and 72.62 % population of Jalpaiguri districts lives in rural areas of villages. In total, 1,060,351 people live in urban areas, with males accounting for 545,778 and females accounting for 514,573. The urban region of Jalpaiguri district has a sex ratio of 943. Jalpaiguri district comprises of 2 Sub-Division Jalpaiguri and Mal subdivision and 7 Blocks [Jalpaiguri Sadar / Dhupguri / Maynaguri / Rajganj / Mal / Matiali / Nagrakata]. Cattle and buffalo population of Jalpaiguri district are roughly 524734 and 6541. Most prevalent breeds are Siri, Gir, Sahiwal indigenous cattle breed, HF and Jersey Crossbred and to Murrah Buffalo. Milk production of this district is roughly 235 thousand MT. Most important city of this district is Jalpaiguri which had a population of 107,341 (53,708 males and 53,633 females), while the metropolitan region had a population of 169,002 (85,226 males and 83,787 females). The population of children aged 0 to 6 years was 14,522. The effective literacy rate for people aged 7+ was 86.43 percent. Jalpaiguri is also known as twin city Siliguri and along with this this region ismost important social, economic, agricultural zone of North Bengal. Production and productive details of major crops of this district was shown in table 3.5.

Table 3.5 Agricultural production data of Jalpaiguri district

Name of crop	Kharif		Rabi		Summer		Total	
	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
Paddy	94.8	3320	335.9	3391	49.0	2815	470.8	9526
Potato	-	-	348.6	27864	-	-	348.6	27864
Wheat	-	-	31.8	255.0	-	-	31.8	2550
Rape & Mustard	-	-	4.8	768	-	-	4.8	768
Jute	-	-	505.1	2114	-	-	505.1	2114
Maize	-	-	-	-	18.9	2315	22.5	2315

Table -3.6: Basic information about Jalpaiguri district of West Bengal

Sl.No.	Particulars	Values
1.	Total geographical area	3386.18
2.	Location	26º15′47″ & 26º59′34″ N Latitude 88º23′2″ & 89º7′30″ E Longitude
3.	Number of sub-divisions	2
4.	Number of blocks	7
5.	Number of Municipality	3
6.	Total Number of Tehsils	13
7.	Number of Villages	80
8.	Population Density	701
9.	Population growth	33.7
10.	Total population Rural population Urban population Male population Female population	2381596 1628791 752805 1217532 1164064
11.	Livestock population (As per 19th livestock census 2012) Cattle Buffalo	524734 6541
12.	Literacy rate (%) Male Literacy Female Literacy	73.25 79.95 66.23
13.	Sex Ratio	956

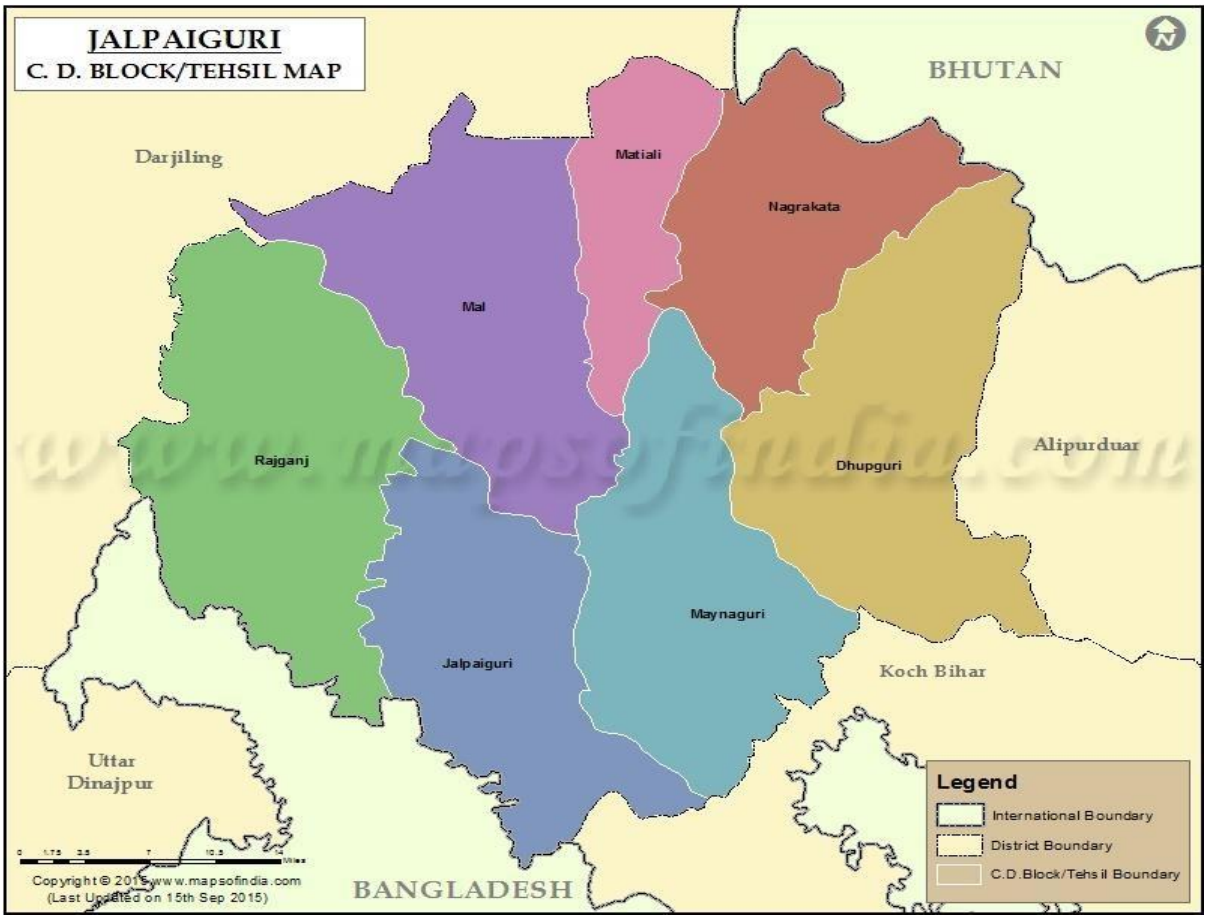


Fig 3.3: Map of Jalpaiguri District

3.3 Sampling plan:

3.3.1 : Selection of Study area

Northern part of West Bengal consists of 8 districts, namely Cooch Behar, Dakshin Dinajpur, Darjeeling, Kalimpong, Jalpaiguri, Malda, Murshidabad and Uttar Dinajpur. Out of 8 districts two districts namely Darjeeling and Jalpaiguri were selected purposevely. From each selected district three blocks further selected for the investigation. In this way 6 blocks were selected from the both districts.

District	Darjeeling			Jalpaiguri		
Blocks	Matigara	Naxalbari	Khoribari	Jalpaiguri	Dhupguri	Mal
Respondents						
Urban respondents	20	20	20	20	20	20
Farmers	05	05	05	05	05	05
Total	30	30	30	30	30	30

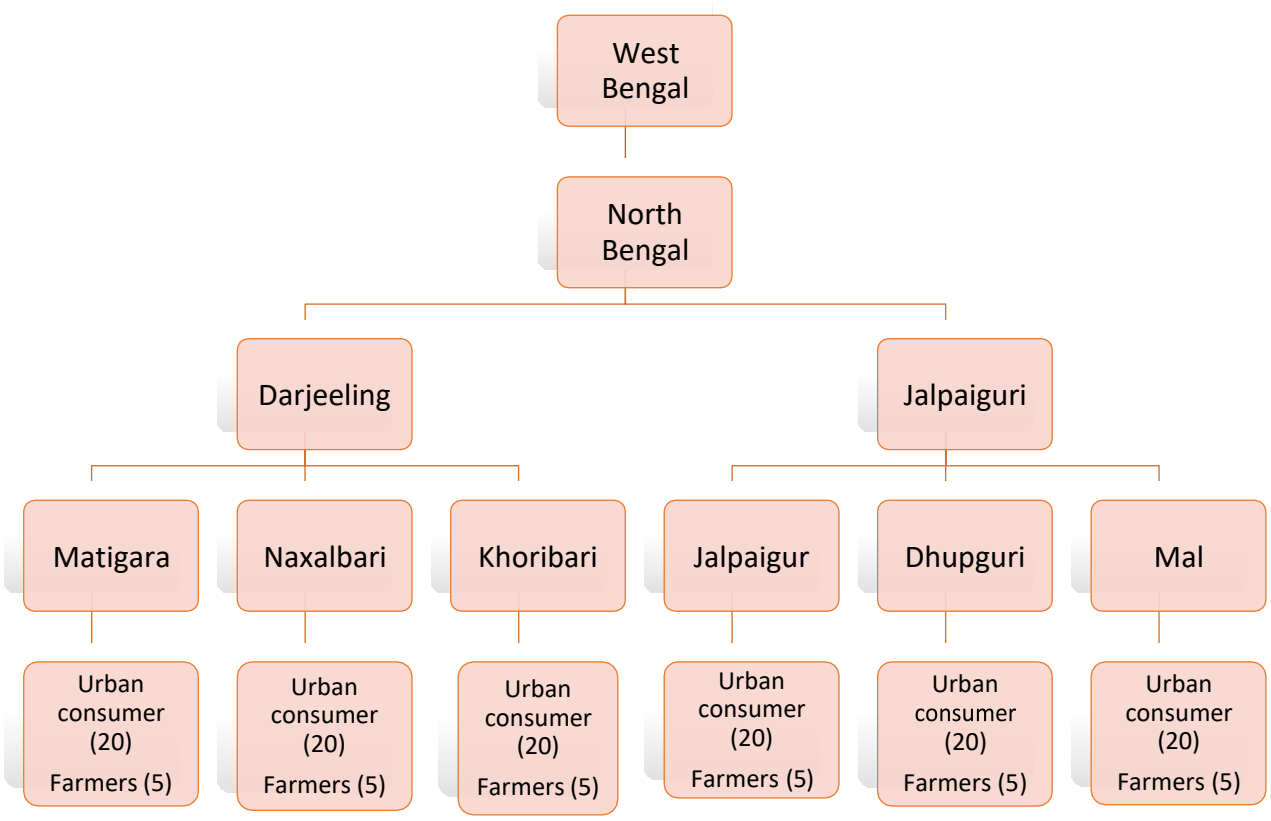


Fig: 3.4 Sampling Plan

3.3.2 Selection of Respondents

For the present investigation, two types of respondents i.e., Urban consumers and Farmers were selected. From each selected block 20 urban consumers and 5 farmers were selected. In this way from each district, 60 Urban Consumers and 15 farmers were selected using snowball sampling. Thus, a total of 150 respondents were interviewed to get first-hand information. The "Urban consumers" sub-sample includes Urban resident who have purchased raw food items such wheat, rice, fruits, vegetable and milk and milk products directly from primary producers i.e., rural farmers. Whereas the "farmers" sub-sample includes farmers who have cultivated agricultural crops, fruit, vegetable and selling milk and milk products directly to the urban consumers without any middleman in marketing of agro-animal produces.

3.4: Variables and their measurement:

For any study undertaken in social science research, it is customary to precisely mention the variables used for the study with their working concepts and measurement procedures. After extensive review of literature and consultation with the experts, relevant variables were included which had been found significant for the study. Table 3.7 depicts the variables and their respective measurement at a glance. The selected variables and their operational definitions and

measurement procedures have been dealt in detail as follows;

Table-3.7: Selected variables and their empirical measurement

Sl. No	Variables	Measurement
A. Independent Variables		
1	Age	Direct Questioning
2	Gender	Observation
3	Education	Direct questioning
4	Type of Family	Interview schedule was developed
5	Occupation	Direct questioning
6	Annual Income	Interview schedule was developed
7	Mass Media Exposure	Interview schedule was developed
8	Household Expenditure Pattern	Interview schedule was developed
9	Consumption frequency	Interview schedule was developed
10	Source of Information	Interview schedule was developed
11	Preferred shop	Interview schedule was developed
12	Land holding size (farmers specific)	Interview schedule was developed
13	Herd size (farmers specific)	Interview schedule was developed
14	Extension contact (farmers specific)	Interview schedule was developed
15	Social participation (farmers specific)	Interview schedule was developed
B. Dependent Variables		
16	Purchase Intention	Theory of planned behaviour (Ajzen's, 1991) was used
17	Attitudes Toward Buying Directly from Farmer	Interview schedule was developed
18	Symbiotic relation between urban-rural linkage	Interview schedule was developed
19	Determinants of direct purchase of agricultural produces	Interview schedule was developed
20	Willingness to Accept (WTA)	Interview schedule was developed

3.4.1 Operational definitions of variables

Operationalization is the process of defining a concept so as to make the concept clearly distinguishable or measurable and to understand it in term of empirical observations. According to Kerlinger Operationalization of variable is "Do such and such things in so and so manner". "Operational definitions" of the variables studied under the study have been given below:

3.4.1.1 Age:

It referred as chronological age of the consumer completed at the time of investigation. Age is one of the important socio-demographic factors consider in this study. In the market-related research, age should be considered because age affects the physical and psychological development of the consumer, which, in turn, affects his/her consumption behaviour. One of the important socio-demographic factors considered in this study is age. Age should be considered in market research because it affects the physical and psychological development of the consumer, which in turn affects his/her consumption Behaviour. The respondents were classified into three categories young, middle and old age groups according to the procedure followed in population census report, 2011 (GOI)

Sl. No.	Category	Age (in years)
1.	Young	Up to 35
2.	Adult	36 to 50
3.	Old	Above 50

3.4.1.2 Gender:

Gender means the societal meaning assigned to respondents as male or female. The respondents were classified as male and female and result was expressed in terms of frequency and percentage. This was measured by Direct Observation. Gender is one of the important socio-demographic factors in this study. As gender affects the purchasing decision, it has significant implication in market-related research. Male coded as “1” and subsequently female coded as “2”.

3.4.1.3 Education:

It was operationalized as the academic qualification of respondent acquired through formal schooling and collegiate education. It was measured by direct questioning. Frequency and percentage of each category was calculated and presented accordingly. The respondents were assigned score as;

Sl. No.	Category	Score
1.	Illiterate	1
2.	Primary	2
3.	Middle	3
4.	Secondary	4
5.	Higher secondary	5

6.	Graduate and above	6

3.4.1.4 Type of family:

It was defined as respondent's family pattern either joint or nuclear family. It was generally expressed in terms of joint and nuclear family with respective scores of 1 and 2.

3.4.1.5 Occupation:

Operationally, it is defined in terms of the source of earning. In present study main and subsidiary occupations undertaken by the respondents were recorded and scores were given as Agriculture-1, Dairy-2, Government service-3, Private sector-4, Business-5, Labour-6.

Sources	**Score**
Agriculture	1
Dairy & Livestock	2
Government employment	3
Private sector employment	4
Business/Trade	5
Labour	6

3.4.1.6 Annual income:

It refers to the total income earned by the respondents and other family members obtained from various sources on annual basis at the time of data collection. It was generally expressed in Rs/annum. Respondents were categorized as low, medium and high.

3.4.1.7 Mass Media Exposure:

It is operationalized as respondents used to or having exposure of special media as Rarely (1), Occasionally (2), Regularly (3) basis.

3.4.1.8 Household Expenditure pattern:

Operationally, it is defined as the amount of money spent on various activities. Different potential areas of expenditure are taken and yearly amount is calculated for each respondent. Here different categories have been chosen as food, cloths, education, housing, health, social function.

3.4.1.9 Consumption frequency:

Operationally eating frequency of the respondents is generally regarded as the how many times a person was taking the different category of food items (vegetable, fruits, grains, pulses, tea/coffee, milk & milk products, non veg items). In order to take out the eating frequency we have taken different food items along with their eating time frequencies. Results were expressed in frequencies and percentages. They were asked to select the appropriate option among the 5

points of the Likert scale given with options: Daily (1), Weekly (2), Fortnightly (3), Monthly (4), Occasionally (5).

3.4.1.10 Sources of information:

It is operationally defined as different persons or agencies through which the respondents seek information. Respondent were asked whether they check food information while purchasing food products. Different food items and their combinations were inculcated in the interview schedule and also the different popular sources of information to get the respondents accurate response. Respondents were asked to select one category from which they got information about the food. Options were given as Family & friends (1), Electronic &social media (2), Food expert (3), Farmer (4). Results were expressed in frequency and percentage.

