Agricultural Value Networks in Contemporary India: A Comparative Study of Paddy in Punjab and Bihar

Thesis Submitted to the
Jawaharlal Nehru University for the
Award of the Degree of

DOCTOR OF PHILOSOPHY

MANISH KUMAR

Centre for Economic Studies and Planning

School of Social Sciences

Jawaharlal Nehru University

New Delhi-110067

2019

CENTRE FOR ECONOMIC STUDIES & PLANNING
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067 (INDIA)

Phone: 91-11-26742575, 26741557,
26742676, Ext. 4421
Direct : 26704421
Fax : 91-11-26741504, 26741586

Date 30.12.2019

Declaration

I hereby declare that the thesis titled **'Agricultural Value Networks in Contemporary India: A Comparative Study of Paddy in Punjab and Bihar'** submitted by me to Jawaharlal Nehru University for the award of the degree of **Doctor of Philosophy** is the result of original research and has not been previously submitted for any degree to this or any other university.

Manish Kumar

Certificate

We recommend that this thesis may be placed before the examiners for evaluation.

Prof. Praveen Jha
Supervisor

Prof. Shakti Kumar
Chairperson

Supervisor
CESP, SSS, JNU
New Delhi - 110067

अध्यक्ष / Chairperson
आर्थिक अध्ययन और नियोजन केन्द्र
Centre for Economic Studies & Planning
सामाजिक विज्ञान संस्थान / School of Social Sciences
जवाहरलाल नेहरू विश्वविद्यालय
Jawaharlal Nehru University
नई दिल्ली-110067 / New Delhi-110067

Acknowledgements

Sincere gratitude and thanks to my supervisor, Professor Praveen Jha for his continuous guidance and support. I am overwhelmed by the generosity and the strength that he extends as a teacher and supervisor. I am fortunate to undertake courses offered by Prof. Jha at the Centre for Economic Studies and Planning (CESP); *Problem of Indian Economy*, *Classical Theory of Value and Distribution* and *Labour Economics*. The class lectures have helped me to build the foundation of this thesis. His acquaintance and profundity of theoretical aspects have been a source of inspiration for a learning scholar like me. His affectionately sensitive approach has been a major contributor to the social and political aspects of my life.

I take this opportunity to express my gratitude to Late Prof Sam Moyo for motivating me to work on Political Economy of Agriculture. I am grateful to Prof Archana Prasad for her support and suggestions towards my thesis.

I am grateful to my teachers at the CESP. Prof Prabhat Patnaik, Prof Utsa Patnaik, Prof Abhijit Sen, Prof Arun Kumar, Prof C. P. Chandrasekhar, Prof Jayati Ghosh, Prof Biswajit Dhar, Prof Vikas Rawal, Prof Surajit Mazumdar, Prof K. G. Dastidar, Prof S. Dasgupta, Prof S. Guha, Prof P. Chaudhary, Prof Sujoy C., Dr Himanshu, Dr Rohit, Dr Ashok, Dr Surajit Das and Dr R. P. Kundu have been source of encouragement and learning during different stages of my studentship at the Centre. I am also thankful to the teachers at the Centre for Informal Sector and Labour Studies (CISLS), specially Dr Avinash Kumar and Dr Pradeep Shinde for their care and support at different points of time.

It is my humble offering of thanks to Sam Moyo African Institute of Agrarian Studies (SMAIAS), Harare, Zimbabwe for allowing me to participate in six Annual Summer Schools, which is a unique international platform to learn and engage with several issues and scholars of agrarian studies in the Global South. I have presented all my PhD Chapters at Summer School and benefitted immensely from the comments of fellow participants. I take this opportunity to thank Prof Paris Yeros, Dr Walter Chambati, Dr Freedom Mazwi and other comrades for enriching my research and understanding.

I am obliged to Prof Christoph Scherrer for including me in his research on Global Agricultural Production Systems (GAPS). Participation in the GAPS project of International Centre for Development and Decent Works (ICDD) helped me in shaping the methodology for the primary data collection as well as this thesis. The ICDD generously funded for the data collection from four districts of two Indian States. I am thankful to Prof Scherrer for providing me wonderful international exposure that gave me an opportunity to present my research in Zimbabwe and Brazil.

I thank Global and European Studies Institute (GESI), University of Leipzig, Germany, where I had spent a semester as an exchange student on the Erasmus+ fellowship. Using the resources at GESI, I could write the theoretical chapter of this thesis. I am also grateful to the ICDD, University of Kassel, for providing me short term Doctoral Fellowship. Using the resources of ICDD, I could complete concluding chapters of this thesis.

I thank office staffs at the CESP, CISLS, School of Social Sciences, Exim Bank Economics Library and Central Library, JNU for their cooperation and support. Rajesh, Ranjeet, Rahul, Prem, Sitaram, Jitender, Uma and others have always been available for help. In the long journey of studentship at Jawaharlal Nehru University and to complete this thesis, I have received support from many friends. With Santosh and Gurpreet, I could always discuss my academic and personal issues. I also thank Nivedita, Satadru, Nilachala, Amit, Chandan, Puja, Deepali, Suresh, Sourabh, Anupam, Imran and other fellow research scholars for their help and comments on the draft of this thesis.

Many people helped me at various stages of conducting field-studies, data collection and data entry. I thank Vinay Bhaiya to provide resources and logistical support for field studies in South Bihar. I am grateful to my late brother-in-law, Kedar Shah for his great help in completing survey in Katihar. I thank Abhishek for his assistance during survey in Katihar, Purnea and Patna. I also thank Ashutosh and his brothers for all logistical supports during field study in Patna. During the field survey in Punjab, I was benefitted by the assistance of comrades of Students Federation of India (SFI) and Prof

Balwinder Tiwana. I thank Ashish for his help during the survey in Amritsar and Patiala. I am thankful to Umesh and Deepanjan for their help in data entry.

During this journey, I had the privilege to learn and spend time with many comrades. I thank all my comrades in SFI for their love and support. The long association, debate, and discussion with comrades helped in framing the political as well as academic understanding of various issues.

Much thanks is due to my parents, sisters and other members of the family who are source of inspiration. Because of my academic engagements in last nine years, I could not give enough time at home, being elder son that is expected from me. At all these occasions, my cousins were available for my parents and I extend thanks and love to them. During all these years, my younger brother Abhinub, alone has been fulfilling various responsibilities at home. This was a great support and allowed me to focus on my study. I am immensely grateful to Twinkle for her intellectual company. She has been associated with this research since the beginning, from motivating and encouraging to editing the draft. I hope to have many more years of togetherness.