3.4.1.11 Preferred shop:

It is operationally defined as channels or medium generally favored by respondent for buying of food items. Here preferred markets categorized as farmers field, Sabzi mandi, Roadside farmer, Super market, Milk outlet, Milk vender.

3.4.1.12 Land holding size:

It was operationalised as the total area owned or cultivated by the family.

3.4.1.13 Herd Size:

Various types of dairy animal reared by the farmers, their number and breed were considered.

3.4.1.14 Extension contact:

It was operationally defined as the frequency of contacts of the respondents with the different extension agents. This was measured in terms of frequency of meeting.

3.4.1.15 Social participation:

It was defined as participation of the farmer respondents in social institutions as a member or office bearer.

3.4.1.16 Purchase Intention:

Purchase intention is referred as measure of the strength of one's intention or willingness to carry out a particular behaviour or to decide to purchase a product or service. Theory of planned Behaviour (Ajzen's, 1991) was used to predict the purchase intention of the respondents.

3.4.1.17 Attitudes Towards Buying Directly from Farmers:

It is degree of feeling or opinion towards direct purchasing behaviour of consumer from farmer. Different statement composing of positive and negative statements were taken with response of three continuum i.e., Strongly Agree (5), Agree (4). Undecided (3), Disagree (2), strongly Disagree (1). Results were expressed in terms of frequencies and percentage accordingly.

3.4.1.18 Symbiotic relation between urban-rural linkage:

It is referred as relation or linkage between urban and rural residents by which both are mutually benefitted.

3.4.1.19 Determinants of direct purchase of agricultural produces:

It is operationalized as factor influencing direct purchase of agricultural produce from field.

3.4.1.20: Willingness to Accept (WTA):

Willingness to accept (WTA) operationalized as the minimum amount of money that a producer (a seller) is ready to accept to sell a particular good or service. Willingness to accept (WTA) also operationalized as goods and services accepted by the consumers with their term and condition and finally, they ready are to purchase the good and services in terms of money.

3.5.1 Appraising behaviour of respondents towards direct purchase:

For appraising behaviour of respondents for direct purchase of agricultural produces mainly purchase intention and attitudes of the respondents were emphasized.

3.5.1.1 Purchase intention of the consumer regarding the purchase of agricultural products directly from producers:

Purchase intention refers to the willingness of the customer to buy a certain product or a certain service. Purchase intention is a dependent variable that depends on several factors such as Subjective norms, perceived behavioural control, attitude and purchase intention of agricultural produces from the producer. The theory of planned behaviour was applied to predict the purchase intention of the respondents. This theory relates to beliefs with behaviour. The theory of planned behaviour (TPB) began in 1980 to predict a person's intention to conduct in a specific location and time. The theory was designed to explain all conducts that people can control themselves. The key component to this model is behavioural intent; behavioural intentions are influenced by the attitude about the likelihood that the behaviour will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome. It was proposed by Icek Ajzen for improving the predictive power of Theory of Reasoned Action (TRA). In the present study, it is used in the context to check the intentions that lead to the direct purchase of agricultural produces from producers. The theory was intended to explain all behaviours over which people have the ability to exert self-control. The key component to this model is behavioural intent; behavioural intentions are influenced by the attitude about the likelihood that the behaviour will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome. The measurement model followed for analyzing the factors affecting purchase intention is Confirmatory Factor analysis (CFA).

Variables under TPB

- **Behavioural Intention**:

This refers to the motivational factors that influence a specific behaviour, with the stronger the intention to perform the Behaviour, the more likely the behaviour will be performed. Behavioural intentions can be operationalized as the perceived likelihood or "subjective probability that he or she will consume healthy food". According to the TPB, attitudes toward the behaviour, subjective norms and perceived behaviour control all influence behavioural intention.

- **Attitude:**

This is the degree to which a person has a favorable or unfavorable opinion of the Behaviour of interest. It entails taking into account the consequences of carrying out the Behaviour. In the current study, attitude is operationalized as urban respondents' favourable or unfavourable behaviour toward healthy food consumption.

- **Subjective Norms:**

This refers to the belief that the majority of people approve or disapprove of the behaviour. It refers to a person's beliefs about whether peers and important people in his or her life believe he or she should engage in the Behaviour. Subjective norms are defined in the current study as urban respondents' beliefs about how other people perceive their consumption of healthy food.

- **Perceived Behavioural Control (PBC)**

This refers to a person's perception of the ease or difficulty of carrying out the desired Behaviour. Perceived Behavioural control varies across situations and actions, resulting in a person's perception of behavioural control changing depending on the situation. This theory construct was added later, resulting in a shift from the Theory of Reasoned Action to the Theory of Planned Behaviour. It was operationalized here as the perceived ease or difficulty that consumers associate with the consumption of healthy food.

- **Scoring**

TPB typically assesses behavioural intentions using a Likert type scale with items ranging from 1 to 5. Attitude items were coded so that a higher number indicates a more favourable attitude and a lower number indicates a less favorable attitude. For the overall attitude toward the action, the mean was calculated. The norm items were coded in such a way that a higher score indicates that there is more social pressure to perform the action. It was also assigned a code from 1 to 5. A low score indicates less social pressure, and the mean was computed. PBC items were scored in such a way that a higher score indicates greater control over beliefs and a lower score indicates less control over beliefs, and an overall mean was calculated. Results were expressed in frequencies and percentages.

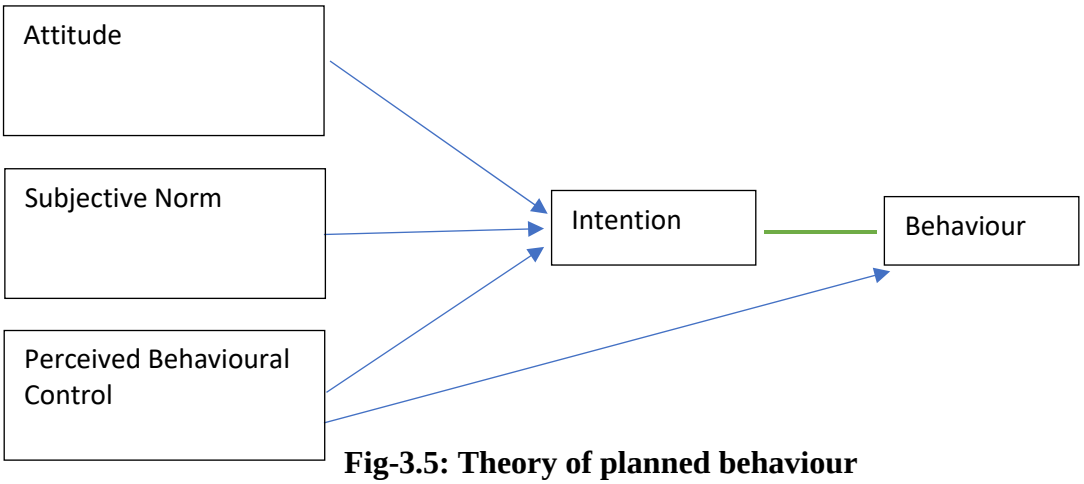


Fig-3.5: Theory of planned behaviour

3.5.1.2: Attitudes of respondents Toward Buying Directly from Farmers:

Different statements composing of positive and negative statements are taken with response of three continuum i.e., Strongly Agree (5), Agree (4). Undecided (3), Disagree (2), strongly Disagree (1). Results were expressed in frequencies and percentage accordingly. Respondents were surveyed about their attitudes regarding buying directly from producers for that single mean z test was calculated**.**

3.6.2 : Symbiotic relation between urban-rural linkage and its determinants factor:

Frequency and percentage were calculated for different statements. It was proven from different literature that personal, motivational; production factor is important factor for urban-rural symbiotic linkages.

3.6.3 : Willingness to accept farm produces as per the block chain management:

Interview schedule of different price range was used to study the consumers minimum willingness to accept farm produces as per Blockchain Technology. This method involves directly asking people in a survey, how much they are willing to accept for specific services/ products. It is called contingent valuation because peoples are asked to state their willingness to accept, contingent on a specific hypothetical scenario and description of the services. To estimate the willingness to pay we have taken different price ranges for farm produces as per Blockchain compared to traditional supply chain. Different price ranges are mentioned and responses of the respondents are taken that which one they prefer by using frequency and percentage.

For the current study, both primary and secondary data were gathered. The primary data were collected using a survey method and a well-structured schedule. Personal interviews with interview schedules and focus group discussions were the most important data collection tools. Secondary data were gathered and compiled from a variety of sources, including a review of the literature, government reports, publicly available data, and so on. MS-Excel and SPSS Packages used for data analysis.

Percentage

A percentage is a way of expressing a number as a fraction of 100 (per cent meaning "per hundred")

$$Percentage = \frac{Frequency * 100}{Total\ number\ of respondents}$$

Mean Score

The arithmetic means or mean score of a set of data had to be often computed during data analysis operation. The mean score was calculated by the following formula:

$$x = \frac{\sum x_i}{N}$$

Where, Xi = observation score, N = Total number of observations, X = Mean score

Standard deviation

The standard deviation is defined as the square root of variances or the square root of the mean of the squared deviations of individual values from their mean. The formula used for standard deviation is as under

$$SD = \sqrt{\frac{\Sigma(Xi - X)}{n}}$$

Where, Xi = Values of every cell entries, X = Mean of overall cell entries, n = Number of observations.

Single mean Z test:

The one-sample z-test is used to test whether the mean of a population is greater than, less than, or not equal to a specific value.

$$Z = \frac{x_i - \bar{\mu}}{(\sigma / \sqrt{N})}$$

3.5 Data collection:

Before starting the final data collection, the entire schedule was pre-tested in non- sample area for elimination, alteration and modification, if any. Data for the study were collected from the study area with the help of a pre-structured and pre-tested interview-schedule, developed in the light of objectives of the study. Data were collected by face-to-face method.

3.6 Statistical tools used and data analysis:

The collected data were tabulated keeping in mind the objectives of the study and the ease of statistical analysis The data collected from the dairy product consumers were scored, tabulated and analysed in the light of the objectives set forth for the present study. Statistical measures used in this study include mean, frequency, percentage, and weighted mean.

4. RESULTS AND DISCUSSION

Keeping in mind the study's objectives and empirical data, the results were analyzed using appropriate statistical and analytical tools. The conclusions reached have been presented and discussed in light of theoretical concepts and existing research in the field of study. In light of the study's objectives, the results obtained from collected data are presented after proper statistical analysis. In writing result, tables and figures (like graphs, flow diagram, drawings, etc.) are used present detail, whereas narration of result is used to describe the general findings. The discussion over it follows the result. Discussion is written to present the meaning, necessity and relevance of the finding. It explains and evaluates what has been found relating it to review of literature and research questions, and finally makes an argument supporting an overall conclusion. The results and their discussions, after analysing the data and referring past literature have been presented under the following headings:

4.1 Socio-economic profile of the respondents

- Socio-economic profile of urban consumer
- Socio-economic profile of farmers

4.2 Appraising behaviour of respondents towards direct purchase

4.3 Explore the symbiotic relationship of rural and urban linkages and its determinant factor

4.4 Willingness to accept farm produces as per the block chain management

4.1 SOCIO-ECONOMIC PROFILE OF THE RESPONDENTS.

Respondents are the fundamental building blocks of any social research expression. As a result, it is critical to describe the respondents' backgrounds, as socio-personal and socio-economic traits play an important role in predicting purchase intention. The variables under investigation were examined and the findings of urban consumer respondents were represented under the following headings:

- **Socio-economic profile of urban consumer**

4.1.1 AGE:

The age of respondents was selected as an independent variable as it influences the farmer to choose and adopt an innovative technology. It plays a vital role as it indicates the mental maturity of the individual and also affects the decision-making capability of the person.

Table 4.1 revealed that most of the (43.33%) respondents belonged to middle age group followed by 31.67 percent young age group. Whereas only 25.00 percent of the respondents were belonging to old age group in the study area.

Table: 4.1 Distribution of urban respondents on the basis of Age

Sl.No.	Category	Range (in years)	Frequency	Percentage
1.	Young	Up to 35	38	31.67
2.	Middle	36- 50	52	43.33
3.	Old	Above 50	30	25.00

4.1.2 GENDER:

It can be observed from the Table 4.2 that majority (85.00%) respondents for the present investigation were male and only 15.00 percent were female respondents, which shows the frequency distribution and percentage of urban respondents based on their gender.

Table 4.2: Distribution of respondents on the basis of their gender

Category	**Frequency**	**Percentage**
Male	102	85.00
Female	18	15.00
Total	120	100.00

4.1.3 EDUCATION:

Education plays an important role in food and nutrition status of urban peoples. Better education improves managerial ability and acceptability of innovation. Table 4.3 revealed that 31.67 percent respondents educated up to high school, followed by 28.33 percent middle school education and 20.83 percent of the respondents did up to higher secondary in the study area. Interestingly, none of the respondents were found in the illiterate category.

Table 4.3: Distribution of respondents on the basis of their Education

Sl. No.	**Category**	**Frequency**	**Percentage**
1	Illiterate	0	0.00
2	Primary	9	7.50
3	Middle	34	28.33
4	High school	38	31.67
5	Higher secondary	25	20.83
6	Graduate & above	14	11.67

4.1.4 TYPE OF FAMILY:

Family type signifies about the family pattern of the respondents. The pattern of the family will play a major role for respondents' buying habits. Data presented in table 4.4 showed

that majority of the (69.16%) respondents had nuclear family and 30.84 percent of respondents belonged to joint family in the study area.

Table 4.4: Family type of urban respondents

Sl. No.	Category	Frequency	Percentage
1	Nuclear	83	69.16
2	Joint	37	30.84
3	Total	120	100

4.1.5 OCCUPATION

Table 4.5 indicated that in case of young respondent category, 47.36 percent were engaged in service sector followed by 34.36 percent in business and 15.78 percent respondent engaged in urban dairy farm. Same table also indicated that in adult respondent category 47.73 percent were engaged in service sector where 9.09 percent of the respondents had labour as their occupation. Further in case of old category 50.00 percent engage in business sector followed by equally 25.00 percent in services and labour sector. It can be concluded from the table that in urban areas service, business labour were the main sources of occupation.

Table 4.5: Distribution of respondents according to occupation

Occupation	Respondent category							
	Young (n=38)		Middle (n=52)		Old (n=30)		Pooled (n=120)	
	f	%	*f*	%	*f*	%	*f*	%
Agriculture	0	0.00	0	0.00	5	16.66	5	4.16
Urban Dairy	6	15.78	2	3.84	0	0.00	8	6.67
Services	18	47.36	26	50.00	12	40.00	56	46.67
Business	13	34.21	19	36.53	11	36.67	43	35.84
Labour	1	3.84	5	9.63	2	6.67	8	6.66

4.1.6 ANNUAL INCOME:

Annual income level was important variable because it indicates economic condition of the respondents. Table 4.6 indicates that majority (59.16%) of respondents fall in medium level of annual income (Rs. 2-5 lakhs). 24.17% of respondents had fallen under lower income range limit. 16.67% of respondents belonged to high income range of greater than 5 lakhs.

Table 4.6: Distribution of urban respondents according to Annual Income

Sl. No.	Category	Frequency	Percentage
1	Low income (0-2 lakhs)	29	24.17
2	Medium income (2-5 lakhs)	71	59.16
3	High income (>5 lakhs)	20	16.67
4	Total	120	100.00

4.1.7 MASS MEDIA EXPOSURE:

Mass media exposure was helpful to understand that how much innovative the respondents are. Table 4.7 indicates that respondents were regularly exposed to social media (89.33%), Newspaper (66.67%) and TV (64.00%). Occasionally exposed to Magazines, leaflets, bulletin (60.00%), Documentary film on agriculture (47.33%), Folk media (32.00%), Radio (29.33%), Krishi mela (26.00%). About 65.33 percent of the respondents were rarely exposed to cattle show/exhibition followed by Krishi/dairy mela (57.33%), folk media (48%) and Documentary film on agriculture (32.67%). Surprisingly 14 percent of respondents were never exposed to cattle show and 11.33 percent of the respondents were never exposed of folk media/Krishi mela.

Table 4.7: Mass media exposure of urban respondents

Particulars	Never		Rarely		Occasionally		Regularly	
	f	%	*f*	%	*f*	%	*f*	%
Radio	14	9.33	87	58.00	44	29.33	5	3.33
TV	1	0.67	28	18.67	25	16.67	96	64.00
Social media	0	0.00	5	3.33	11	7.33	134	89.33
Newspaper	0	0.00	15	10.00	35	23.33	100	66.67
Magazine, leaflets, bulletin	0	0.00	7	4.67	90	60.00	53	35.33
Documentary film on agriculture	4	2.67	49	32.67	71	47.33	26	17.33
Krishi/dairy mela	17	11.33	86	57.33	39	26.00	8	5.33
Cattle show/exhibition	21	14.00	98	65.33	23	15.33	8	5.33

4.1.8 HOUSEHOLD EXPENDITURE PATTERN OF RESPONDENT

Data from table 4.8 revealed that respondents were spending their earning on food (80567 Rs/annum) followed by Education (48900 Rs/annum) and health (24196 Rs/annum), cloth (21253 Rs/annum), House (14460 Rs/annum) and last but not the least on social activity (12597 Rs/annum).

Table 4.8: Household expenditure pattern of urban respondent

Sl. No.	Expenditure (Rs/annum)	Average (Rs.)	Rank
1	Food	80567	**i**
2	Cloth	21253	**iv**
3	Education	48900	**II**
4	House	14460	**V**
5	Health	24196	**iii**
6	Social	12597	**vi**
7	Total	201973	

4.1.9 CONSUMPTION FREQUENCY:

The frequency of consumption of respondents is generally considered how often a person takes different foods. As shown in Table 4.9, we have taken various everyday food items such as fruit, vegetables, grain, milk, etc. We calculated the frequency of foodstuffs by frequency and percentage every day, weekly, fortnightly, monthly and occasionally. Table 4.9 indicates that among the respondents' grains (95.33%) have highest daily intake followed by fruits (57.33%) in terms of monthly intake, tea/coffee (41.33%) in terms of fortnightly, monthly and occasionally intake. In case of vegetable 71.33 percent respondents had taken daily followed by weekly (28.67%). Fruits were taken weekly by 57.33% followed by fortnightly (19.33%), and daily (23.33%). About 85.33 percent respondents had taken pulses daily followed by 14.67 percent weekly, milk and milk products were taken daily by 44.67 percent respondents followed by weekly (39.33%) and fortnightly (16%). In case of Non veg food (chicken/Eggs/ Meat) about 48.67 percent respondents had taken daily followed by weekly (47.33%) in the study area.

Table 4.9 Distribution of respondents according to consumption frequency

Food item	Daily		Weekly		Fortnightly		Monthly		Occasionally	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Vegetables	107	71.33	43	28.67	0	0.00	0	0.00	0	0.00
Fruits	35	23.33	86	57.33	29	19.33	0	0.00	0	0.00
Grains (wheat/paddy)	143	95.33	7	4.67	0	0.00	0	0.00	0	0.00
Pulses	128	85.33	22	14.67	0	0.00	0	0.00	0	0.00
Tea/ coffee	29	19.33	35	23.33	62	41.33	15	10.00	9	6.00
Milk & milk Products	67	44.67	59	39.33	24	16.00	0	0.00	0	0.00
Chicken/ Meat/ Fish/egg	73	48.67	71	47.33	3	2.00	0	0.00	3	2.00

4.1.10 SOURCE OF INFORMATION FOR RAW FOOD ITEMS:

Data presented in table 4.10 indicated that most of the respondents had depended on family member and friend for getting latest information about availability of food items. Respondents had also consulted food experts, farmers and electronic and social media for the knowledge about food items.

Table 4.10: Distribution of urban respondents according to source of information

Sl.No.	Food items	Family and Friends		Electronic and social media		Food Expert		Farmer	
		f	%	*f*	%	*f*	%	*f*	%
1	Vegetables	67	44.67	19	12.67	51	34.00	13	8.67
2	Fruits	110	73.33	37	24.67	0	0.00	3	2.00
3	Grains (wheat/paddy)	60	40.00	25	16.67	33	22.00	32	21.33
4	Pluses	77	51.33	54	36.00	17	11.33	2	1.33

5	Tea/ coffee	87	58.00	48	32.00	15	10.00	0	0.00
6	Dry fruits	52	34.67	38	25.33	60	40.00	0	0.00
7	Milk & milk Products	69	46.00	42	28.00	37	24.67	2	1.33
8	Chicken/ Meat/ Fish/egg	73	48.67	28	18.67	47	31.33	2	1.33

4.1.11 PREFERRED SHOPS/MARKETS:

Table 4.11 indicated that in case of vegetable, about 42.67 percent respondents had preferred sabzi mandi, followed by (29.33%) farmers field and only 15.33 percent respondents preferred super market. In case of purchasing of fruits, 48.00 percent respondents had preferred sabzi mandi followed by 19.33, 17.33 and 15.33 percent respondents preferred roadside farmer, farmers field and super market, respectively. In case grains (50.00%) respondents preferred super market and 39.33 percent respondents preferred sabzi mandi and 10.67% respondents preferred online marketing. For tea/coffee 59.33% respondents preferred sabzi mandi, 33.33 percent respondents preferred super market and 65.00 percent respondents preferred farmer's field. In case of dairy products 30.67 percent respondents preferred milk vendor, 27.33 percent of respondents preferred milk outlet, 21.33 percent respondents preferred sabzi mandi and 19.33 percent respondents preferred super market. For chicken/eggs/meats majority (70.00%) preferred sabzi mandi and remaining (30.00%) preferred super market.

Table 4.11: Preferred shops for purchase of food items perceived by the respondents

Food items	Farmers field		Sabzi Mandi		Roadside farmer		Super market		Milk Outlet		Online		Milk Vender	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Vegetables	44	29.33	64	42.67	19	12.67	23	15.33	0	0.00	0	0.00	0	0.00
Fruits	26	17.33	72	48.00	29	19.33	23	15.33	0	0.00	0	0.00	0	0.00
Grains	0	0.00	59	39.33	0	0.00	75	50.00	0	0.00	16	10.67	0	0.00
Pulses	0	0.00	50	33.33	4	2.67	96	64.00	0	0.00	0	0.00	0	0.00
Tea/coffee	9	6.00	89	59.33	2	1.33	50	33.33	0	0.00	0	0.00	0	0.00
Milk	2	1.33	32	21.33	0	0.00	29	19.33	41	27.33	0	0.00	46	30.67
Chicken	0	0.00	105	70.00	0	0.00	45	30.00	0	0.00	0	0.00	0	0.00

Socio-economic profile of the farmers:

4.1.12 Age:

Majority (53.33%) of the farmers respondents belongs to middle aged category followed by old aged (30.00%) and least is young age (16.67%) category.

Table 4.12: Distribution of farmers based on age

Age group	Frequency	Percentage
Young (25-34.9)	5	16.67
Middle (35-45.6)	16	53.33
Old (45.7-62)	9	30.00

4.1.13 Gender:

Table 4.13 indicates that majority of the farmers are male (83.33%) and rest are female (16.67%).

Table 4.13: Distribution of Farmer on the basis of their gender

Category	**Frequency**	**Percentage**
Male	25	83.33
Female	5	16.67
Total	30	100.00

4.1.14 Education:

Table 4.14 indicates that 30.00 percent farmer respondents have fallen into middle level education category followed by primary education level (23.33%), secondary education level (16.67%). Only 10.00% farmers are illiterate.

Table 4.14 Distribution of farmers based on education

Sl. No.	**Category**	**Frequency**	**Percentage**
1	Illiterate	3	10.00
2	Functionally literate	4	13.33
3	Primary	7	23.33
4	Middle level	9	30.00
5	Secondary	5	16.67
6	Graduation and above	2	6.67
7	Total	30	100.00

4.1.15 Type of family:

Data presented in Table 4.15 indicated that majority (76.67%) of the farmer respondents belong to nuclear family and 23.33% belongs to joint family type.

Table 4.15 Distribution of farmers based on type of family

Sl. No.	Category	Frequency	Percentage
1	Nuclear	23	76.67
2	Joint	7	23.33
3	Total	30	100

4.1.16 Occupation:

About 90.00% farmers have main occupation of agriculture and 80.00% farmers also involve in dairy farming. Whereas 83.33 percent farmers are involved in business as subsidiary purpose followed by labour (80%) and services (76.67%) in the study area.

Table 4.16 Distribution of farmers based on occupation

Occupation	Main		Subsidiary	
	f	%	*f*	%
Agriculture	27	90.00	3	10.00
Agriculture plus Dairy	24	80.00	6	20.00
Services	7	23.33	23	76.67
Business	5	16.67	25	83.33
Labour	6	20.00	24	80.00

4.1.17 Annual income:

Most of the farmers respondents (46.67%) belonged to medium income level followed by high income level (30.00%) and low-income level (23.33%) category.

Table 4.17 Distribution of farmers based on annual income

Sl. No.	Category	Frequency	Percentage
1	Low (<₹60000)	7	23.33
2	Medium (₹60000-₹120000)	14	46.67

3	High (>₹120000)	9	30.00

4.1.18 Land holding size:

Table 4.18 indicated that majority (70.00%) of the farmers respondents belong to small landholding category (<3 acres), followed by medium (20.00%) and only 10 percent of the respondents were in large holding category.

Table 4.18 Distribution of farmers according to land holding size

Sl. No.	Category	Frequency	Percentage
1	Small (<3 acres)	21	70.00
2	Medium (3-7 acres)	6	20.00
3	Large (>7 acres)	3	10.00
3	Total	30	100

4.1.19 Herd size:

Table 4.19 indicated that most of the farmers have medium herd size (53.33%) followed by small herd size (26.67%) and large herd size (20.00%).

Table 4.19 Distribution of farmers based on herd size

Sl. No.	Category	Frequency	Percentage
1	Small (<3)	8	26.67
2	Medium (3-7)	16	53.33
3	Large (>7)	6	20.00
3	Total	30	100.00

4.1.20 Mass media exposure:

Farmers are regularly exposed to TV (83.33%) followed by newspaper (66.67%). Most of the farmers are occasionally exposed to Radio/Krishi mela (60.00%) followed by social media and magazine (46.67%). Farmers are most likely rarely or never exposed to documentary film on agriculture.

Table 4.20 Distribution of farmer according to mass media exposure

Particulars	Never		Rarely		Occasionally		Regularly	
	f	%	*f*	%	*f*	%	*f*	%
Radio	0	0.00	4	13.33	18	60.00	8	26.67

TV	0	0.00	0	0.00	5	16.67	25	83.33
Social media	8	26.67	0	0.00	14	46.67	8	26.66
Newspaper	0	0.00	5	16.67	5	16.67	20	66.67
Magazine, leaflets, bulletin	5	16.67	7	23.33	14	46.67	4	13.33
Documentary film on agriculture	8	26.67	9	30.00	7	23.33	6	20.00
Folk media	7	23.33	7	23.33	8	26.67	8	26.67
Krishi/dairy mela	0	0.00	6	20.00	18	60.00	6	20.00
Cattle show/exhibition	3	10.00	6	20.00	13	43.33	8	26.67

4.1.21 Extension contacts:

Table 4.21 indicates that mass media stands out as the most important extension contact for the farmer followed by interaction with neighborhood farmer (83.33%) and KVKs (73.33%). Kisan Call Centre is last (43.33%) in term of extension contact of farmer. Role of N.G.O is also less in the study area for extension contact.

Table 4.21 Distribution of farmer based on extension contact

Sl. No.	Sources	Frequency	Percentage	Rank
1	Krishi Vigyan Kendra (KVK)	22	73.33	III
2	Mass Media (TV, Radio, Newspaper)	28	93.33	I
3	Kisan Call Centre (KCC)	13	43.33	VII
4	Non-government Agency	16	53.33	VI

5	Extension/ Village level workers	18	60.00	V
6	Internet	20	66.67	IV
7	Interaction with farmers	25	83.33	II

4.1.22 Milk and milk products sales:

Most of the farmers (46.67%) sold milk to consumer directly followed by through middlemen (30.00%) and dairy cooperatives (13.33%). Farmers were selling least amount of milk to private dairy companies (10.00%).

Table 4.22 Distribution of farmer based on milk selling points

Sale points	Frequency	Percentage
Sale through middle men	9	30.00
Direct sale to the consumer	14	46.67
To Private dairies	3	10.00
To dairy Cooperatives	4	13.33

4.1.23 Product group that farmer sells:

Table 4.23 indicates that majority (56.67%) of farmers sold milk products directly to consumer followed by 53.33 percent vegetables and 46.67 percent of farmers sold fruits/milk directly to consumer. Other raw food items like cereals (83.33%), pulses (90.00%), tea (73.33%) and meat (60.00%) are mostly sold through middlemen.

Table 4.23 Product group that farmer sells to consumer

Product	Directly sale to consumer		Sale to middlemen	
	f	%	*f*	%
Fresh Vegetable	16	53.33	14	46.67
Fresh fruits	14	46.67	16	53.33
Meat	12	40.00	18	60.00
Milk	14	46.67	16	53.33

Milk products	17	56.67	13	43.33
Cereals	5	16.67	25	83.33
Pulses	3	10.00	27	90.00
Tea	8	26.67	22	73.33

4.1.24 Social participation:

The data presented in table 4.24 indicated that 40.00 percent of farmers respondents were member in at least one social organization. It was also reported that about 26.67 percent of the respondents were not taken membership of any social organization. It was worth to noted that about 13.33 percent farmers respondents were office bearers in some organization.

Table 4.24 Distribution of farmers based on social participation

Category	**Frequency**	**Percentage**
No membership	8	26.67
Member in one organization	12	40.00
Member in more than organization	6	20.00
Office bearers	4	13.33

4.2 APPRAISING BEHAVIOUR OF RESPONDENTS TOWARDS DIRECT PURCHASE OF AGRICULTURAL PRODUCES:

4.2.1 Frequency and time of purchase from Farmers field

An attempt was made to delineate the frequency and purchase of food products from the field. The perusal of Table 4.25 indicated that majority (51.33%) of the respondents along with his/her family member were responsible for purchase of food purchases. It was found that 62.00 percent of respondents purchased food products 1-2 times per week. More than half of respondents (56.67%) bought the food for the first time from a farmer's field in more than 5 years before.

Table 4.25 When and how often respondents purchase from the farmers' field

Sl. No	Choice	Frequency	Percentage
1	Responsibility for the food item purchase		
	Self	61	41.67
	Another Person in family	12	8.00
	Family as a whole	77	51.33
2	Frequency of buying the food products from farmer's fields		
	Daily	4	2.67
	Weekly	8	5.30
	Fortnightly	21	14.00
	1-2 times per week	93	62.00
	Occasionally	24	16.00
3	The last time when first food products were bought from the farmer's field		
	Recently	11	7.33
	One Year back	4	2.67
	1-3 Years	31	20.67
	3 to 5 Years	19	12.67
	> 5 Years	85	56.67

4.2.2 REASONS FOR PURCHASING OF RAW FOOD ITEMS FROM FARMER'S FIELD

To measure the basic purpose/ reasons of purchase of raw food items from the farmers' fields by the urban consumers, the response was recorded on a Likert type scale having a 5-point continuum with strongly agree, agree, undecided, disagree, and strongly disagree. For this purpose, 8 reasons were selected which were administered to the respondents to find out to what extent they agreed or disagreed with each reason related to food products. Statement wise frequency and the percentage were calculated for each category starting from strongly agree, agree, undecided, disagree to strongly disagree.

Data in Table 4.26, indicated that most of the respondents strongly perceived that food products purchased from farmer fields are healthy (41.33%), high nutritious value (36.67%) and also, they think that products were grown in harmony with nature (30.00%). Most of the respondents agreed that products were free from adulteration (40.00%), organic (47.33%), and they could know the production technique (38.00%). Respondents were undecided regarding the reason's chemical/ pesticide/fertilizer free product (26.67%), environment-friendly production techniques (10.00%). A small proportion of the respondents disagreed with the issue like produces are organic (4.67%), environment-friendly production techniques (18.67%), healthy (7.33%), high nutritious value (16.67%), products are grown in harmony with nature (16.67%), free from chemical residue (12.67%).

4.2.3 Reasons for buying produces directly from farmers' fields by respondents:

The number of respondents who could provide the degree of agreement or disagreement to the statement have been presented in Table 4.27. Item wise frequency of statements and their percentage out of the total number of respondents have been displayed in the table. It was found that respondents had strongly agreed on statements healthy for me and my family (41.33%), support local/small farmers (35.33%), taste good (33.33%), fresh products (29.33%), Relationship with producer (28.67%). Most of the respondents had agreed with the statement that purchasing a product from farmers give me satisfaction (69.33%), traceability (49.33%), fresher than items on the shops (48.00%), they have a high safety level of guarantee and control (46.67%), support farming sustainability (46.67%), support local/small farmers (44.67%), taste-good (40.67%), animals are reared by them better (36.67%), healthy for me and my family (34.67%). Respondents were undecided regarding the reasons for not willing to support big multinational companies (41.33%), relationship with producer (26.67%).