Contents

*****

List of Tables

List of Figures

Abbreviations

AAGR:	Average Annual Growth Rate
AFCA:	Agriculture and Food Council of Alberta
APBR:	A-grade Par-Boiled Rice
APEDA:	Agricultural Products Export Development Authority
APMC:	Agricultural Produce Market Committee
APMR:	Agricultural Produce Market Regulation
ARR:	A-grade Raw Rice
ASG:	Agricultural Statistics at a Glance
AVC:	Agricultural Value Chains
AVN:	Agricultural Value Networks
CACP:	Commission for Agricultural Cost and Prices
CAGR:	Compound Annual Growth Rate
CF:	Contract Farming
CIAT:	International Centre for Tropical Agriculture
CIP:	International Potato Centre
CISS:	Competitiveness, Inclusiveness, Scalability and Sustainability
CMR:	Custom Milled Rice
CoC:	Cost of Cultivation

CoP:	Cost of Production
CPBR:	Common Par-Boiled Rice
CRR:	Common Raw Rice
CWC:	Central Warehouse Corporation
DCA:	Department of Consumers Affair
DCOB:	Directorate of Census Operations, Bihar
DCOP:	Directorate of Census Operations, Punjab
DES:	Directorate of Economics and Statistics
DFID:	Department for International Development
DGCIS:	Directorate General of Commercial Intelligence and Statistics
DMI:	Directorate of Marketing and Infrastructure
EC:	Economic Cost
EU:	European Union
FAO:	Food and Agriculture Organisation of United Nations
FCI:	Food Corporation of India
FGD:	Focused Group Discussions
FPO:	Farmers Producer Organisations
GR:	Green Revolution
GSDP:	Gross State Domestic Product
GTZ:	German Agency for Technical (now International) Cooperation

HYV:	High Yielding Varieties
ILO:	International Labour Organization
KCC:	Kisan Credit Card
M4P:	Making Market Work for the Poor
MoSPI:	Ministry of Statistics and Programme Implementation
MSP:	Minimum Support Price
MSR:	Marketed Surplus Ratio
NAM:	National Agricultural Market
NBARD:	National Bank for Agriculture and Rural Development
NEP:	New Economic Policy
NSS:	National Sample Survey
OBC:	Other Backward Classes
PACS:	Primary Agricultural Credit Society
PMCA:	Participatory Market Chain Approach
PSU:	Public Sector Units
PUNSUP:	Punjab State Civil Supply Corporation Limited
PVN:	Paddy Value Networks
PWG:	Private Entrepreneurs Guarantee
PWS:	Private Warehouse Scheme
RA:	Rapid Appraisal

RBI:	Reserve Bank of India
RMM:	Rice Market Monitor
SC:	Schedule Castes
SDC:	Swiss Agency for Development and Cooperation
SFC:	State Food Cooperation
ST:	Schedule Tribes

An Introduction to Agricultural Value Networks in Contemporary India

In India, agriculture has been the largest sector regarding employment generation capability; the sector shares 42 percent of the total employment in the country (World Bank Data, 2018). Since the adoption of the New Economic Policy (NEP) in India, the Government has changed policy on agriculture to reduce and eventually eliminate the restrictions on internal and external trade of agricultural products, to reduce subsidy on agricultural inputs and to allow entry of private big companies to operate freely (Vaidyanathan, 2000). For further integration of producers and markets, priority was given to create market led extension services in agriculture of which establishing the 'Agricultural Value Chain (AVC)' is a prominent one. In Indian context, the discussion on Farmers' integration in AVC can broadly be grouped under three categories; 1. Support the integration of farmers in AVC, 2. Support the integration but under strong legislation and 3. Oppose integration of farmers in a capitalist arrangement of economy.

In context of the broad policy framework, arguments were made in favour of developing value chains. It has been noted that because of multiple transactions, the price range between consumers and producers becomes quite large that results in farmers getting lesser than their contribution and consumers pay an unjustifiably higher price. A reduction in the number of intermediaries, allowing economies of scale in market operations and integration of supply chains could be one of the solutions (Chand, 2012). The development of AVC in India has been studied with reference to various agricultural products and scholars have noted its limitation. A range of studies on agricultural products claims that farmers, who are part of AVC could earn more profit than those who were not part of AVC. The institutional development in organising and integrating the farmers in the value chains could benefit the farmers (Singla, 2017; Choudhary et al., 2015).

Many scholars have noted that farmers' integration in the value chain is beneficial and also stressed upon the regulation (Dev and Rao, 2005; Singh, 2012; Birthal et al, 2007). With reference to the organic cotton value chains in

India, it was noted that farmers are the weakest link in the import/export driven value chains (Singh, 2007). A study on oil palm and gherkin in Andhra Pradesh noted that the processors, under contract farming have neglected the small farmers (Dev and Rao, 2005). The exclusion of small farmers by the supermarkets were also noted in the study of fresh fruits supermarkets in Indian Punjab (Singh and Singla 2011). A study of contract farming in Indian Punjab noted that the contract farming failed to diversify agriculture in the state and had to shift agricultural practice out of paddy and wheat (Singh, 2005). The study also noted the discriminatory approach of agribusiness companies towards small farmers. A study on dairy value chains in Indian Punjab found that farmers in cooperative value chains realises more profit than those in other value chains and the profit realised by large dairy farmers is more than the small farmers (Birthal et al, 2005).

The other view claims that the integration of farmers in the AVC cannot be an integration of 'equals'. The risks are always borne by farmers in the AVC, while the maximum decision vis-à-vis production and marketing remains with corporate (Chandrasekhar, 2013a). The capitalist development, by its very nature, in the context of backward agrarian system is not interested in large scale transformation as the big corporate can maximise profit without improving the economic and social condition of the mass of labourers and peasants (Patnaik U, 1986). According to the critics of the agribusiness promotion, the integration of farmers in the agribusiness model is exploitative in nature as these agri-activities transfer the decision-making powers in favour of corporates (Wilson, 1986; Reardon & Barrett, 2000).

In 2003, the Government of India came up with new Agricultural Produce Market Committee (APMC) Act. The Act was made in consistence with the NEP. As per the APMC Act 2003, the setting up of private markets were allowed and such markets could directly procure from the farmers. The change was supposed to bring efficiency in the agriculture and to increase the overall farm sector (Singh, 2012). The Act used the word Contract Farming (CF) with reference to the private purchaser. In 2017, the Central Government came up with the Model Contract Farming Act 2018. The 2018 act further formalises

the private-led CF (GoI, 2017).[1] The act makes provision for the Farmers' Producer Organisations (FPO), which can be registered as a cooperative society, Non-Government Organisation, company, Producer Company and trust (NBARD, 2015).

The Point of Departure in the Present Study:

Some form of integration of farmers have always existed in India ever since the colonial period. According to the Directorate of Marketing and Infrastructure (DMI) of Government of India, the colonial Government established the first regulated market for agricultural produce in 1886 in Hyderabad Residency. The regulated market was established with the viewpoint of providing a guaranteed supply of cotton for the textile industry in Manchester. Later on, the Government enacted the Berar Cotton and Grain Market Act in 1887.[2]

Regarding the guaranteed buyers for the agricultural produce, the cooperative structure is quite an old practice in India. Post-independence, the cooperative farming got the attention of the policymakers through various five-year plans. The attention of the cooperative has been more on the credit and input side. In case of some cash crops, which requires significant industrial processing before the final consumption also got some contractual arrangements for the agricultural produce. The sugar cooperatives in Maharashtra, dairy cooperative in Gujarat are some examples where the farmers get an assured market for their produce (Jadhav, 1994). However, the delay in payment is one of the problems that some cooperatives are facing today. It is also worth noting that the arrears are also huge for the non-cooperative structure as well in case of sugar cooperatives.[3]

Since the mid-1960s, the Government's intervention started on formalising the regulated marketing structure for agricultural produce, the recommendation of support price and procurement of agricultural produce. According to the DMI, most of the Indian states enacted Agricultural Produce Market Regulation

[1] http://agricoop.nic.in/sites/default/files/model%20contract%20farming%20act%202018.pdf
[2] http://dmi.gov.in/documents/brief%20history%20of%20marketing%20regulation.pdf
[3] Government of India's reply in the Lok Sabha on 28 March, 2017, available at http://www.indiansugar.com/pdfs/sugarcane_arrears.pdf

(APMR) Act during the 1960s and 1970s.[4] The APMR Act makes the provision for setting APMC. All the APMCs are required to regulate the practices in the *Mandi* as per the State guidelines. In 1965, the Government formed Agricultural Prices Commission (renamed as Commission for Agricultural Cost and Prices (CACP) in 1985) to recommend the minimum support price (MSP) for the agricultural produce.[5] The arrangement of MSP was supposed to provide a cushion from fluctuating market system. In 1965, Food Corporation of India (FCI) was instituted, and given the mandate to procure agricultural products from the farmers.[6] Together with MSP, the public procurement agencies like FCI provided some kind of formal arrangements between farmers and buyers. As per such arrangements, farmers get a price decided before harvest. Though, the guarantee of the price is only limited in case of public sector procurements.

The point of departure for the present study is primarily in visualisation of connection between different types of actors, exchange/trade, processing industry, and end markets. The sequence of value adding processes, where different actors add value to the product is generally called value chains, supply chains, production chains etc. In most of the concepts, the connection between different value adding processes is visualised as a linear sequence. The linear concepts consider each stage of production as single unit and hence fails to visualise the heterogeneity of each production process. These concepts also fail to recognise the power relation between different production processes and actors and hence, fail to answer, why a particular type of process has been adopted when there are other options available.

Linear concepts like value chains, supply chains etc., considers that the price of commodity, after completion of each stage of the value chain is equal to the value added by that particular stage. Such inferences are drawn from the understanding that all factors of production are paid equal to value added by them. However, according to Marx, the value added by labour is more than the payment made to them. In a situation of exchange between two production

[4] http://dmi.gov.in/documents/brief%20history%20of%20marketing%20regulation.pdf
[5] https://cacp.dacnet.nic.in/content.aspx?pid=32
[6] http://dfpd.nic.in/history.htm

processes (as in case of value chains etc.), the nature of such production processes are also a determinant of price. According to Kalecki, price for primary commodities (example; agricultural products) are demand determined and price for manufactured goods is determined by the cost of production and mark-up. Hence, because of concepts of value and nature of production process, it is possible that each factor is not paid equal to value added and part of the value chain that provides primary commodity, is not paid the price equal to value added by that production process. Missing of these two critical points from most of the value chains like concepts result is wrong conclusion. This is discussed in detail in the next chapter.

In light of the above gaps, which are discussed in detail in the next chapter, the value system of product is conceptualised as a network. In the Value Network concept, production processes or actors of the production processes are connected with each other in a non-linear fashion. Each stage of the production process is considered to have multiple options and hence power equation is guiding factor for the particular shape that value system takes. It is also possible using the Value Networks concept to explain the appropriation of value created at one stage by another and one factor by another. Using the same concept, the current study focuses on interaction between agriculture and non-agriculture sections of the value system and hence, is called Agricultural Value Networks (AVN).

The present study analyses the integration of agriculture with non-agriculture segments of the value system under the framework of classical theories of value and distribution. There is already abundant literature available to analyse the agriculture with immediate backward and forward linkages. Krishna Bharadwaj theorises, how the different conditions of input and output markets lead to compulsive involvement of the small farmers (Bharadwaj, 1974). Amit Bhaduri has discussed involuntary involvement of the small peasantry in the market under certain conditions and those are the reasons for forced commerce (Bhaduri, 1986). John Harris discusses the matter of power in linkages of farmers in the market system (Harris, 2006). The linkages between different actors *per se* are not only the defining feature of the value and distribution but also structure the overall agricultural systems. Moyo et. al 2013, noted that

cooperativism is an important method for the peasant production in terms of scale and position against monopolistic markets. Coe et al. 2008, Jha and Chakarvarty, 2016, have discussed the complexities and non-linearity of the linkages between different actors of the value systems. The current study, using the literature of political economy on the subject, not only analyses the integration of farmers with immediate backward and forward value system, but also with the entire system of value generation and distribution for an agricultural product (paddy).

Paddy/Rice in India:

Paddy is grown in almost every part of the country. However, the top ten paddy producing states of India with a contribution of nearly 80 percent are located in northern, eastern, and southern part. The contribution of north-eastern, central, and western India in paddy production is relatively smaller (Annexure 0.1). Unlike other food grains, paddy has an extended range of varieties regarding the market value and its breeds. Broadly, the varieties of rice in India are clubbed into two groups, Basmati Rice and Non-Basmati Rice. Basmati rice has its origin in the Himalayan foot range of Indian sub-continent.[7] In India, Punjab, Haryana, western Uttar Pradesh, Uttarakhand, Jammu-Kashmir and Himachal Pradesh are the leading Basmati producing states.

In the last decade, the public sector agencies procured almost one-third of rice produced in India. Nevertheless, the procurement is also dependent on the Government's decision regarding buffer stock, public distribution and welfare schemes (Gaiha and Kulkarni, 2005). The procurement of rice is not alike across different states in India. Out of the total rice procurement for the central pool, the public sector agencies procure almost 75 percent from five states, Punjab, Haryana, Andhra Pradesh, Telangana, and Chhattisgarh. The procurement-production ratio for the states with a higher share in all India varies from 50 percent to 80 percent. The same ratio is between 10 percent and

[7] "Basmati" is a long grain aromatic rice with some characteristics of soft and fluffy texture upon cooking, delicious taste, superior aroma and distinct flavour, (http://agriexchange.apeda.gov.in/product_profile/prodintro/basmati_rice.aspx)

23 percent for four other major rice-producing states, Bihar, Tamil Nadu, Uttar Pradesh, and West Bengal (Annexure-0.2).

Out of the total rice procured by the Government agencies, the Government makes a buffer stock, and the remaining portion is distributed to the public under different welfare schemes. The other significant portion of the domestic consumption comes through open market sales. Marketed Surplus Ratio (MSR)[8] indicates the surplus production for the market. As per the latest available data, in the last decade, the all India MSR for rice is close to 80 percent.[9] The MSR in Punjab and Haryana is close to 99 percent and in Andhra Pradesh and Tamil Nadu is nearly 90 percent. The MSR is between 65 percent and 80 percent for other major paddy producing states, Bihar, Orissa, and West Bengal. Rice is a staple food for the eastern states of India, so, the lower MSR indicates production for consumption (Annexure-0.3).

Table 1: Production, Procurement and Export of Rice (Million Tonnes), 2007-2018

Year	Production of Rice in World	Production of Rice in India	Public Procurement	Export of Rice	Basmati Export	Non-Basmati Export
2007-08	453.5	96.69	28.74	6.47	1.18	5.29
2008-09	452.5	99.18	34.10	2.49	1.56	0.93
2009-10	462.7	89.09	32.03	2.16	2.02	0.14
2010-11	479.4	95.98	34.20	2.47	2.37	0.10
2011-12	485.9	105.30	35.04	7.18	3.18	4.00
2012-13	489.7	105.24	34.04	10.15	3.46	6.69
2013-14	490.0	106.65	31.85	10.89	3.76	7.13
2014-15	488.5	105.48	32.04	11.98	3.70	8.27
2015-16	489.0	104.41	34.22	10.51	4.05	6.46
2016-17	501.2	109.70	38.11	10.76	3.99	6.77
2017-18	503.9*	111.52*	35.31*	12.71	4.06	8.65

[8] Marketable Surplus equals net availability of the rice in one year minus consumption by the farm family, by permanent and occasionally labour engaged on the farm, the quantity retained for seed and feed for farm animals, payments in kind for machinery, equipment, land rent etc., and physical losses.