Table 4.26 Reasons for purchasing of raw food items from farmer's field perceived by the respondents

Reasons	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Healthy	62	41.33	52	34.67	12	8.00	13	8.67	11	7.33
High Nutritional Value	55	36.67	44	29.33	10	6.67	25	16.67	16	10.67
Products are grown in harmony with nature	45	30.00	33	22.00	26	17.33	25	16.67	21	14.00
Free from chemical residue	34	22.67	45	30.00	40	26.67	19	12.67	12	8.00
Produced with environmentally / animal friendly techniques	31	20.67	58	38.67	15	10.00	28	18.67	18	12.00
Free from adulteration	20	13.33	60	40.00	37	24.67	18	12.00	15	10.00
All products coming from organic agriculture	32	21.33	71	47.33	34	22.67	7	4.67	6	4.00
I can know the production techniques from farmers	29	19.33	57	38.00	42	28.00	18	12.00	4	2.67

Table 4.27 Perceived attributes of food products purchased from farmer's field

Statements	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Healthy	62	41.33	52	34.67	12	8.00	13	8.67	11	7.33
Food safety	42	28.00	70	46.67	19	12.67	13	8.67	6	4.00
Animals are reared by them better	34	22.67	55	36.67	24	16.00	20	13.33	17	11.33
Taste good	50	33.33	61	40.67	10	6.67	18	12.00	11	7.33
Freshness	44	29.33	72	48.00	15	10.00	12	8.00	7	4.67
How produced (important to know)	39	26.00	72	48.00	20	13.33	9	6.00	10	6.67
Support local / small farmers	53	35.33	67	44.67	16	10.67	10	6.67	4	2.67
Support farming sustainability	40	26.67	70	46.67	27	18.00	5	3.33	8	5.33
Not willing to support big multinational companies	23	15.33	63	42.00	32	21.33	20	13.33	12	8.00
Support local farmers (it is important to me)	39	26.00	36	24.00	64	42.67	11	7.33	0	0.00
Purchasing a product from farmers give me satisfaction	28	18.67	104	69.33	9	6.00	9	6.00	0	0.00
Relationship with producer	43	28.67	56	37.33	40	26.67	11	7.33	0	0.00
Traceability	26	17.33	74	49.33	41	27.33	9	6.00	0	0.00

4.2.4 Reasons for buying more agricultural produce directly from producers as perceived by the respondents:

The reason for preference of respondents to buy agricultural produce directly from producers was measured using a Likert type scale having a 5-point continuum viz. strongly agree, agree, undecided, disagree, and strongly disagree. For this purpose, 14 statements were selected and were administered to the respondents to find out why they would like to buy agricultural produces from the farmer field. The analysis has been depicted in the table 4.28. The finding of the table reveals that respondents had agreed that they would like to purchase agricultural products directly from the farmer's field if they have more income (53.33%), more information in the media (49.33%), more products from their local region (48.00%), assurance for less fertilizer/ insecticide residue (47.33%), have more time to look for agricultural produce (46.67%), products were cheaper (45.33%) and more trust to farmers/ sellers (36.67%). They have strongly agreed on the factor of more options availability (45.33%) and better appearance/taste (35.33%).

Table 4.28 Reasons for preference of consumers to buy agriculture products directly from farmers

Reasons	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
More cheap prices	39	26.00	68	45.33	15	10.00	19	12.67	9	6.00
More income	36	24.00	68	53.33	10	6.67	24	16.00	12	8.00
More accessibility in the locality	43	28.67	57	38.00	18	12.00	26	17.33	6	4.00
More assortment availability	55	36.67	65	43.33	16	10.67	5	3.33	9	6.00
Better appearance and taste	53	35.33	65	43.33	5	3.33	16	10.67	11	7.33
More time to look for agricultural produce	32	21.33	70	46.67	22	14.67	12	8.00	14	9.33
Assurance for no fertilizer/pesticide residue	36	24.00	71	47.33	26	17.33	5	3.33	12	8.00
More trust to farmers/ seller	52	34.67	55	36.67	31	20.67	8	5.33	4	2.67
More products from my local region	41	27.33	72	48.00	18	12.00	11	7.33	8	5.33
Longer shelf life	35	23.33	51	34.00	30	20.00	21	14.00	13	8.67

Less packing material	30	20.00	62	41.33	37	24.67	14	9.33	7	4.67
More information in the media	19	12.67	74	49.33	42	28.00	7	4.67	8	5.33

4.2.5 Food habit of the respondents

Data represented in frequency and percentage in Table 4.29, which revealed that the majority of the respondents had purchased vegetables (72.00%), fresh fruits (67.33%) and to some extent meat (48.67%) and milk products (33.33%) from primary producers. Other food products like cereals (89.33%), bread and bakery products (63.33%), pulses (92.67%), spices (100.00%), dried fruits (100.00%), beverages (100.00%), oil (100.00%), sugar products (100.00%) and herbs (82.00%), they purchased through middlemen.

Table 4.29 Food habit of the respondents

Product	Purchase from primary producer		Purchase from middlemen		Direct purchase from producers in future	
	f	%	*f*	%	*f*	%
Fresh Vegetable	108	72.00	42	28.00	0	0.00
Fresh fruits	101	67.33	49	32.67	0	0.00
Meat	73	48.67	77	51.33	0	0.00
Milk	50	33.33	87	58.00	13	8.67
Cereals	16	10.67	134	89.33	0	0.00
Bread and bakery products	33	22.00	95	63.33	22	14.67
Pulses	11	7.33	139	92.67	0	0.00
Spices	0	0.00	150	100.00	0	0.00
Dried fruits	0	0.00	150	100.00	0	0.00
Beverages	0	0.00	150	100.00	0	0.00
Oil	0	0.00	150	100.00	0	0.00
Sugar products	6	4.00	144	96.00	0	0.00
Herbs	7	4.67	123	82.00	20	13.33

4.2.6 Respondents attitude towards change in food habit:

A total of nine statements were administered before respondents to gain their perception of their change in food habits. The majority of the respondents had opposed the idea of no change in food habits (Disagree, 74.67% & strongly disagree, 20.00%) and also disagreed with the idea of

more packaged food items (Disagree, 68.00%) (Table 4.30). Most of the respondents either strongly agreed or agreed with the food habit of more directly purchased food items from farmers field (strongly agree, 58.67%), more fruits and vegetables (agree, 46.00% & strongly agree, 29.33%), more organic food (agree, 48.67% & strongly agree, 29.33%), more variety (agree, 41.33% & strongly agree, 36.67%), less ready to food (agree, 47.33% & strongly agree, 35.33%), more local food (agree, 38.67% & strongly agree, 44.67%), less packaged items (agree, 59.33% & strongly agree, 26.67%).

Table 4.30 Respondents attitude towards change in food habit

Food Habit	**Strongly Agree**		**Agree**		**Neutral**		**Disagree**		**Strongly Disagree**	
	f	**%**	***f***	**%**	***f***	**%**	***f***	**%**	***f***	**%**
No Change	0	0.00	0	0.00	8	5.33	112	74.67	30	20.00
More fruit and vegetable	44	29.33	69	46.00	24	16.00	13	8.67	0	0.00
More organic food	44	29.33	73	48.67	33	22.00	0	0.00	0	0.00
More variety	55	36.67	62	41.33	33	22.00	0	0.00	0	0.00
Less Ready to Eat food	53	35.33	71	47.33	23	15.33	3	2.00	0	0.00
More local food	67	44.67	58	38.67	25	16.67	0	0.00	0	0.00
Less packed food item	40	26.67	89	59.33	19	12.67	2	1.33	0	0.00
More packed food items	2	1.33	17	11.33	19	12.67	102	68.00	10	6.67
More item from farmers field	15	10.00	88	58.67	43	28.67	4	2.66	0	0.00

4.2.7 Social behaviour at the market for consumers of different groups:

Table 4.31 indicates that majority of the respondents often met friends at the market (97.33%), recall childhood memories at the market (95.33%) and feel natively in the market (71.33%). About 85.33 percent respondents reported that it had never happed that they never met friend at market.

Table 4.31 Social behaviour of respondents

Sl. No.	Statement	Yes (F)	Yes (%)	No(F)	No (%)
1	Often met friend at market	146	97.33	4	2.67
2	Never met friend at market	22	14.67	128	85.33
3	Feel natively in the market	107	71.33	43	28.67
4	Childhood memories in market	143	95.33	7	4.67

4.2.8 Purchase intention of the consumer regarding the purchase of agricultural products directly from producers:

Confirmatory Factor analysis (CFA) method assesses the reliability and validity of the variable for each factor. This method was deployed on 4 factors and 34 items. First of all, Cronbach's alpha value was checked for each factor. It was found from table 4.32 that for all factors Cronbach's alpha value was well above 0.70 as suggested by Nunnally & Bernstein (1994). This shows that there is high reliability of the scale.

Table 4.32 Cronbach's alpha for factors

Sl.	Factor	Cronbach's Alpha value
1	Attitude	0.810
2	Subjective norms	0.798
3	Perceived behavioural control	0.802
4	Behaviour intention	0.769

A perusal of table 4.33 shows the understanding of path coefficients with their probability level. When Attitude goes up by 1 unit BI goes up by 0.207 unit, when Subjective norms goes up by 1 unit BI goes down by 0.103 unit and when PBC goes up by 1 unit BI goes up by 0.261 unit. From the path coefficients, it is clear that the path from subjective norms to behavioural intentions failed to achieve statistical significance. Hence, the path from perceived behavioural control is highly significant with a p-value less than 0.05. The path from attitude to behavioural intentions is also significant with a p-value less than 0.05. Subjective norm has a negative non-significant effect on behavioural intention. Attitude and Perceived behavioural control have a positive significant effect on the direct purchase intention of agricultural produces. Attitude has the regression weight estimate of 0.207, has a standard error of about 0.085, Subjective norm has the

regression weight estimates of -0.103, has a standard error of about 0.097 and Perceived behavioural control has the regression weight estimate of 0.261, has a standard error of about 0.079.

Table 4.33 Unstandardized path coefficients with their probability

Dependent Variable	Regression weight sign	Independent variables	Estimate	S.E.	C.R.	P
Behavioural intention	<---	Attitude	0.207	0.085	2.432	.015**
Behavioural intention	<---	Subjective Norms	-0.103	0.097	1.060	0.289
Behavioural intention	<---	Perceived behavioural control	0.261	0.079	3.315	***

The findings given in Table 4.34 shows the standard estimate of the paths between behavioural intention and attitude is 0.206, between behavioural intention and subjective norm is estimated to be -0.094 and between behavioural intention and perceived behavioural control is standardized estimated to be 0.272

Table 4.34 Standardized Regression Weights:

			Estimate
Behavioural intention	<---	Attitude	0.206
Behavioural intention	<---	Subjective Norms	-0.094
Behavioural intention	<---	Perceived behavioural control	0.272

Table 4.35 indicates that correlation between attitude and subjective norm is positive, 0.409 and attitude and perceived behavioural control has positive correlation (0.186). Lastly, subjective norm and perceived behavioural control is involving in positive correlation (0.335).

Table 4.35 Correlation between variable of T.P.B

Correlations				
Variables	Particulars	Attitude	Subjective Norms	Perceived Behavioural control
Attitude	Pearson Correlation	1	0.409**	0.186*
	Sig. (2-tailed)		.000	0.023
	N	150	150	150
Subjective Norms	Pearson Correlation	0.409**	1	0.335**
	Sig. (2-tailed)	.000		.000
	N	150	150	150
Perceived Behavioural control	Pearson Correlation	0.186*	0.335**	1
	Sig. (2-tailed)	0.023	.000	
	N	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

- **Path Diagram:**

Path diagram indicates that the standard estimate between behavioural intention and attitude is 0.21, between subjective norms (S.N.) and behavioural intention (B.I) is -0.10, and between

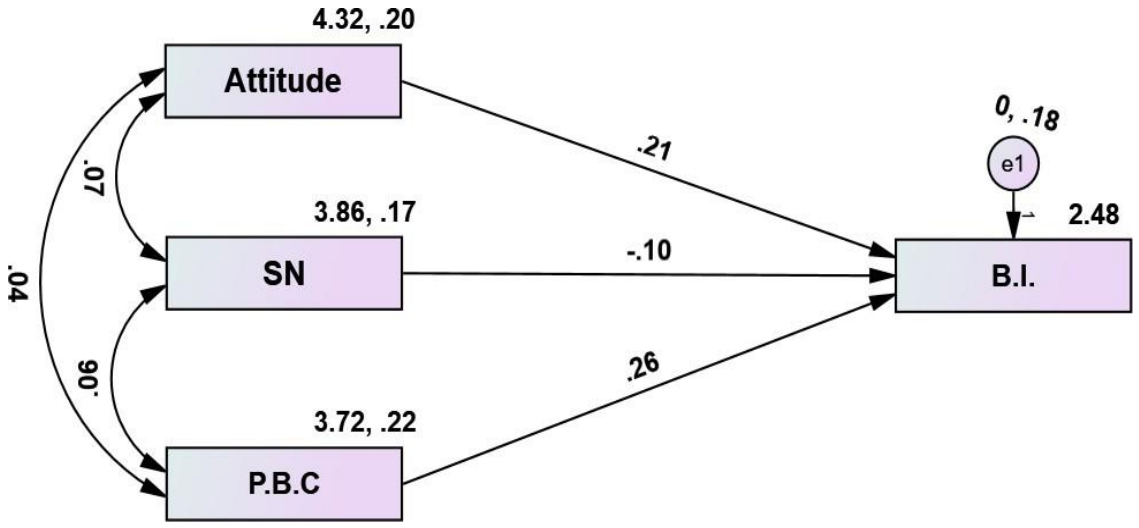


Fig 4.1 Path diagram showing intentions of direct purchase of agricultural produces

perceived behavioural control (P.B.C) and behavioural intention is 0.26. It revealed that perceived behavioural control was having maximum influence over the behavioural intention to direct purchase of agricultural produce followed by 0.21. The subjective norms have the least influence on purchase intention. This was shown in Fig 4.1.

A perusal of Table 4.36 delineated the Root Mean Square Error of Approximation value (R.M.S.E.A) for the model. The Root Mean Square approximation error as an additional fit may be a potential mechanism to accommodate large sample sizes. In structural equation modelling (S.E.M) RMSEA is widely used to provide a sample size adjustment mechanism where Chi-square statistics are used. The range between 0 to 1 indicates a better model fit with smaller values. An acceptable model fit is indicated by a value of 0.08 or less. Table 4.21 RMSEA value of the used model is 0.053 which is less than 0.08. Hence, the TPB model is good fit in the context of the behavioural intention of direct purchasing agricultural produces from the producer.

Table 4.36 RMSEA value of the model

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	0.053	.199	.312	.000

4.2.9 Attitudes of respondents Toward Buying Directly from Farmers:

Attitude is generally the mental or emotional entity that inherits in or characteristics of a person. It is defined as the settled way of thinking or feeling about something. Respondents were surveyed about their attitudes regarding buying directly from producers for that single sample z test was calculated Amongst the attitude towards direct purchase of agricultural produces, the most important factor having the highest mean score was “strengthening the local economy (4.39)” followed by “healthy food product (4.37)”, “personal health or diet concerns influence my food purchases (4.33)”, and “chemicals free food products (4.31)”. On the other hand, “The farmers’ market has products that I can’t find anywhere else” received the lowest mean score (3.71). The results presented in Table 4.37 also shows that according to the response given by respondents about their attitude, the most important statement having the highest mean score was “strengthening the local economy (4.39)” with a z-value of 7.44, followed by the statement “healthy food product (4.37)” with a z-value of 6.75, “personal health or diet concerns influence my food purchases (4.33)” with a z-value of 5.88, and “chemicals free food products (4.31)” with a z-value of 5.35. In the table single mean z test, at 5.00 percent level of significance, all the statements have been found significant.

Table 4.37 Attitude of respondent's direct purchase of agricultural produces n=150

Sl.	Statements	Mean	S. D	Z value
1	If agricultural produce is labelled as 'locally grown' then I would like to purchase	4.12	0.55	0.31
2	I would be willing to pay more if products grown locally	4.01	0.78	-2.65
3	I would be willing to pay more if I buy directly from producers	3.89	0.76	-5.79
4	Consumers should have more locally–grown fruits and vegetables available to them	4.22	0.68	2.92
5	Consumers can influence what fruits and vegetables are grown locally	4.09	0.63	-0.39
6	Cafeterias in schools, hospitals and other public institutions should serve food grown by local farmers	4.03	0.68	-1.96
7	Keeping farms viable in your region is important	4.01	0.55	-2.65
8	Buying local produce is an effective way to keep your regional farms viable	4.16	0.65	1.35
9	Laws should try to protect farmland from urban development	4.12	0.59	0.31
10	Price is the most influential factor when I make my purchases.	4.11	0.78	0.15
11	Shopping at the farmers' market is less convenient than shopping at a supermarket for me	4.00	0.62	-2.83
12	Fresh products are the main reason that I shop at the farmers' market	4.06	0.63	-1.26
13	The farmers' market has products that I can't find anywhere else.	3.71	0.76	-10.31
14	Direct contact with the farmer is an important reason to shop at the farmers' market for me.	4.06	0.85	-1.26
15	My purchases can affect farmers' production decisions.	4.09	0.84	-0.39
16	Buying locally produced foods is important to me.	4.25	0.58	3.61

17	I believe that shopping at farmers' markets supports agricultural open space.	4.31	0.78	5.35
18	I believe that shopping at farmers' markets improves the local economy	4.39	0.73	7.44
19	I enjoy shopping at the farmers' market.	4.26	0.76	3.96
20	healthy food products is important to me.	4.37	0.65	6.75
21	Personal health or diet concerns influence my food purchases.	4.33	0.75	5.88
22	Food safety concerns influence my food purchases.	4.10	0.61	-0.22
23	Purchasing foods grown without chemical residue is very important to me.	4.31	0.73	5.18

4.3 Symbiotic relationship of rural and urban linkages and its determinant factor:

By 2050, two-thirds of the world's population will live in urban areas. Should we thus be more concerned with urban development? On the contrary, we should still focus on rural development, as this will remain critical to ensuring food security and eliminating poverty. With the ongoing demographic change, however, successful rural development will need to heavily rely on strong linkages between rural and urban economies. In the past, rural and urban areas have been viewed and described as two separate entities, with the underlining assumption of a limited interrelationship. In recent times though, there has been, a growing recognition and awareness of the inseparability of rural and urban areas given the dynamic flows of information, resources and people between the areas. Markets can play major roles in facilitating and sustaining this linkage. The Food and Agricultural Organization (FAO) (2009) defines assembly markets as rural or town markets, normally situated on main highways connecting rural-urban centers and near to local transport inter change points, where the buying and selling of agricultural produce takes place. Traders, collectors, and commission agents, acting on behalf of urban wholesalers were identified as the usual buyers of produce at assembly markets.

4.3.1 Symbiotic relationship of rural and urban linkages:

Symbiotic relation is factor that is beneficial for both farmer and consumer. Hence, factor which have the major degree of acceptance leads to symbiotic relation between both farmer and consumers. Table 4.38 indicates most important factor which have reported both the farmer and

consumer is financial benefit to both seller and consumers (85.33%) followed by Direct purchasing of agricultural produce reduced the conflict of interest between farmers and consumers (83.33%), Relationship between producer and consumer at a local level, can greatly reduce the distance of travel of food (75.33%) and shortening supply chain (72.00%).

Other factors specifically lead farmer and consumer to adopt direct purchase practices. For farmer, particularly interest focused on getting the best return from his produce (97.33%) and diversified production to meet the consumer demand (97.33%). For consumers ethical value (98.67%), high quality food produces (86.67%), shortening the supply chain (81.33%) is most important factor.

Table 4.38 Mutual benefit of urban and rural people

n=150

Statement	**Urban**		**Rural**		**Both**	
	f	**%**	***f***	**%**	***f***	**%**
Price satisfaction in direct purchasing (Price often perceived as too high in retails market)	33	22.00	3	2.00	114	76.00
Financial benefit to both seller and consumers	16	10.67	6	4.00	128	85.33
Increase understanding and knowledge about agriculture produce for urban consumer	97	64.67	2	1.33	51	34.00
Opportunity for sharing and exchanging information	79	52.67	2	1.33	69	46.00
By shortening the supply chain, consumers can find out more about production methods and processes	122	81.33	7	4.67	21	14.00
Consumers learn about the environmental benefits from farmers	90	60.00	7	4.67	53	35.33
Consumers are interested in obtaining high quality products at low prices	130	86.67	2	1.33	18	12.00
Diversify production to meet consumers' demand	0	0.00	146	97.33	4	2.67
Enhanced entrepreneurial skills in aspects	7	4.67	75	50.00	68	45.33

such as their relationships with customers						
Diversify production to meet consumers' demand	0	0.00	146	97.33	4	2.67
Rediscovery of traditional vegetables and dairy products made from indigenous breeds.	2	1.33	95	63.33	53	35.33
Short supply chain	8	5.33	34	22.67	108	72.00
Relationship between producer and consumer at a local level, can greatly reduce the distance of travel of food.	31	20.67	6	4.00	113	75.33
Direct purchasing of agricultural produce reduced the conflict of interest between farmers and consumers	22	14.67	3	2.00	125	83.33
"Pick-your-own" farms and on-farm produce stands as a way to capture consumers who may drive by or be seeking an on-farm experience.	99	66.00	28	18.67	23	15.33
Storage problems can be solving from both sides	19	12.67	36	24.00	95	63.33
Transportation of goods / producers	81	54.00	34	22.67	35	23.33
Supporting the financial prosperity of small- and medium-sized farms.	100	66.67	26	17.33	24	16.00
Vocal for local	55	36.67	18	12.00	77	51.33

4.3.2 Determinants for direct purchase of agricultural produces:

Table 4.39 indicates personal factor that influences symbiotic relation between farmers and consumers. Majority of the respondents reported that age (96%) is most important socio-personal factor that influence direct interaction between producer and consumer. Other important factor stands out occupation (86.67%), Education (86.67%), health status (85.33%), social participation (83.33%).

Table 4.39 Socio personal profile of customers n=150

Factor	**Urban**		**Rural**		**Both**	
	f	**%**	***f***	**%**	***f***	**%**
Age	3	2.00	3	2.00	144	96.00

Education	20	13.33	9	6.00	130	86.67
Family size	132	88.00	0	0.00	18	12.00
Decision maker	67	44.67	18	12.00	65	43.33
Mass Media exposure	116	77.33	0	0.00	34	22.67
Social participation	14	9.33	11	7.33	125	83.33
Health status	21	14.00	1	0.67	128	85.33
Extension contact	15	10.00	60	40.00	75	50.00
Occupation	11	7.33	9	6.00	130	86.67

Table 4.40 reveals motivational factors for that both farmers and consumers perceives that direct purchase would lead both of them in beneficial state. Most important factor is Absence of middleman and commission (87.33%) followed by Social Interaction (86.67%) and convenient pricing (79.33%). Traceability is the attributes by which consumer would know from which farm they are receiving products, which is one important aspect of Blockchain technology. Provision of traceability (76.00%) holds important motivational role for direct purchase practices.

Table 4.40 Motivational factor for direct purchasing of agricultural produce n=150

Factor	**Urban**		**Rural**		**Both**	
	f	**%**	***f***	**%**	***f***	**%**
Variety of products available	91	60.67	32	21.33	27	18.00
Superior Product	123	82.00	15	10.00	12	8.00
Safety	70	46.67	20	13.33	60	40.00
Support Local	79	52.67	44	29.33	27	18.00
Organic in nature	108	72.00	11	7.33	31	20.67
Recommendation by elder	135	90.00	2	1.33	13	8.67
Prices	19	12.67	12	8.00	119	79.33
Social Interaction	14	9.33	6	4.00	130	86.67
Absence of malpractices	20	13.33	24	16.00	106	70.67
Absence of middleman and commission	8	5.33	11	7.33	131	87.33
Remembering childhood days	129	86.00	5	3.33	16	10.67
Provision of traceability	24	16.00	12	8.00	114	76.00
Proximity	117	78.00	11	7.33	22	14.67

Table 4.41 indicates productive factor which needs to be offered to consumers by the farmers. Majority of the urban consumer reported that relationship with producer (91.33%), visual

appeal of products (84.67%), taste of the product (80.00%), organic products (79.33%) is most important production practice factor. Same table also indicated that traceability (75.33%) is factor for that both consume.0r and farmer involve in direct purchase of the products. Traceability factor also stimulate the adoption of Blockchain technology.

n=150

Table 4.41 Production practice attribute factors

Factor	Urban		Rural		Both	
	f	%	*f*	%	*f*	%
Organic	119	79.33	9	6.00	22	14.67
Free from Pest / disease / adulteration/ insecticide/ pesticides, etc.)	94	62.67	29	19.33	27	18.00
Freshness	51	34.00	11	7.33	88	58.67
Visual Appeal	127	84.67	0	0.00	23	15.33
Traceability	23	15.33	14	9.33	113	75.33
Locally Grown	113	75.33	23	15.33	14	9.33
Relationship with producer	137	91.33	5	3.33	8	5.33
Taste	120	80.00	14	9.33	16	10.67
Trialability	131	87.33	6	4.00	13	8.67

4.4 Willingness to accept farm produces as per the block chain management:

Willingness to accept (WTA) operationalized as the minimum amount of money that a individual is ready to accept to sell a particular good or service. Willingness to accept (WTA) also operationalized as goods and services accepted by the consumers with their term and condition and finally, they ready to purchase the good and services in of money.

4.4.1 Understanding of Blockchain technology:

Table 4.42 revealed that majority (54.67%) of the respondents heard about the Blockchain Technology at the same time majority of the respondents (63.33%) do not aware about working principle or how it works properly. After serving several attributes of this innovative idea to respondents, it is important to see that majority of the respondents understand importance and principle of Blockchain technology. Results of the same table are also shown in figure 4.2 ,4.3.

Table 4.42: Understanding of respondents about Blockchain Technology

Sl. No.	Choice	Frequency	Percentage
1	Have you heard about Blockchain Technology?		
	Yes	82	54.67
	No	68	45.33
2	Do you aware of the Blockchain Technology?		
	Yes	55	36.67
	No	95	63.33

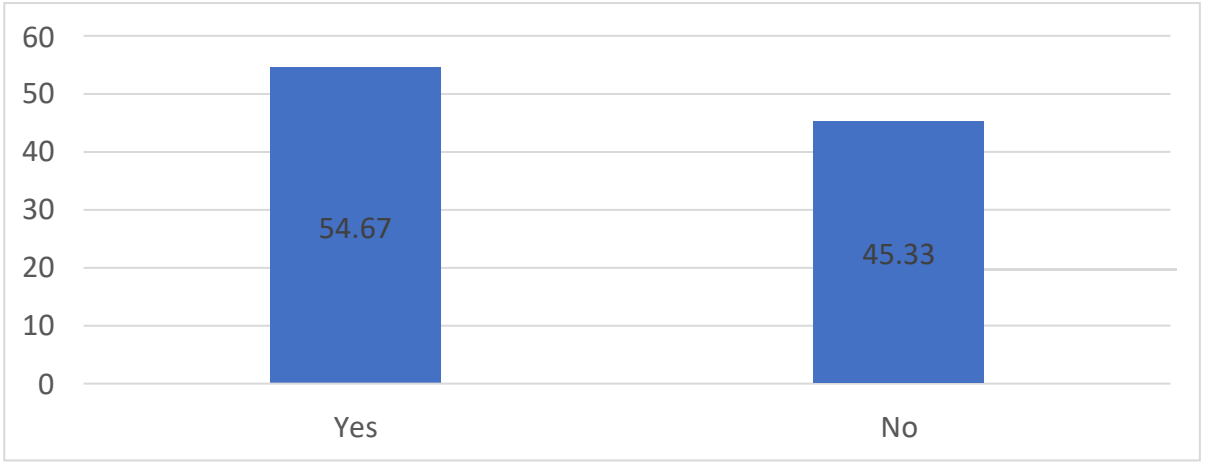


Fig 4.2: Have you heard about Blockchain Technology?

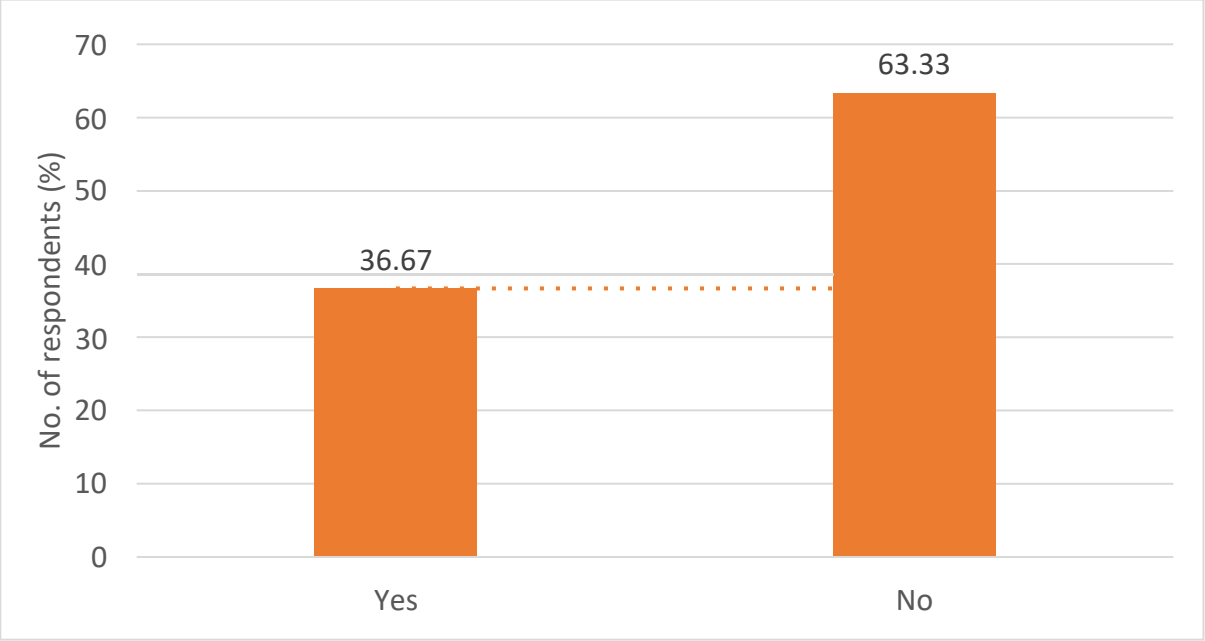


Fig 4.3: Awareness about Blockchain Technology

4.4.2 Respondents Willingness to accept Blockchain Technology for agricultural produces:

In the study attempt was made to know whether consumers are willing to accept food produces per protocol of Blockchain Management rather than traditional supply chain management. Survey respondents were asked whether they are willing to accept or not, two options were given “yes” or “no”. After serving several attributes to respondents, it is important to see that majority ofthe respondents (46.00%) were willing to accept the Blockchain Technology (B.C.T). About 27.33percent of the respondents were still in undecided stage about acceptance of Blockchain Technology (B.C.T). about 26.67 percent respondents were not influenced by this new idea. This is shown table 4.43 and fig no 4.44.