[9] Directorate of Economics and Statistics releases agricultural statistics at a glance. The latest available is for year 2016, which gives data up to year 2014-15.

Sources: World Production: FAOSTAT and FAO-RMM, India Production: Directorate of Economics and Statistics, Procurement: Department of Food and Public Distribution, Export: Agricultural and Processed Food Products Export Development Authority, '*' estimated value

India exported almost 8 percent of the rice produced in the country in the last decade, which is close to 21 percent of the global rice trade in this period. Out of the total rice exported, Basmati variety constitutes almost one-third, and the other is non-Basmati variety. The fluctuation in the export of rice is largely because of non-Basmati varieties, which is the result of the Government policy post-2008 crisis, the Government had to put some restriction on the export of non-Basmati rice up to four years.[10] In September 2011, the Government allowed export of non-Basmati rice out of privately held accounts.[11] Later on, the Government allowed the Public Sector Units (PSUs) as well to export the non-Basmati rice to some countries as part of their diplomatic policies.[12] Following the complete removal of the ban, the export of non-Basmati rice is on the rise.

In the last five years, India produced 35.30 million tonnes of Basmati Rice (APEDA, 2017a) and exported 54 percent (19 million tonnes) out of the total. The export-production ratio (33 million tonnes out of 496 million tonnes) of non-Basmati rice is less than 7 percent for the same period. The export revenue on account of Basmati is more than that for the non-Basmati rice. Out of all states in India, Punjab produced almost 11 percent of the total rice produced in the country with a yield of 39 quintals per hectare in the last decade. The national average of rice yield in India was 23 quintals per hectare. Bihar, on the other hand for the same period produced almost 5.5 percent of the total rice produced in the country. The yield of rice in Bihar remained one of the lowest (8^{th} position) among the top ten paddy producing states (Annexure-0.1). Punjab is one of the main Basmati producing states, whereas, Bihar produces only non-Basmati varieties. Punjab has the highest density of agricultural produce markets (APM) among the major paddy producing states in India with 47

[10]http://www.thehindubusinessline.com/economy/agri-business/rice-exports-to-be-record-10-mt-in-201112-year-usda/article3968487.ece

[11]Notification No. 71 (re – 2010)/2009-2014, Department of Commerce, Ministry of Commerce & Industry, Government of India.

[12]dgft.gov.in/exim/2000/not/not11/not8810.htm, dgft.gov.in/exim/2000/not/not11/not8710.htm, dgft.gov.in/exim/2000/not/not11/not7610.htm

wholesale and rural primary markets per 1000 km square. In Bihar, there are 23 wholesale and rural primary APM per 1000 km square. There are 425 regulated markets[13] in Punjab, whereas, Bihar does not have regulated markets (MoA, 2012). The rice mill density is also highest in Punjab in India with almost 36 organised sector mills per 1000 km square. Bihar has just six organised rice mills per 1000 km square (Annexure-0.4).

Research Objectives and Questions:

There are many concepts, such as value chains, market chains, supply chains, production chains, production networks, production systems etc., which are used interchangeably for the discussion on value generation in agriculture. However, all methodologies carry special meaning and framework. Each of the methodological framework has its own difficulties and advantages; the current study discusses both dimensions of methodological guides that connect the whole processes/actors from production to consumption of agricultural products. Hence, the first objective of the present study is to conceptualise the system of value creation in agriculture preceded by the clear understanding of overall value network. This objective tries to answer; 1. How are the different value chains of the same value network connected? 2. Since, the interaction of different actors and value adding activities, is also an interaction of respective power positions. Therefore, under the first objective, there is an attempt to answer, how does power relation exist between the various actors and activities of the value network? 3. How does power relation exist between different chains of the same value network? 4. And finally, under the first objective of the research attempt is made to conceptualise that how do the creation and appropriation of value in the chain and the network, take place?

Following the presentation of the concepts of Agricultural Value Networks, the second objective of the research is to use the same concept to understand the diversity of the Agricultural Value Networks (AVN) in India. Under the second objective attempt is made to answer, what are the contributing factors of AVN; this includes the study of AVN's relation with caste and class of farmers, agro-

[13] Regulated Markets are governed by the Agricultural Produce Market Committee (APMC) Act of the respective State.

ecology and broad political-economic issues. The study is primarily focused on paddy/rice; the detailed study was conducted for Paddy Value Networks in India. The third objective of the research is to map the different links to get a better understanding of connections between actors and processes of paddy value network, first for India and then for Bihar and Punjab. The focus of the third objective on the following questions; (1) what are the core processes in the paddy value networks? (2) Who are the actors in the different processes and what actions they perform? (3) What are the flows of product, information and knowledge in the paddy value networks? (4) What are the number of outputs, the number of actors and jobs? (5) Where does the product (or service) originate from and where does it go? (6) How does the change of value take place along the chains in paddy value networks? (7) What types of relationships and linkages exist in paddy value networks? and (8) What types of services are feeding into the paddy value network?

The fourth objective is to understand the distributional aspects under different segments of the paddy value networks in Bihar and Punjab. The research questions under the fourth objective are; (1) How does distribution take place within the same production process? and (2) How does distribution of take place between interlinked production processes? There are multiple possible segments of the PVN in both states, therefore, the fourth objective covers all such segments. The fifth objective of the study is to understand governance and public policies related to different activities/actors of value networks. The Governments' policy plays an important role in the backward and forward linkages of agriculture and letter on marketing. Hence, the fifth objective tries to answer that how are the existing public policies work with respect to different levels of PVN?

Methodology:

The current study includes theoretical build-up as well as empirical findings. The theoretical part of the research uses the classical theories of value and distribution. The theories under the said framework with respect to different categories of farmers/peasantry, backward and forward linkages, trade,

processing industries and distinguishing agriculture and non-agriculture segments are used to conceptualise the value system of agricultural products.

The operational land size with the farmers is main distinguishing factor for the agricultural community. Hence, for many studies on agriculture, land size class is the prime unit on analysis. The present study also uses the same method; the definition of different land size class is adopted from Government of India's official data (example; agricultural census of India). For the present study, the definition of different land size class of the farmers is as follow; farmers with operational holding of less than one hectare are marginal farmers, between one and two hectares are small farmers, between two and four hectares are semi-medium, between four and ten hectares are medium and more than ten hectares are large farmers.

For the next layer of the agricultural value system, that is trade, the present study adopted the categorisation of trade from National Sample Survey (NSS) questionnaire on Situation Assessment Survey of agricultural households. According to NSS categorisation, the immediate output linkages are local trader, *mandi*, public procurement agency, processor, input dealer, and others. The final segment under the same layer of the value system is domestic trade and export of the product.