Table 4.43: Willingness to adopt Blockchain Technology

Choice	Frequency	Percentage
Yes	69	46.00
No	40	26.67
Undecided	41	27.33

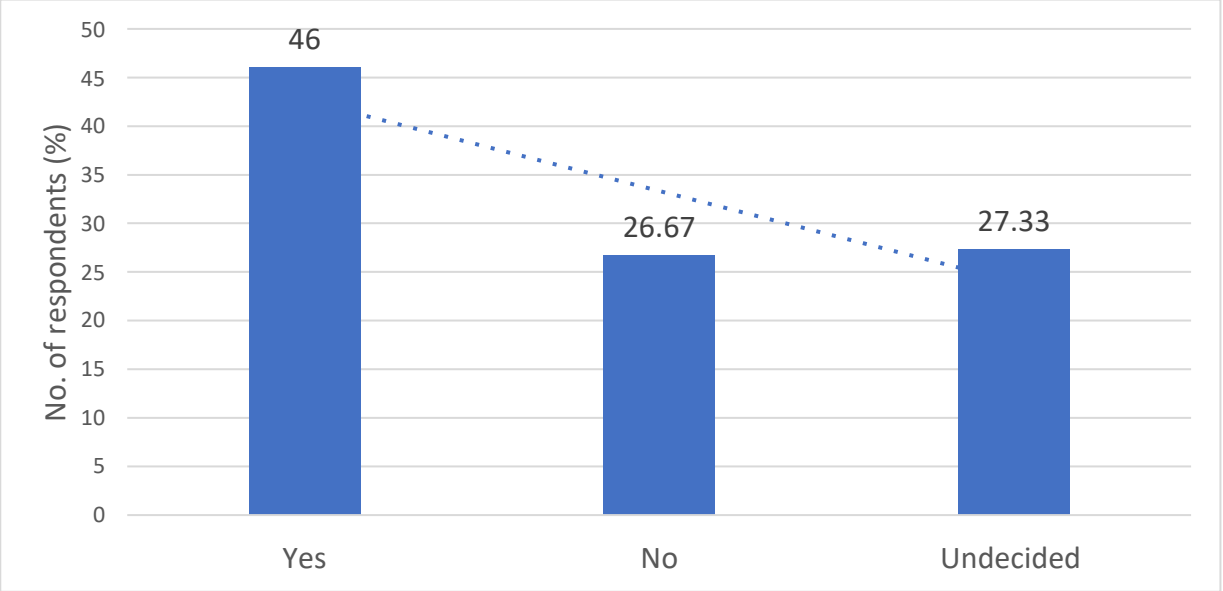


Fig 4.4: Willingness to accept Blockchain Technology

Similarly, respondents with "YES" they were further asked how much more they would like to pay to accept food produces as per Blockchain Management if available in the market near future as compared to traditional supply chain management. They were asked to mark one among five options given, namely "Up to 10 %", "From 10-20%", "From 20-30%", "From 30-40%" and "From 40-50%". It has been assumed that consumers won't be paying more than 50percent for Blockchain Technology. After analysis of the respondents, it was found that among the 150 respondents' 27.33 percent of the respondents would accept Blockchain technology if price goes "Up to 10%" in addition to regular price. At the same time 26.00%, 24.67%, 14.67%. 7.33% of the respondents were willing to give "10-20%", "20-30%", "30-40%" and "40-50%" in addition to regular price. This is shown in Table 4.44. Graphical representation is shown in 4.5. It is clearly showing the trend that consumers were willing to pay less with increasing the price in addition to regular price.

Table 4.44: Price range for acceptance of Blockchain Technology

Choice	Frequency	Percentage
Up to 10%	41	27.33
From 10% to 20%	39	26.00
From 20% to 30%	37	24.67
From 30% to 40%	22	14.67
From 40% to 50%	11	7.33
Total	150	100.00

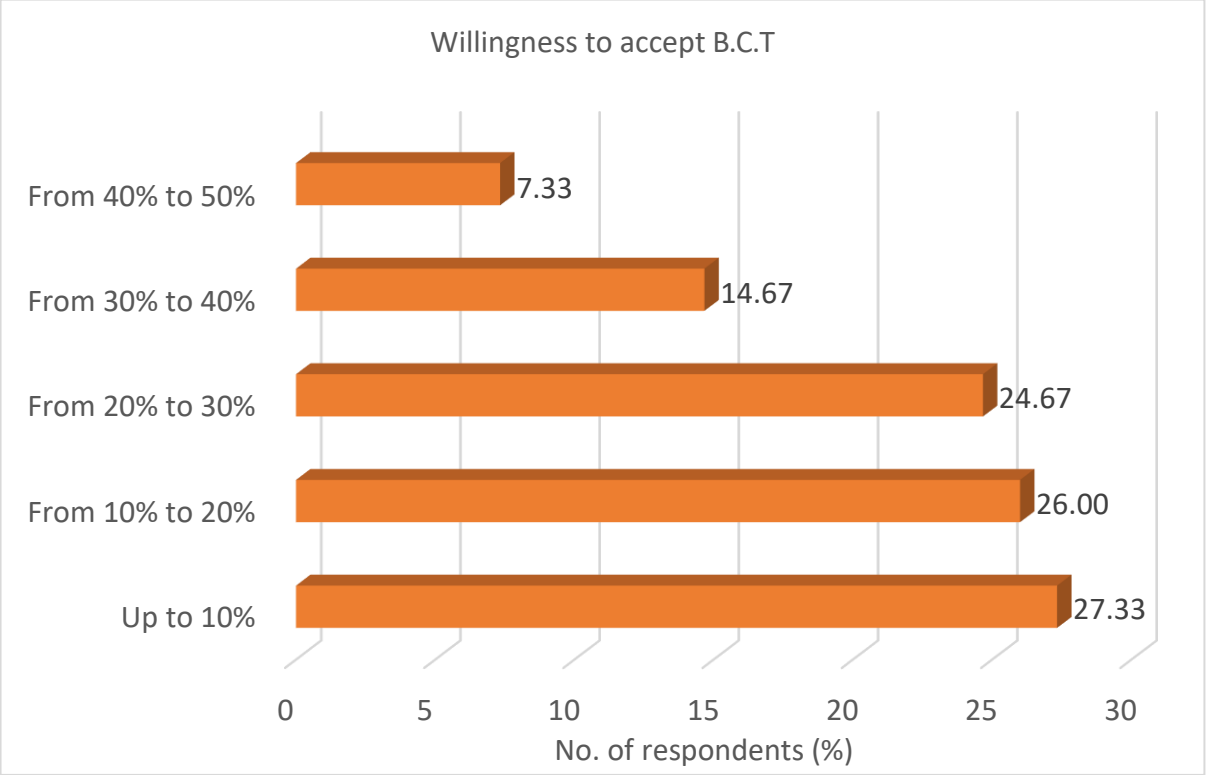


Fig 4.5: Price range for acceptance of Blockchain Technology

Same respondents were asked "above what price (in addition to regular price) respondents would definitely not accept the farm produce as per B.C.T, because they can't afford it or not worth the value". Majority of the people (35.33%) responded "30-40%" in addition to regular price is not affordable or value for money to accept the B.C.T. 20.67% respondents perceived that B.C.T become unaffordable above "40-50%" from regular price followed by 20.00%, 17.33%, 6.67% for "10-20%", "20-30%" and "0-10%" respectively. This is shown in table 4.45. Graphical representation is shown in 4.6.

Table 4.45 Price range for varying level of unaffordable rates of B.C.T

Choice	Frequency	Percentage
Up to 10%	10	6.67
From 10% to 20%	30	20.00
From 20% to 30%	26	17.33
From 30% to 40%	53	35.33
From 40% to 50%	31	20.67
Total	150	100.00

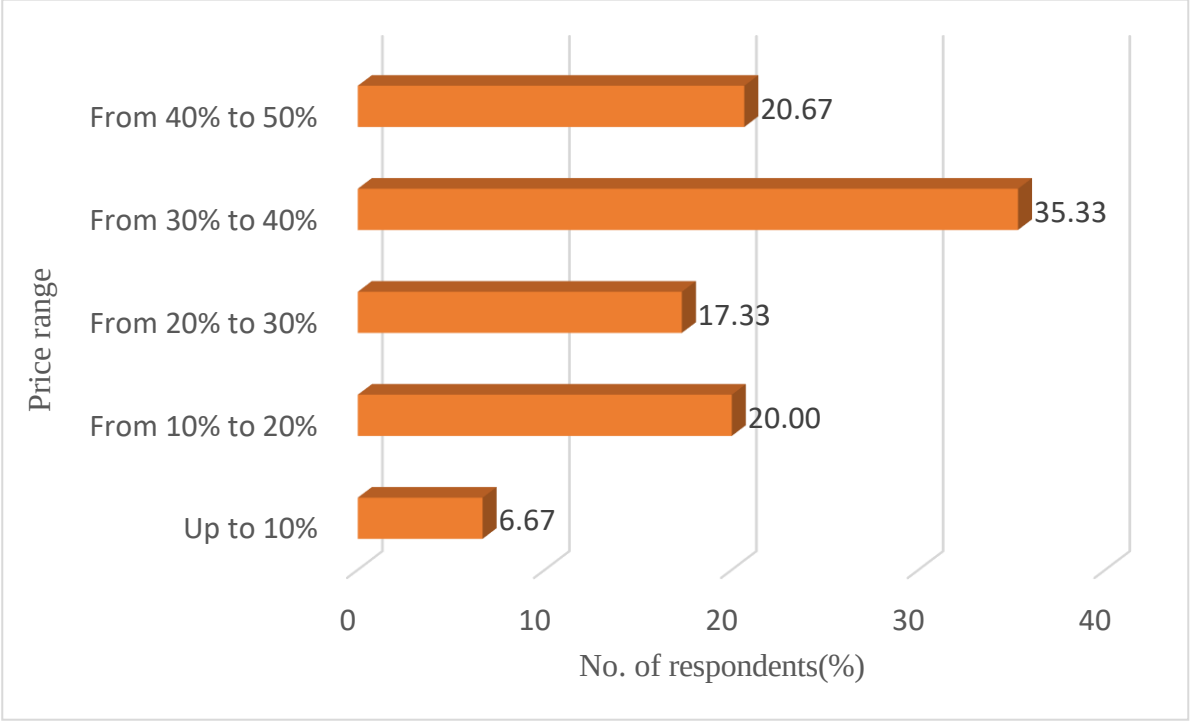


Fig 4.6: Price level at which B.C.T is unaffordable

Respondents were asked "Below which price would you say you would not accept the farm produce as per Blockchain Management because you would start to suspect the quality?". Table 4.46 shows that majority of the respondents (45.33%) reported that "40-50%" decrease from regular price is not acceptable cause then it may compromise with quality. It is showing the trend that greater the decreasing in price, greater the percentage of suspect in quality.

Table 4.46: Price range for quality suspect if B.C.T is accepted (decrease from regular price)

Choice	Frequency	Percentage
Up to 10%	9	6.00
From 10% to 20%	22	14.67
From 20% to 30%	27	18.00
From 30% to 40%	24	16.00
From 40% to 50%	68	45.33
Total	150	100.00

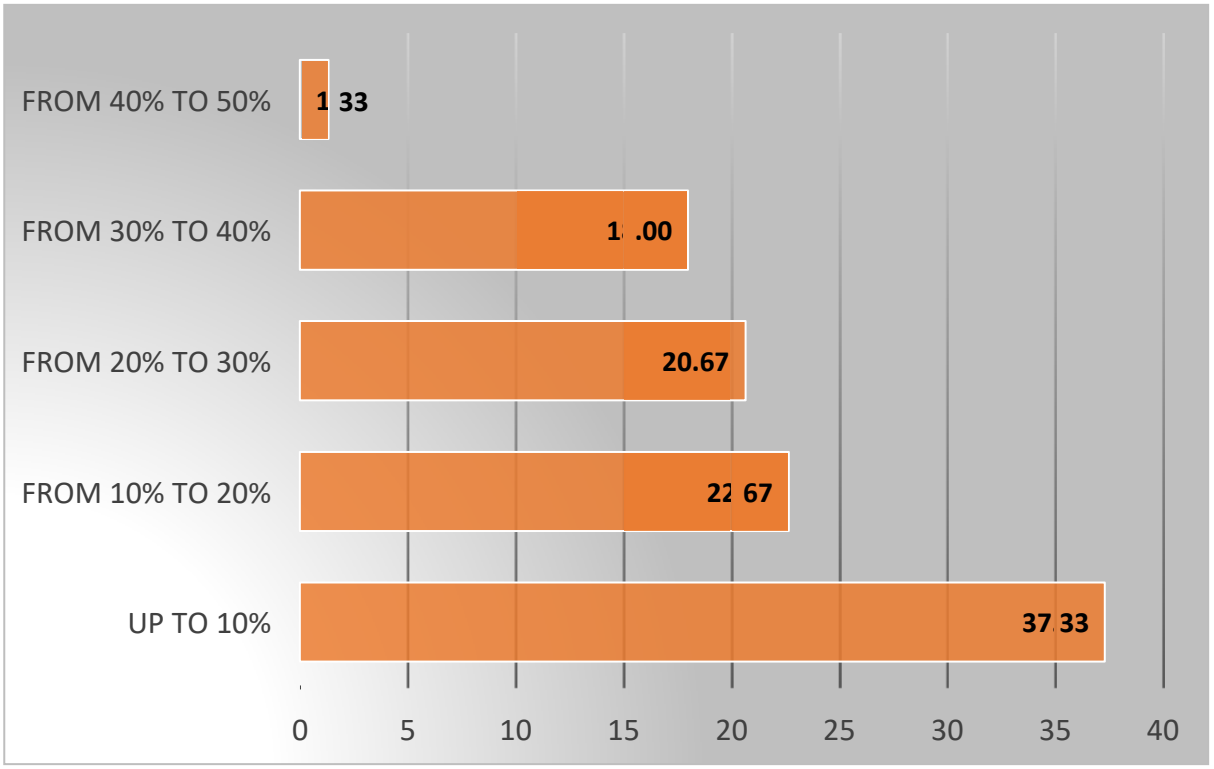
Respondents were asked "at what price would you consider the product to be a bargain for the money?". Table 4.47 indicates that "Up to 10%" price range in addition to regular price would be a great bargain to accept B.C.T if available in the market in near future as 37.33% respondents

indicates. It is followed by “10-20%” and “20-30%” in addition to regular price. This is shown in fig 4.7. It is clearly showing the trend that with increasing the price, consumer perceived that B.C.T become unworthy.

Table 4.47: Price range for acceptance of B.C.T as great bargain of money

Choice	Frequency	Percentage
Up to 10%	56	37.33
From 10% to 20%	34	22.67
From 20% to 30%	31	20.67
From 30% to 40%	27	18.00
From 40% to 50%	2	1.33
Total	150	100.00

Fig 4.7 Price range for acceptance of B.C.T as great bargain of money



The following table 4.48 explains that statement 2 “I will ONLY accept or consider farm produces through Blockchain Management if they are more or less the same as traditional supply chain management” was having mean value of 4.01 which indicates consumer are willing to accept Blockchain Technology if they are more or less same price with traditional supply chain management. On the other hand, statements 4 “I will accept or consider farm produces through Blockchain Management EVEN if they are significantly more expensive than traditional supply chain management” was having the least mean value 3.71 which indicates respondents were not

willing to accept Blockchain Technology for expensive price as compare to traditional supply chain.

Table 4.48: Willingness to accept(WTA) Blockchain Technology (B.C.T)

Sl. No.	Statements	Mean
1	I will ONLY accept or consider farm produces through Blockchain Management if they are cheaper than traditional supply chain management	4.00
2	I will ONLY accept or consider farm produces through Blockchain Management if they are more or less the same as traditional supply chain management	4.01
3	I will accept or consider farm products through Blockchain Management EVEN if they are slightly more expensive than traditional supply chain management	3.89
4	I will accept or consider farm produces through Blockchain Management EVEN if they are significantly more expensive than traditional supply chain management	3.71

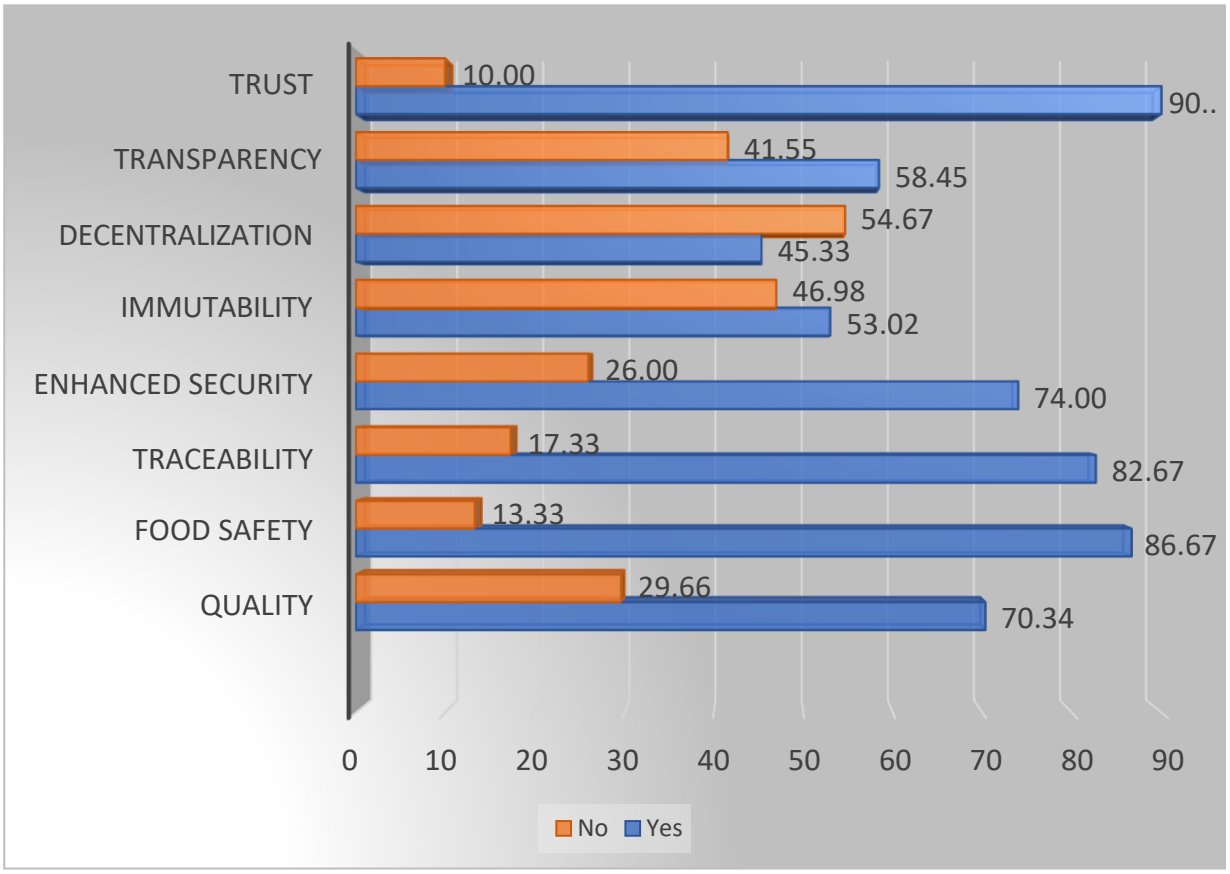
4.4.3: Expected Attributes of Blockchain Management affecting willingness to accept:

Table 4.49 indicates that expected attributes of Blockchain Technology. Majority off the respondents agreed that Blockchain Technology offers trust (90.00%), Quality (82.67%), Food safety (90.00%), Traceability (86.67%), Enhanced security (74.00%), Immutability (53.02%), Transparency (58.45%). This is shown in fig 4.8.