A network appears combining the above-mentioned stages along with different categories of actors/processes and with power relation among themselves. The empirical part of the study uses the theoretical setup of AVN with reference to paddy/rice. As mentioned above, export, sale in domestic markets and public procurement are the three end markets for rice. Secondary data is looked into to build and understand PVN with respect to public procurement and export from India. A similar approach is adopted for Bihar and Punjab. The data system in India is not sufficient to study the cross-state trade or trade within state. Hence, the primary data were collected to study the whole PVN in selected Indian villages.

The Directorate of Economics and Statistics (DES) provides annual 'Agricultural Statistics at a Glance (ASG)'; various years' ASG is used to provide data on area under paddy cultivation, yield and production of paddy.

ASG is also used to provide various years Marketed Surplus Ratio (MSR) of various crops. DES, provides state-wise cost of cultivation and cost of production. The study used aggregated as well as plot level data of various element of cost of cultivation. The DES data only provides data for non-Basmati paddy, for Basmati variety, Agricultural Product Export Development Authority (APEDA) of Government of India constituted a research committee. There are six Basmati reports by APEDA, covering the period between 2013-14 and 2017-18; the data presented in the reports are used for the presentation of the PVN of Basmati.

The NSS, 70th round, Situation Assessment Survey of Agricultural Households data is used to discuss the forward linkages with respect to paddy cultivators. Under the survey, NSS asked the agricultural households questions about various crops, the procurement agencies, price of procurement etc. From the unit level data of NSS, information was filtered for paddy. Then the number of paddy growers, who sold paddy to different agencies was calculated for different size group of farmers. In a similar manner, price and total quantity of rice/paddy were also calculated. Since, the farmers sell paddy multiple times, so, the information was aggregated for presentation in tabular form. Data of Department of Consumers Affair (DCA) of Government of India was used for wholesale and retail price of rice. The APEDA data, under the Ministry of Commerce and Industry of Government of India was used for providing export data of Basmati and non-Basmati rice. The Department of Food and Public Distribution of Government of India, provides state-wise and year wise break-up of economic cost of rice, under the public procurement. For the analysis of public procurement segment of PVN, the same data source was used. The data on economic cost is available only for the period between 2013-14 and 2017-18. For the country level cost of cultivation and economic cost of rice, the weighted average of state level data was used; where weight is assigned according to the states' share in total rice production in the country.

For the primary data collection, one village each from Amritsar and Patiala districts of Punjab and Katihar and Patna districts of Bihar were selected. Amritsar has the highest share of area under Basmati cultivation but, in Patiala, the area under non-Basmati cultivation is comparatively higher. Katihar is

located in the north of the Ganga River in Bihar, which is generally a flood-affected area. Patna is located in the southern part of Bihar, which has a better yield of rice. The names of the selected villages are; *Kuraitha* (Katihar), *Kharbhaiya* (Patna), *Seel* (Patiala) and *Mehlanwala* (Amritsar). The selection of the villages was made to capture the social, economic and political diversity of the district to a maximum possible extent. The period covered for the study was the paddy cultivation season (*Kharif*/Monsoon) of 2017-18 and the time of field study was April-May 2018. During the field study, 60 smallholder farmers and 67 agricultural workers were interviewed.

In each village, 15 smallholder agricultural households were selected using snowball technique. The data was collected in a structured questionnaire format covering the basic profile of the head of the households, land, backward linkages, and expenditure over paddy cultivation, forward linkages and income from paddy cultivation. The different land size group for the smallholder farmers in Punjab and Bihar is selected as the distribution of land is not similar in these states. In Bihar, 97 percent of the agricultural land holdings are below 2 hectares in size, which covers 76 percent of the total agricultural land in the State. In Punjab, 35 percent of the total agricultural holdings is more than 4 hectares in size, which covers 70 percent of the total agricultural land in the state (Annexure-0.5). Because of the larger size of the holdings, many academicians consider any landholdings below 2.5 hectares as marginal and 2.5 to 5 hectares as smallholders (Gill, 2004). However, in Bihar land below 2 hectares is considered as small and marginal holding.

Two focused group discussions (FGD) were conducted separately in each village with male and female agricultural workers. The selection of workers for the FGD was based on the snowball method. A set of questions based on decent work parameters were asked for the discussion. The number of participants in each FGD was between eight and ten. The participants of FGD were local dwellers except in Patiala. The workers, who participated in FGD in *Seel* village, were migrants from Bihar.

Expert interviews were taken for other actors in the value chains. Since actors and processes are different at different places, so, there is no uniformity

concerning respondents of the interview. A set of questions covering the aspects of input costs, actions performed in the value chain of rice, revenue generated, were asked during the interview. In Katihar district of Bihar, the expert interview was conducted for one Local Trader of paddy and two Wholesalers. In Patna district, one Local Trader, one Wholesaler, Chairperson of one Primary Agricultural Credit Society (PACS) and one Rice Mill owner was interviewed. In Patiala district of Punjab, one Commission Agent and one Rice Mill Owner were interviewed. In Amritsar district, the expert interview was conducted for one Commission Agent.

Chapters:

The first chapter of the study focuses on conceptualisation of the network of value creation in agriculture. The discussion in the chapter starts with the terms that are used to describe the systems that combines a range of activities and actors from production to consumption. The chapter provides a literature review on the existing concepts and discusses various methodological guides on those concepts. Later on, chapter discusses the issues with dominating concepts of value systems and presents an alternative concept. With the help of key literature, the concept of value network is presented that explains how actors and activities would function. The chapter finally discusses the Indian Agricultural Value Networks, and the factors affecting the AVN in India. The section includes discussion on regional differences in agro-ecology, social dimension of land ownership, major agricultural products of India, and various end markets of agricultural products.

The second chapter discusses Paddy Value Networks (PVN) in India and provides rationale behind selection of paddy for the study. Further, the chapter provides state-wise paddy production scenario in India that includes area under paddy cultivation, yield, production, cost of cultivation and cost of production of paddy in different Indian states. The chapter discusses at length about cost of various factors required for cultivation of paddy. Using the NSS data, the chapter further presents forward linkages of different size and class of paddy farmers in India. The discussion in the section includes number of farmers who sold paddy to different agencies, the quantity of sale and price received by

farmers on each reported sale of paddy. Further, the chapter discusses domestic segment of paddy value networks in India with focus on rice mills, inter-state rice trade, markets available for paddy sale in India with the help of secondary data. The chapter presents a detail discussion on the Indian rice export of both Basmati and non-Basmati. The section presents phases of Indian rice export in last two decades (1997-98 to 2016-17) with the explanation of such movements. The last section of the second chapter provides a comparison of economic cost of producing rice in India the wholesale, retail and export price of rice. Using the deductive method, the last section tries to explain the impact of different prices of rice on farmers' earning.

Chapter three and four discusses PVN in Bihar and Punjab respectively. Both the chapters begin with a discussion on literature related to changes in general agricultural situation in respective states and attempt is made to connect the past and present of agriculture in these states. With the help of agricultural census data, 2011 and NSS data, the social dimension of land ownership and agricultural households in respective states are explained. Further, in chapter three, paddy production scenario in northern and southern Bihar are discussed. In chapter four, the discussion of paddy production scenario is based on varieties of paddy, that is, Basmati and non-Basmati. The next section of respective chapters presents the discussion on various factors of cost of cultivation for the period between 2011-12 and 2015-16; 2015-16 is latest available cost of cultivation data. The next section in these chapters presents various aspects of forward linkages for paddy cultivating households; quantity, price and agencies for paddy sale. Based on secondary data, later sections of these chapters present the various end markets for rice in Bihar and Punjab respectively. The last section of chapter three and four provides a comparison of the economic cost, wholesale price, retail price and export price of rice in respective states.

Chapter five and six, presents the finding from the field survey. The chapter first provides the rationale behind the selection of villages selected for the study. The later section of the chapter provides a detailed analysis of different segments of PVN in selected villages. The cost of production, revenue, and surplus is discussed at length in the same section followed by the discussion on

the value added by farmers, the processes, activities and value added by other actors of value system. The chapters provide detailed comparison of value addition and distribution among various actors in different villages. The last section of chapter five and six, discusses situation of workers in the PVN.

Chapter seven of the study is devoted to study of power in the PVN. The chapter provides a coherence of theory presented and empirical findings. The chapter first discusses about how power asymmetry is central to the agricultural value systems. The realisation of power appears through differential surplus distribution among the actors of the agricultural value system. The chapter presents how, the non-agricultural segment of the value system extracts surplus generated in agriculture. The role of state is also presented in terms of directing the surplus flow. For all discussion empirical evidence is presented from the previous chapter in the present study. Finally, the study concludes with the presentation of comparative picture of PVN in Bihar and Punjab. The same chapter discusses the policy implication emerged from the present study.

Conceptualising Value Creation and Appropriation Networks

Concept of Value Chain and Value Network:

Any product, from its conception to consumption passes through several value adding processes where different actors add value to the product. The series through which processes pass is named as value chain, supply chain, production chain, market chain, production network etc. Many scholars have attempted to define these terms through the explanation of objectives and scopes of the study. However, there is hardly any unanimity over the use of these terms. Before going into the analysis of value chain, it is quite important to conceptualise it. The conceptualisation will help in the identification of the problems and framing of the further questions.

The existing literature on the value chain believes that, since the 1950s this concept is continuously in practice, though with different names. During the 1950s, the macro level 'Input/Output Analysis', 'Agribusiness' study, and 'Industrial Dynamics and System Science' were conceptually like value chain analysis in the economics and management discipline. During the 1960s and the 1970s, the studies related to 'Industrial Organization' 'Commodity System Approach' or the 'Subsector Analysis' in the s discipline of economics were also based on the same kind of analysis. The word 'Value Chain' and 'Supply Chain' first came in the 1980s in the management discipline. Afterwards, during the 1990s, 'Agri-food Chain', 'Agro-Industrial Chain', 'Productive Chain', 'Global Value Chains' emerged as popular understanding (FAO, 2007).

There are some studies, which suggest that the term 'Value Chain' was first used by Michael Porter in 1985 in his book *Competitive Advantage* (World Bank, 2010; GTZ, 2008; FAO, 2007). In this book, Michael Porter provides a basic tool, namely value chain, to analyse how different activities interact in a firm. The analysis of interaction between different activities is crucial source for competitive advantage of the firm. The author describes suppliers' and buyers value chain, but the central theme is firm's value chain. He further points out, that firm's value chain represents a collection of activities that include designing, producing, marketing, delivering and supporting activities. The author divides firm's value chain in 'Primary Activities' and 'Supporting

Activities'. According to him, primary activities include, 'Inbound Logistics', 'Operations', 'Outbound Logistics', 'Marketing', and 'Sales'. In supporting activities, he puts, 'Procurement', 'Technology Development', 'Human Resource Management', and 'Firm's Infrastructure'. The author, in his analysis, gives importance to 'linkages' between different activities and he claims that linkages between different activities can lead to competitive advantage through optimization and coordination. He suggests that value chain tool can help the firm in creating and sustaining the competitive advantage (Porter, 1985).

The concept of the value chain presented in the book is essentially concerned with a firm, which focuses on competitive advantage. The author conceptualises "value" as "the amount buyers are willing to pay for what a firm provides them. Value is measured by total revenue, a reflection of the price, a firm's product commands, and the unit it can sell" (*ibid*, p. 38). The value chain analysis of such kind is hardly concerned about the inclusiveness of different actors and their bargaining power. However, Michael Porter claims, that coordination and optimisation of the linkages between different activities of the value chain would certainly benefit all of the participants. Likewise, various other studies suggest that value chain development would create many opportunities for all the participants.

Value Chain and Other Terms in Agriculture

The studies concerning the agricultural product, on the value chain touches its peak with the beginning of the 21st century. The studies have suggested tools to analyse value chain and recommended the measures for its development. The conceptual framework of the existing studies discusses governance, efficiency, synergy, upgrading of the value chain and political, legal, as well as market context.

In 2004, Agriculture and Food Council of Alberta (AFCA), Canada provided a value chain guide book to discuss the approaches required in the value chain analysis. While creating the difference between supply chain and value chain, the guide advocates moving towards the later. The guide evaluates risks and winning factor of the value chain approach. According to this, value chain is "*an alliance of enterprises collaborating vertically to achieve a more*

rewarding position in the market" (AFCA, 2004; pp. 1). The guidebook opines that the 'Value Chain' has extensive communication with focus on value that produces differentiated products. Whereas, 'Supply Chain' has little or no communication with focus on cost or price which produces commodity. In case of value chain, relationship is of demand-pull with interdependent organization structure but in supply chain, relationship is of supply push with independent organizational structure (*ibid*). However, in both, the focus is on 'rewarding position' in the market.

In 2006, the International Potato Centre (CIP), situated in Peru, intervenes in the study of value chain with a methodological framework called the "Participatory Market Chain Approach" (PMCA). This study opines that the active participation in the existing market opportunities can eliminate poverty. PMCA provides three-phase methodology; first to know the situation of different actors in the value chain, second to analyse potential business opportunity in a participatory manner, and third is to put into practice joint innovation, that is business plan and marketing concept development. PMCA focuses on combining research and development activities in the participatory processes, building trust among market chain actors, and stimulating innovation based on demand-oriented interactions. In this approach, the value chain consists of all value adding actors, production and activities (CIP, 2006).

In 2007, Food and Agricultural Organization of the United Nations (FAO) provides guidelines for Rapid Appraisal (RA) method for agricultural value chain in developing countries. Using collection and analysis of information, the proposed methodology focuses on to identify the factors that affect efficiency and competitiveness. The methodology desires to recommend the policies for both, public and private sector to improve the economic performance of chain stakeholders that can further contribute in the upgradation of the country's social well-being. The RA guidelines visualises 'Value Chain' as a set of inter-related activities. The method also recognises the transaction between different 'chain actors' and the processes of value addition (FAO, 2007).