Table 4.49: Expected attributes of Blockchain Technology (B.C.T)

Expected attributes	Yes		No	
	f	**%**	***f***	**%**
Quality	102	70.34	43	29.66
Traceability	124	82.67	26	17.33
Food safety	130	86.67	20	13.33
Enhanced security	111	74.00	39	26.00
Immutability	79	53.02	70	46.98
Decentralization	68	45.33	82	54.67
Transparency	83	58.45	59	41.55
Trust	135	90.00	15	10.00

Fig 4.8: Attributes of the Blockchain Technology (B.C.T)



5. SUMMARY AND CONCLUSIONS

The number of people living in urban areas worldwide is over three billion, or 55% of the world population, and it is projected that 68% of the world's population will be living in urban areas by 2050 (United Nations, 2018). In India, 34.93% of the population currently lives in urban areas (World Bank, 2020). The continued expansion of cities nationwide places a heavy toll on the demand for resources, such as sustainable infrastructure and affordable food retail options, to meet the basic needs of households living within city limits. The use of new technologies in food production has potential benefits for both food manufactures and consumers and when the food industry is creating the new products and new ingredients, the farmers are growing the new crops with improved or modified characteristics, the question is open whether the new technologies and industries invested money are cost effective, are the new products accepted and assumed by the consumers. With the social development and the improvement of people's living standards, consumers are gradually paying more and more attention to the issue of food safety and environmental protection while purchasing the food. Such products may harm the environment, may not meet food hygiene and safety standards and may adversely affect consumers' health. Food safety plays an essential role in modern life. More and more citizens are concerned about their health in connection to food purchases, especially agricultural foods, Therefore, urban consumers looking for director purchasing of agriculture products from their producers. Before entering the market, agricultural commodities must go through a series of operations such as harvesting, threshing, winnowing, bagging, transport, storage, processing, and exchange. Several studies across the country have shown that crop production suffers significant losses at all stages. According to a recent estimate by the Ministry of Food and Civil Supplies of the Government of India, total preventable post-harvest losses of food grains amount to 10% of total production, or approximately 20 million tonnes (Mt), which is equivalent to the total food grains produced in Australia each year. The amended Agricultural Produce Market Regulation (APMR) Act, the country's main agricultural marketing act, which has been enforced by the various states of India, includes a provision allowing the promotion of contract farming and direct marketing between producer and consumer. Farm direct marketing is a long felt need of the farmers and consumers of the country as it goes a long way in ensuring higher remuneration to the farmers and meeting the satisfaction level of the consumers through direct sale of the agricultural commodity by the farmers to the consumer at affordable prices. Direct marketing of agricultural produce helps in reduction of middle men and commission agents who charge high

level of commission fee from the agriculturists/farmers coming to the market yards for selling their produce and then artificially inflate the retail prices. This marketing approach is more entrepreneurial or more business-like than wholesale marketing, the farmer using this method grows a "product" rather than. The opportunity to interact with growers is one of the reasons consumers like to purchase this way. Direct marketing can help to ensure the sustainability of agriculture and food systems by increasing farmer profitability, promoting the local economy, and providing consumers with higher-quality, healthier products. Alternative marketing options are viable options for farmers with a small production scale who want to increase their profitability. The purchasing experience is also part of the product. Although there is evidence that consumers are increasingly buying food directly from local producers, factor influences purchase decision are availability of fresh, superior, vitamin-rich, and locally-grown produce at market locations (Bond *et al.,* 2009). The most desirable characteristics for consumers are those concerning appearance, taste, quality, value, and price. Inexpensive, locally grown, good for the environment, and traceable to the processor and grower are the moderately desirable produce characteristics. At the same time Blockchain Management offers food traceability, food safety and direct interaction between producers and consumer in many ways. An increasing demand in society for more information on food reflects the need for greater transparency and lack of confidence. At the same time, more and more food products and beverages are being branded and accompanied by a variety of certification schemes, with an increasing risk of fraud (sale of unqualified product with high-quality labels or claims) and adulteration. There lies the support of direct purchase of agriculture produces through Blockchain perspective.

Keeping this view in the mind, a study entitled **‘‘Direct Purchase Behaviour of Urban Consumers for Agricultural Produce in North Bengal”** was undertaken, which focus to highlight the consumers behaviours, Symbiotic relation and willingness to accept agricultural produces with following specific objectives

1. To appraise behaviour of urban Consumers towards direct purchase of agricultural produce
2. To explore the symbiotic relationship of rural and urban linkages and its determinants for direct purchase of agricultural produces.
3. To estimate the willingness to accept farm produces as per the block chain management.

Research methodology:

Study was conducted in northern district of Darjeeling and Jalpaiguri. These areas have been selected purposively due to the following specific reasons-

- It has been clearly seen that among the 4 East Indian state West Bengal have highest level of Urbanization. According to 2011 census West Bengal have 31.89% urban population followed by Jharkhand (24.05%), Odisha (16.68%), Bihar (11.29%).
- Level of Urbanization of West Bengal (31.89%) is slightly higher than the average level of urbanization of India (31.14%).
- Siliguri is the third largest urban agglomeration in West Bengal, after Kolkata and Asansol. It lies within 35 kms west to its twin city, Jalpaiguri. The merging of the two cities makes them the largest metropolis of the Northern part of West Bengal.
- West Bengal already allows cash and carry retailers to buy directly from farmers under the model Agricultural Produce Market Committee (APMC) Act.
- Familiarity of the investigator with the area and investigator is well aware of the language, culture and behaviour of the respondents of study area.
- No systematic research has been conducted on direct purchase of agricultural produces in the northern region of West Bengal.

For the present investigation two types of respondents i.e., Urban consumers and Farmers were selected. The "Urban consumers" sub-sample includes urban resident who have purchased raw food items such wheat, rice, fruits, vegetables and milk and milk products directly from primary producers i.e., rural farmers. Whereas the "Farmers" sub-sample includes farmers who have cultivated agriculture crops, fruits, vegetables and selling milk and milk products directly to the urban consumers without any middleman in marketing of agro-animal produces. From each selected block 20 urban consumers and 5 farmers were selected. In this way from each district 60 Urban Consumers and 15 farmers were selected using snowball sampling. Thus, a total of 150 respondents were interviewed to get first-hand information.

Salient findings of the research:

- Majority (43.33%) respondents belong to middle age group followed by 31.67 percent young age group. Whereas only 25.00 percent of the respondents were belonging to old age group in the study area.
- Majority (85.00%) respondents for the present investigation were male and only 15.00 percent were female respondents.
- About 31.67 percent respondents educated up to high school, followed by 28.33 percent middle school education and 20.83 percent of the respondents did up to higher secondary in the study area. It was surprise to note that none of the respondents were found in the illiterate category.
- Majority (69.16 percent) respondents had nuclear family and 30.84 percent of respondents belonged to joint family.

- In case of young respondent category 47.36 percent were engaged in service sector followed by 34.21 percent in business and 15.78 percent respondent engaged in urban dairy farm. In case middle aged respondent category 50.00 percent were engaged in service sector where 9.63 percent of the respondents had labour as their occupation.
- Majority (59.17%) of respondents fall in medium level of annual income (Rs. 2-5 lakhs). While 16.67% belongs to high income range (>5lakhs)
- Respondents were regularly exposed to social media (89.33%), Newspaper (66.67%) and TV (64.00%). Occasionally exposed to Magazines, leaflets, bulletin (60.00%), documentary film on agriculture (47.33%), radio (29.33%), krishi mela (26.00%).
- Respondents were spending their earning on food (80567 Rs/annum) followed by Education (48900 Rs/annum) and health (24196 Rs/annum)
- Respondents' grains (95.33%) have highest daily intake followed by fruits (57.33%) in terms of monthly intake, tea/coffee (41.33%) in terms of fortnightly, monthly and occasionally intake. In case of vegetable 71.33 percent respondents were taken daily followed by weekly (28.67%). Fruits were taken weekly by 57.33% followed by fortnightly (19.33%), daily (23.33%). About 85.33 percent respondents taken pulses daily followed by 14.67 percent weekly, milk and milk products were taken daily by 44.67 percent respondents followed by weekly (39.33%) and fortnightly (16.00%).
- Majority of the respondents were depended on family member and friend for getting latest information about availability of food items.
- In case of vegetable, about 42.67 percent respondents were preferred sabzi mandi, followed by (29.33%) farmers field and only 15.33 percent respondents preferred super market. In case of purchasing of fruits, 48.00 percent respondents were preferred sabzi mandi followed by 19.33, 17.33 and 15.33 percent respondents preferred roadside farmer, farmers field and super market, respectively. In case of dairy products 30.67 percent respondents preferred milk vendor, 27.33 percent of respondents preferred milk outlet, 21.33 percent respondents preferred sabzi mandi and 19.33 percent respondents preferred super market.
- Majority of the respondents were purchased vegetables (72.00%), fresh fruits (67.33%) and to some extent meat (48.67%) and milk products (33.33%) from primary producers.
- Most of the respondents strongly perceived that food products purchased from farmer fields are healthy (41.33%) and having high nutritious value (36.67%).
- Majority of the respondents bought food products from farmers field because they perceived food products are better in taste, healthy and fresh.
- The respondents were agreed that they would like to purchase agricultural products directly from

the farmer's field if products were cheaper (45.33%), if they have more income (53.33%), have more options availability (43.33%), have more time to look for agricultural produce (46.67%).

- The majority of the respondents had opposed the idea of no change in food habits (Disagree,74.67% & strongly disagree,20.00%) and also disagreed with the idea of more packaged food items (Disagree, 68.00%).
- The path from perceived behavioural control and attitude is highly significant with a p-value less than 0.05. However, the path from subjective norms to behavioural intentions failed to achieve statistical significance. Attitude and Perceived behavioural control have a positive significant effect on the direct purchase intention of agricultural produces.
- Path diagram indicates that the standard estimate between behavioural intention and attitude is 0.21, between subjective norms (S.N.) and behavioural intention (B.I) is -0.10, and between perceived behavioural control (P.B.C) and behavioural intention is 0.26.
- RMSEA value of the used model is 0.053 which is less than 0.08. Hence, the TPB model good fit in the context of the behavioural intention of direct purchasing agricultural produces from the producer.
- Amongst the whole attitude towards direct purchase of agricultural produces, the most important factor having the highest mean score was “strengthening the local economy (4.39)” followed by “healthy food product (4.37)”, “personal health or diet concerns influence my food purchases (4.33)”, and “chemicals free food products (4.31)”. On the other hand, “The farmers’ market has products that I can’t find anywhere else” received the lowest mean score (3.71).
- Most important factor for symbiotic relation which have reported both the farmer and consumer is financial benefit to both seller and consumers (85.33%).
- Personal factor that influences symbiotic relation between farmers and consumers is Age (86.67%) followed by occupation (86.67%) Education (86.67%), health status (85.33%), social participation (83.33%).
- Motivational factor for symbiotic relationship is absence of middleman and commission (87.33%) followed by Social Interaction (86.67) and convenient pricing (79.33%).
- Majority (54.67%) of the respondents heard about the Blockchain Technology at the same time majority of the respondents (63.33%) do not aware of it properly or how it works.
- Most of the respondents (46.00%) were willing to accept the Blockchain Technology. 27.33% respondents are undecided about acceptance.
- Consumers won’t agree to pay more than 50% for Blockchain Technology. It was found that 27.33%, of the peoples would accept Blockchain Technology if price goes “Up to 10%” in addition to regular price.

- Majority of the people (35.33%) responded "30-40%" in addition to regular price is not affordable or value for money to accept the Blockchain Technology (B.C.T). "20-30%" price range in addition to regular price would be a great bargain to accept Blockchain Technology (B.C.T) if available in the market in near future.
- Majority of the respondents (45.33%) reported that "40-50%" decrease from regular price is not acceptable cause then it may compromise with quality. "Up to 10%" price range in addition to regular price would be a great bargain to accept Blockchain Technology (B.C.T) if available in the market in near future
- Majority off the respondents agreed that Blockchain Technology (B.C.T) offers trust (90.00%), Quality (82.67%), Food safety (90.00%), Traceability (86.67%), Enhanced security (74.00%), Immutability (53.02%), Transparency (58.45%).

❖ **Conclusion:**

Majority of the respondents were purchased vegetables (72.00%), fresh fruits (67.33%), meat (48.67%) and milk products (33.33%) from primary producers and consumers strongly perceived that food products purchased from farmer fields were healthy (48.00%) and nutritious (47.33%). They also observed that food products bought from farmers field were better in taste, healthy and fresh. This indicated that urban consumers had favorable Behaviour towards direct purchase of agricultural produce from farmer's field. Most important factor for symbiotic relation which have reported both the farmer and consumer is financial benefit to both seller and consumers (85.33%). Majority (54.66%) of the respondents heard about the Blockchain Technology and 46.00% respondents were willing to accept the Blockchain technology. Consumers were not agreed to pay more than 50% for Blockchain technology. It was found that 27.33%, of the peoples would accept Blockchain technology if price goes "from 20 to 30%" in addition to regular price.

❖ **Implications and Recommendations:**

- Efforts should be directed towards the improvement of knowledge towards direct purchase agricultural produces and Blockchain technology so that consumer and producer can use it in a beneficial way in near future.
- The demand for direct purchase of agricultural produces is increasing, this will in turn help the farmers to identify the proper market segments to get better returns and thereby will help in increasing farmers' income. In this context, market led extension strategies will play a major role.
- It also suggests that there is a need for mass awareness and timely information to the people regarding direct purchase practices of agricultural produces along with its easy accessibility and availability. Awareness programme are needed to be conducted.

- Study revealed that although people are having good perception regarding direct purchase of agriculture produces but, consumption is still low. Therefore, appropriate strategies should be undertaken to overcome these hindrances that come in the path of consumption of food and thereby converting the intent to consume into real action.
- People are interested and willing to accept farm produces as per Blockchain technology if the price is to some extent more than the traditional supply chain. These products should be integrated with local food value chain for feeding the future generation in sustainable way.

❖ **Suggestions for future research:**

On the basis of findings and experiences of the present study, following areas are identified where further research could be contemplated:

- The investigation was confined to two districts of North Bengal only. Similar studies may be undertaken in other states, so that the results obtained can be generalized to a greater extent.
- Similar studies may be conducted with large sample size from different geographical area to arrive at wider generalization.
- New attitudinal and behavioural dimensions can be added to predict the direct purchase intention of the respondents.
- Further research can be conducted how the Blockchain technology affects the consumption pattern of the people.