The International Centre for Tropical Agriculture (CIAT) in 2007 provided a guide called Participatory Market Chain Analysis (PMCA) for Smallholder

Producer. This participatory market chain is very close to PMCA of CIP, but it focuses more on smallholder cultivators. This guide too believes that being competitive at the market place is very important. The method focuses on to identify the area where intervention could lead to rural enterprise development. The analysis also opines that diversification is a useful guide for the smallholder farmers. The guide considers 'Market Chain' as "numerous links that connects all actors and transactions involved in the movement of the agricultural goods from the farm to the final consumer" (CIAT, 2007; p. 12)

The Swiss Agency for Development and Cooperation (SDC) provided a methodology for value chain analysis in 2008. They called their approach "M4P" (Making Market Work for the Poor). The method targets at the poverty reduction through market system development. This particular approach raises questions related to poverty in the analysis and tries to bring effective change in the market system. This approach focuses on the development of a market system by addressing the causes of so-called weak performance. The method also looks on the role of external agencies in the market system. The guide does not claim to provide any alternative but wishes to complement and strengthen the established development methodologies (SDC, 2008). In the same year, UK Department for International Development (DFID) used the M4P approach for the value chain analysis. The DFID guide for value chain analysis recommends eight tools along with different kinds of dimensions. These tools are; prioritising value chain for analysis, mapping of the value chain, governance, linkages, analysis of options for demand driven upgrading, analysis of costs and margin, analysis of income distribution, and analysis of income distribution. The guide looks at value chain as a full range of activities, required to bring a product from the different phases of production to final consumers (DFID, 2008).

In 2008, German Agency for Technical (now International) Cooperation (GTZ) provided another approach for value chain analysis, namely 'Value Link' methodology. The methodology claims to be an action-oriented approach. This approach focuses on promotion of the selected value chain. That is followed by analysis and formulation of upgrading strategy. The method also includes know-how for facilitators of value chain promotion. The Value Link method

also highlights the business linkages, services, and business environment in the whole analysis. The method defines value chain in two ways; first as a sequence of related business activities, which is termed as functions and second as a set of enterprises, which is called operators. Summarising the two, the proposed method opines that value chain consists of chain links (GTZ, 2008).

Later, the value chain analysis or the methodological guide became very theme centric or region specific. In 2009, International Labour Organization (ILO) provided a methodology to incorporate 'Decent Work' in the value chain development. In 2010, the World Bank provided a guidebook of value chain concepts and application with focus on African Agriculture.

Other than the above-mentioned literature, a vast number of conceptual guides are also available, though with the added international dimension and in the areas related to the study of global production (Gereffi and Korzeniewicz's, 1994; Gereffi et. al. 2005). However, amongst all, the value chain is the most dominating term used in the research guides. Given the vast use of value chain analysis in sociology, economics, business management, development studies etc., the concept of value chain also differs. However, in most of the conceptual guides, as discussed above, development of the value chain has been considered as panacea for the issue of impoverishment of the countryside. These studies also believe that market and participation in the market is very important. It is claimed that through exploration of opportunities in the different parts of a value chain, one can actively participate in it.

Based on the definitions adopted by different method guides, the concept of the value chain can be broadly grouped under three categories. First; activity based, which suggests that value chain is the full range of value adding activities, second; actor based, which considers value chain as different actors connected along in a chain, and third; network based, which defines value chain as a network of different independent or interdependent organizations (Donovan et.al., 2015).

Issues Related to the Value Chains and Other Dominating Terms:

The first and noticeable problem that we encounter while going through the literature is the interchangeable use of different terms. The different methods, approaches, objective of the study and contrasting intellectual orientation are the main reasons behind terminological variations. The different terms also signify the distinction in theoretical and disciplinary affinity (Taylor et. al. 2013). The lack of the unanimity in the concepts creates a serious problem in clubbing and summarising the debate. Therefore, it is important to understand the connotation of different names that defines this study. The interchangeable use of different terms as well as an incorrect nomenclature leads to the problem of description of the sequence of process by which goods are conceived, produced, and brought into the market. Therefore, it is important to understand the connotation of different names that defines this study.

The value chain, supply chain, commodity chain, market chain, production chain etc. are conceptually and practically dissimilar concepts. Even if we look at the terms in their totality with which it was envisioned, there is a need to catalogue these terms based on their actual conceptual origin. That will further help us to prioritise the themes as well as the issue that needs to be addressed through conceptual building and empirical enquiry.

The above literature suggests that the philosophy behind value chain is chain optimisation whereas self-optimisation is the guiding philosophy of supply chain. Supply chain considers independent actors or activities in the organisational structure while these independent are interdependent in the value chain concept. The focus in the supply chain is over cost or price of the commodity whereas; in value chain focus is over value alone or quality of the differentiated products. Moreover, the existing studies also attempt to differentiate value chain and production network. It is believed that on the organisational scale, the value chain can be defined as a "sequence of productive or value adding activities" whereas, the study defines production network as a collection of "two or more value chains that share at least one actor". At the same time, the study also believes that there is no difference between supply chain, commodity chain, production chain or value chain. For

this study, production network can also be taken as similar to value network, input-output matrix or supply base (Sturgeon, 2001).

Market, is essentially a place where the transactions of various commodities is taking place. These transactions add some value to the product but that is not the whole value of the commodity. The concept of market chain prioritises the transaction of the commodities and brings smoothness in the transaction as considered in the development of the chain. That is why, improvement of the information sharing mechanism or all sorts of communication are important in the market chain. The concept of market chain very narrowly captures the issue of value addition, which is only in the process of transactions. In other words, market or transaction can only be a small portion of the whole value added process in a commodity from its conception to consumption. The philosophy behind the market chain is sale optimisation that focuses on the maximising interaction of different value adding actors.

Conceptually, production, commodity, and value are very close to each other but not in an identical manner. Commodity is an outcome of the production process and the process of production is essentially a process of value addition. "The commodity is the form of products taken when production is organised through exchange" (Bottomore, 2001, pp. 101). Production is the process, which turns lower value material to higher value product. In the entire story, the key thing is 'value' and this research study is focusing on the concept of value, specifically.

At every stage, the actors or the group of actors involve themselves in the production process that are not homogeneous. The actors or the group of actors can be distinguished based on the access to resources, scale of production (intensive or extensive), methods etc. The different unit of production performing the same task in the value addition of the product can be classified; given, social/economic hierarchy, expertise over performing the task, the link with other actors of the value addition processes, the contextual knowledge about the production process, utilization and access to information, legitimacy in the market and some strategic experience to plan the move. Any of these can make the actors or group of actors to perform differently though they are just different options to perform the same work.

The combinations of above-mentioned factors, which play a role in classifying the actors or group of actors, are nothing but elements to determine the power-relation.[1] The power relation in the entire value addition cannot be neglected. There is a systematic relationship between power structures and changes in agricultural productivity that depends on appropriate economic power. Hence, economic power that means differential access to resources (for instance; land) is related to political power that defines the position of different classes at larger spectrum (Chakravarty, 1984). The ownership of land is among the first links of the agrarian value systems that structures the power relations. Moreover, the question is not only limited to the existence of power structure but also to its sources. The power relations are embedded in the social relations that are also reflected as economic power resulting from different access to the means of production (Jha, 1988). One of the major problems with the concept of "value chain" (or other terms, which are called chain) is the linearity and such concepts intrinsically presume that the value addition processes are linearly arranged or the actors/group of actors are connected in a linear fashion. The linearity that can be unidirectional or bi-directional tries to answer; how the movement of product under value addition is taking place from one end to another? However, the linear concepts do not visualise why such movements are taking place in any particular direction when other options are available. The linearity also fails to answer about the factors, which are affecting the direction of product from one particular stage to another. To summarize, the linearity misses to visualise the key component in the whole process of value addition in the product and that, is power-relation.