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APPENDICES

ICAR-NATIONAL DAIRY RESEARCH INSTITUTE

(Deemed University)

Karnal, Haryana

''Direct Purchase behaviour of Urban Consumers for Agricultural produce in North Bengal''

(The objectives of this project will be to appraise behaviour of urban consumers towards direct purchase of agricultural produce, explore the symbiotic relationship of rural and urban linkages and its determinants for direct purchase of agricultural produces and estimate the willingness to accept farm produces as per the block chain management)

INTERVIEW SCHEDULE

(Your interview is only for research purpose and your identity will not be disclosed, now are you ready to take part in this research work voluntarily. I would be pleased if you participate in this survey, it will take 10 minutes)

Sr. No…… **Date…….**

I. Basic Information of the respondent:

Name of the respondent:

City/Village: Block:

District: Mobile No.:

II. Variables selected to assess the Purchase behaviour of Urban Consumers:

Socio-Personal variables:

1. Age: .....in years
2. Gender of the respondent / Household head: - Male (1) / Female (2)
3. Education of the respondents:

Sl. No.	Qualification	Score
1.	No schooling	0
2.	Functionally literate	1
3.	Primary	2
4.	Secondary/Middle level (3)	3
5.	Higher Secondary (4)	4
6.	Graduate and above	5

4. Family type & size: …….

5. Annual income and sources

S.N.	**Sources**	**Annual income (Rs.)**
1	Agriculture	
2	Livestock	
3	Government employment	
4	Private sector employment	
5	Business/Trade	
6	Labour	
7	Any other (specify)	

6. Household expenditure pattern

S.N.	**Sources**	**Expenditure (Rs.)**
1	Food	
2	Cloth	
3	Education	
4	House	
5	Health	
6	Social function	
7	Others	

7. Mass Media Exposure:

S.N.	**Mass Media**	**Regularly (3)**	**Occasionally (2)**	**Rarely (1)**	**Never (0)**
1	Radio				
2	TV				
3	Social media				
4	Newspaper				
5	Magazine, leaflets, bulletin				
6	Documentary film on agriculture				
7	Folk media				
8	Krishi/dairy mela				
9	Cattle show/exhibition				

10	Any others				

8. Source of information on direct purchase of agricultural produces:

S.N.	**Sources of Information**	**Family and Friends**	**Electronic and social media**	**Food expert**	**Farm & farmers**
1.	Vegetables				
2.	Fruits				
3.	Grains (wheat/paddy)				
4.	Pluses				
5.	Tea/ coffee				
6	Dry fruits				
7	Milk & milk Products				
8	Chicken/ Meat/ Fish/egg				
9	Any others (specify)				

9. Eating frequency of food items.

S.N.	Frequency	Daily (1)	Weekly (2)	Fortnightly (3)	Monthly (4)	Occasionally (5)
1	Vegetables					
2	Fruits					
3	Grains					
4	Pulses					
5	Dry fruits					
6	Tea/ coffee					
7	Milk & milk Products					
8	Chicken/ Meat/ Fish/egg					
9	Any others (specify)					

10. Preferred shops/markets for food items

Market	Farmers filed	Sabzi mandi	Roadside farmers	Super market	Milk outlet	Online	Milk vender	Any other
Vegetables								
Fruits								
Grains								
Pulses								
Dry fruits								
Tea/ coffee								
Milk & milk Products								
Chicken/ Meat/ Fish/egg								
Any others (specify)								
Distance								

III. Objectiove-1 Appraise behaviour of urban consumers towards direct purchase of agricultural produce:

Q1. Who is generally responsible in your house for the food shopping?

1. Me
2. Another person
3. Family as a whole

Q2. How often do you buy food products from farmers field?

1. 5-7 times in a week
2. 1-2 times in a week
3. 2-3 times in a month
4. Once in a month

5. Less than once in a month

Q3. Approximately when did you buy your first food products from farmers field?

1. More than 5 years
2. 3- 5 years
3. 1-3 years
4. Last year
5. Last 6 months

Q4. How would you describe food products purchased from farmers field?

SL	Reasons	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Healthy					
2	High Nutritional Value					
3	Products are grown in harmony with nature					
4	Free from chemical pesticides and fertilizers					
5	Produced with environmentally / animal friendly techniques					
6	Free from adulteration					
7	All products coming from organic agriculture					
8	I can know the production techniques from farmers					

Q5. I buy food items/ agricultural produce directly from farmers field, because…

S.N.	Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Healthy for me and my family					
2	They have high safety level of guarantee and control					
3	Animals are reared by them better					

4	Environment is less polluted in villages					
5	Taste good					
6	Fresher than items on the shops					
7	High quality /Organic					
8	Support local / small farmers					
9	Support farming sustainability					
10	Not willing to support big multinational companies					
11	Saving resources for next generations					
12	Pest free					
13	I support/love farming					
14	Purchasing a product from farmers give me satisfaction					
15	Relationship with producer					
16	Locally grown					
17	Traceability					
18	Any other					

Q6. I would like to buy more agricultural produce directly from producers if…

S.N.	Reasons	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't Know
1	More cheap prices						
2	More income						
3	More accessibility in the locality						
4	More assortment availability						
5	Better appearance and taste						
6	More time to look for agricultural produce						
7	Assurance for less fertilizer/ insecticide in field						
8	More trust to farmers/ seller						
9	More seasonal products						
10	More products from my local region						
11	Longer shelf life						

12	Less packing material						
13	More information in the media						
14	Better/shorter cooking conditions						

Q7. Please select the product group(s) from the table that you consume

S.N.	Market	Purchase from primary producer	Purchase from Middleman	Direct Purchase from producer in future
1	Fresh vegetables			
2	Fresh fruits			
3	Meat and meat products			
4	Milk and milk products			
5	Cereals			
6	Bread and bakery products			
7	Pulses			
8	Spices			
9	Dried fruits and nuts			
10	Beverages			
11	Oil			
12	Sugar Products			
13	Herbs			
14	Textile products			

Q8. Consumer attitudes towards changes in food habits

S.N.	Food habits	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't Know
1	No Change						
2	More fruit and vegetable						
3	More organic food						
4	More variety						
5	Less Ready to Eat food						
6	More local food						

7	Less packed food item						
8	More packed food items						
9	Less food item from producers						
10	More item from farmers field						

Q9. Social behaviour at the market for consumers of different groups

S.N.	Often meet friend at market	Yes (1)	No (2)
1	Sometime met friend at market		
2	Never met friend at market		
3	Feel natively in the market		
4	Childhood memories in market		

Q10. Purchase intention of agricultural products directly from producers:

S.N.	Statement	Response				
		SA	A	UD	D	SD
Attitude towards direct purchasing of agricultural produce						
1.	I like to purchase agricultural products directly from producer					
2.	I think that purchasing directly agricultural produce is favourable					
3.	I think that direct purchasing of agricultural produce is a good idea					
4.	I think that direct purchasing of agricultural produces is chemical free and safer to eat					
5.	Purchasing agricultural products directly from producer is healthy and worthy					
6.	It is important for me to buy high quality food products					
7.	Direct fresh agricultural products are good in taste					
8.	While purchasing directly from producer, I support					

	local for vocal movement.					
9.	I think my family and friends would agree that is an extremely attractive option.					
10.	My diet become more tempting when I purchased from producers.					
Subjective norm						
1.	My family think that I should directly purchase agricultural produce from the producers rather than supermarket.					
2.	My family support my behaviour of direct purchase of agricultural produces from the producers					
3.	My parents think I should get products directly from producer					
4.	My family approve my behaviour of direct purchase of agricultural produce from the farmer					
5.	Mass media messages advocate consumption of direct purchased fresh agricultural produces.					
6.	Most people who are important to me think that I should consume directly purchased food products					
7.	Most people who are important to me think that I should directly purchase fresh agriculture produces rather that normal products					
8.	My friends or colleagues think that I should purchase produces directly from producers					
9.	My significant other think that I should purchase produces directly from producers					
10.	My relatives/neighbours think I should get products directly from producer					
Perceived behavioural control						
1.	I have enough ability to directly purchase from producer					
2.	I can decide whether to purchase fresh agricultural produce from producer					
3.	I can overcome the difficulties that I encounter in					

	the process of direct purchase of agricultural produce from producer					
4.	I am confident that I can directly purchase fresh agricultural produce from producer rather supermarket					
5.	I have time and willingness to purchase agricultural produce directly from producer					
6.	There are likely to be plenty opportunities for me to purchase fresh agricultural produce					
7.	I have resources to purchase agricultural produce directly from producer					
8.	whether or not I buy directly from producer is completely up to me.					
9.	It is difficult to purchase directly					
10.	It does not provide extra advantage					
Direct Purchase intention for agricultural produces						
1.	I intend to purchase directly from producer					
2.	I want to consume fresh agricultural produce					
3.	I intent to purchase in next few weeks					
4.	I aim to purchase for my healthy lifestyle					
5.	I plan to buy directly from producer from next months.					
6.	I plan to increase quantity bought of fresh agricultural produces					
7.	I will continue purchasing agricultural produce directly from producer					
8.	I will recommend my friends and relatives to buy directly from producer					
9.	I expect to buy directly along with my family/friends/relatives.					
10.	I expect to purchase agricultural produce directly from the producer along with my family.					
11.	I will definitely consider next time to buy directly from producer.					

Q11. Attitudes Toward Buying Directly from Farmers:

S.N.	Statement	Response				
		SA	A	UD	D	SD
1.	If agricultural produces are labelled as 'locally grown' then I would like to purchase					
2.	I would be willing to pay more if products grown locally					
3.	I would be willing to pay more if I buy directly from producers					
4.	Consumers should have more locally–grown fruits and vegetables available to them					
5.	Consumers can influence what fruits and vegetables are grown locally					
6.	Cafeterias in schools, hospitals and other public institutions should serve food grown by local farmers					
7.	Keeping farms viable in your region is important					
8.	Buying local produce is an effective way to keep your regional farms viable					
9.	Loss of farmland is not a problem in your town					
10.	Laws should try to protect farmland from urban development					
11.	Price is the most influential factor when I make my purchases.					
12.	Shopping at the farmers' market is less convenient than shopping at a supermarket for me					
13.	Fresh products are the main reason I shop at the farmers' market					
14.	The farmers' market has products that I can't find anywhere else.					
15.	Direct contact with the farmer is an important reason to shop at the farmers' market for me.					
16.	My purchases can affect farmers' production decisions.					
17.	Buying locally produced foods is important to me.					
18.	I believe that shopping at farmers' markets supports agricultural open space.					
19.	I believe that shopping at farmers' markets improves the local economy					

20.	I enjoy shopping at the farmers' market.					
21.	How my food is produced is important to me.					
22.	Personal health or diet concerns influence my food purchases.					
23.	Food safety concerns influence my food purchases.					
24.	Purchasing foods grown without chemicals is very important to me.					
25.	Buying local products is an effective way to help preserve Maine's rural landscape.					

IV. Objectiove-2 Symbiotic relationship of rural and urban linkages and its determinants for direct purchase of agricultural produces

4.1 Symbiotic relationship of rural and urban linkages

S.N.	Symbiotic relationship due to direct purchasing	**Experience by**		
		Urban (1)	Rural (2)	Both (3)
1	Food with an ethical value for urban people			
2	Price satisfaction in direct purchasing (Price often perceived as too high in retails market)			
3	Financial benefit to both seller and consumers			
4	Increase understanding and knowledge about agriculture produce for urban consumer			
5	Opportunity for sharing and exchanging information			
6	By shortening the supply chain, consumers can find out more about production methods and processes			
7	Consumers learn about the environmental benefits from farmers			
8	Consumers are interested in obtaining high quality products at low prices			
9	Enhanced entrepreneurial skills in aspects such as their relationships with customers			
10	Diversify production to meet consumers' demand			
11	The farmer's interest is focused on getting the best return from his produce			
12	Rediscovery of traditional vegetables and dairy products			

	made from indigenous breeds.			
13	Short supply chain			
14	Relationship between producer and consumer at a local level, can greatly reduce the distance of travel of food.			
15	Direct purchasing of agricultural produce reduced the conflict of interest between farmers and consumers			
16	"Pick-your-own" farms and on-farm produce stands as a way to capture consumers who may drive by or be seeking an on-farm experience.			
17	Storage problems can be solving from both sides			
18	Transportation of goods / producers			
19	Supporting the financial prosperity of small- and medium-sized farms.			
20	Ecological awareness			
21	Vocal for local			

4.2 Determinants for direct purchase of agricultural produces

I	**Personal factors of consumer**			
S.N.	Factors	**Experience by**		
		Urban (1)	Rural (2)	Both (3)
1	Age			
2	Education			
3	Family size			
4	Decision maker			
6	Occupation			
7	Social participation			
8	Health status			
9	Extension contact			
10	MM exposure			
II	**Motivational factor for direct purchasing of agricultural produce**	Urban	Rural	Both
1	Variety Available			

2	Superior Product			
3	Safety			
4	Support Local			
5	Convenience			
6	Organic in nature			
7	Recommendation by elder			
8	Prices			
9	Social Interaction			
10	Absence of malpractices			
11	Absence of middleman and commission			
12	Remembering childhood days			
13	Provision of traceability			
14	Proximity			
15	Any others (pl specify)			
III	**Production practice attribute factors**	Urban	Rural	Both
1	Organic			
2	Free from Pest / disease / adulteration/ insecticide/ pesticides, etc.)			
3	Freshness			
4	Visual Appeal			
5	Traceability			
6	Locally Grown			
7	Relationship w/ Producer			
8	Taste			
9	Trialability			
10	Timing			

V. Objective -3: Willingness to accept farm produces as per the block chain management.

Sl.no.	Statements	Yes	No	Undecided
1	Have you heard about Blockchain technology?			
2	Do you aware of the Blockchain Technology?			

	If no then I tell you what is Blockchain Technology: Hope now you understand the term? A folder consist Blockchain technology concept will be provided to you, Hope now you understand, what is this BCT.			
3	Do you willing to accept Blockchain Technology			
4	Willingness to accept	Price range (in %)	Response	
	For How much price you would accept for agricultural products as per B.C.T, if available in the market as compared to traditional supply chain management	Up to 10%		
		From 10% to 20%		
		From 20% to 30%		
		From 30% to 40%		
		From 40% to 50%		
5	Above what price would you definitely not accept the farm produce as per B.C.T, because can't afford it or because you didn't think it would worth the money? Increase in price (addition to regular price)	Price range (in %)	Response	
		Up to 10%		
		From 10% to 20%		
		From 20% to 30%		
		From 30% to 40%		
		From 40% to 50%		
6	Below which price would you say you would not accept the farm produce as per Blockchain management because you would start to suspect the quality?	Price range	Response	
Decrease in price		Up to 10%		

		From 10% to 20%		
		From 20% to 30%		
		From 30% to 40%		
		From 40% to 50%		
7	At what price would you consider the product starting to get expensive, so that is it not out of the question, but you would have to give it some thought to buying it?	Price range	Response	
Increase in price (addition to regular price)		Up to 10%		
		From 10% to 20%		
		From 20% to 30%		
		From 30% to 40%		
		From 40% to 50%		
8	At what price would you consider the product to be a bargain a great buy for the money?			
Increase in price (addition to regular price)		Up to 10%		
		From 10% to 20%		
		From 20% to 30%		
		From 30% to 40%		
		From 40% to 50%		
9	Are sure you about your acceptance decision:	Yes	No	Undecided
10	Expected **Attributes** of Blockchain Technology affecting willingness to accept	Yes	No	Undecided
I.	Quality			

II.	Food safety			
III.	Traceability			
IV.	Enhanced security			
V.	Immutability			
VI.	Decentralization			
VII.	Transparent			
VIII.	Trust			
IX.	Authentication and Authorisation			

Factors for accept Blockchain management

S.N.	Statement	Response				
		SA	A	UD	D	SD
1.	I will ONLY accept or consider farm produces through Blockchain management if they are cheaper than traditional supply chain management					
2.	I will ONLY accept or consider farm produces through Blockchain management if they are more or less the same as traditional supply chain management					
3.	I will accept or consider farm products through Blockchain management EVEN if they are slightly more expensive than traditional supply chain management					
4.	I will accept or consider farm produces through Blockchain management EVEN if they are significantly more expensive than traditional supply chain management					