The linearity excludes the comprehensive incorporation of relevant value adding actors and their relationships. It completely overlooks the fact that each stage of the sequence, from conception to consumption of production, is rooted in broader set of non-linear relationship (Jha and Chakarwarty, 2014; Jha 2016). The concept of linearity lacks to incorporate complex actions, interaction of various institutions and social, economic, political, and cultural

[1]The author's thought presented here is based on the conversation with Mamadou Goïta. The conversation took place in Harare, Zimbabwe in January 2017. According to Mr. Goïta, power-relation is composed of eight factors, Hierarchy, Expertise, Networking, Contextual Knowledge, Utilization of Information, Legacy (Legitimacy) and Strategic Experience.

interest groups. The simple circuits or the linear flows miss to conceptualise the multiplicity of linkages and feedback loops (Coe et al. 2008).

'Chain' or 'Networks' are the two words, generally used as second part of the typologies. As per common understanding, 'chain' can be considered as "a sequence of items of the same type forming a line"[2] or "a set of connected or related things"[3]. Linearity is the prerequisite for a thing to be called a chain. Even using the word 'sequence' or 'series' while defining a term has the concept of linearity somewhere in the background. Hence, the use of the term 'value chain' assumes that value-adding activities/actors/links are arranged in a linear fashion (Sturgeon, 2001).

The linearity can either be horizontal or vertical. That is why value chain is supposed to be in a 'vertical' or 'horizontal' manner. The vertical value chain can be between firms that buy from one actor and sell to another. Whereas, the horizontal linkages are between firms that serve the same functions in the value chain (FAO, 2010).

Linearity is not an obligation for forming a network; it can be non-linear as well. Network(s) are dynamic and can include both, vertical as well as horizontal links between economic actors (Sturgeon, 2001). The simple definition of a network can be "a group or system of interconnected people or things[4]"or "a large system consisting of many parts".[5] By using the term 'network', the definition assumes that value-adding activities/actors need not to be arranged in a linear manner. The chain can be considered as a sub-set of a network that is a simplified snapshot of a complex and dynamic set of activities (Sturgeon, 2001).

Due to linearity related problems with various chain concepts, many thinkers prefer 'production network' over 'value chain' methodology (Sturgeon, 2001; Henderson et al., 2002; Coe et al., 2008; Mackinnon, 2012; Jha and Chakarwarty, 2014; 2016). The conceptual basis for production networks, according to the thinkers mentioned above are value (surplus and economic

[2] https://en.oxforddictionaries.com/definition/chain
[3] http://dictionary.cambridge.org/dictionary/english/chain
[4] https://en.oxforddictionaries.com/definition/network
[5] http://dictionary.cambridge.org/dictionary/english/network

rent), power (corporate, institutional and collective) and embeddedness (societal, network and territorial) (Mackinnon, 2012; Jha and Chakarwarty 2014). The network methodology provides the fluid conceptualisation of production and value addition, covering all relevant actors and relationships (Henderson et al., 2002; Mackinnon, 2012). The network also focuses on a wide range of firm and non-firm actors (Mackinnon, 2012).

The current study uses the concept of network with an interim focus on value. The value addition is actually the central part of any production process. It should be noted that the whole value of a product is not necessarily added during a visible production process alone, there are also some invisible actors who add value to the product directly/indirectly. There is a separate but useful debate that highlights the role of actors who add value to the product outside the production process; such as household works etc. (Prasad, 2016). By using the term 'value', the concept automatically embraces the production process but this is not true in reverse direction. Hence, the proposed study uses "Value Network" as a basic framework, which extensively attempts to address the shortcomings of earlier concepts.

The Value Networks:

The value network can be a combination of two or more Value Chains depending on the numbers of value adding activities in vertical and horizontal arrangements. To understand this in a detailed manner, let us consider that from its conception to consumption, a product has to pass through five vertical steps. In this network, there are three possible methods or ways to perform the first stage's activity followed by four, two, five and three possible activities respectively at every other consecutive step (as shown in the image). Different possible activities for the same step are considered to be in a horizontal arrangement. This simple setup presents a value network.

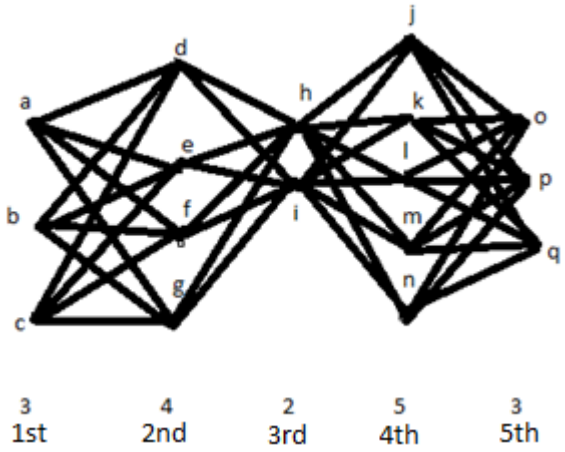


Figure 1.1: Sample Value Network

In this sample value network, it is possible, that the producer at the first step chooses any one out of the three-possible ways for production, say '*a*'. The finished product of the first step can possibly reach to the next step as a raw material in four possible ways; say '*e*' is chosen. Likewise, the product passes through '*i'*, '*m*', and finally '*q*'. In this case, the emerged value chain is '*a-e-i-m-q'* and *a, e, i, m,* and *q* are value adding activities for this value chain. It should be noted here, that the mentioned value chain is just one out of many possible chains from a single value network. If the value adding activities are arranged only in a vertical manner (that is, product does not pass between activities of the same step) then in the given sample value network there are 360 possible value chains.[6] If product also chooses to pass horizontally, then the total number of the possible value chains in such a value network would be even more than 360. Even in the vertical connection, there is a possibility that the product misses some steps. For example, wholesaler may directly sale the product to consumer without sending it to the retailers. In such a case, as well, the total number of value chains in the value network would be larger than the number calculated. Here, a-e-i-m-q is a realised chain as well as an element of a set of value chains i.e. a network. The set of a, e, i, m and q represents the actors of the realised value chain and in this way the value chain is a subset of

[6]To calculate the possible number of value chains, with an assumption that the product only passes to vertical steps, multiply the total number of possible activities in each step. In this case, it will be; 3 x 4 x 2 x 5 x 3 = 360.

the value network. Here, this specimen network offers the possibility for a question that how the flow of product from ‘a’ to ‘d’ is different from other available direction. The value network also provides the room for the question that why ‘a’ is linked with ‘d’ and not with other available options. In other words, the value network addresses the question of inter/intra-chain power relations.

Agricultural Value Networks:

The activities, actors and all sorts of transactions from input supply for cultivation to final retail sale of the ‘product’ are parts of Agricultural Value Network (AVN). The farming, trading, milling (if required), trade of the final product are the major stages in the AVN. These stages are not homogenous and that is why, the AVN does not exhibit a linear flow. However, each of these activities is uniquely integrated in the network due to its differentiable characteristics and that particular integration *ex-post* looks like chain. The sequence of activities after completion of all production processes is one of many chains in the AVN. In this way, the AVN is a set of the Agricultural Value Chains (AVCs). The number of stages in the network, type of activities and actors can vary for different regions and that is why different states have different AVN.

The farming is the first stage of AVN with its backward and forward linkages. The farming remains a heterogeneous process given the land, irrigation, seed varieties, fertilizers, various institutional supports, types of labour employed and other externalities.

The cultivation of crop can be on the own land, leased-in land, occupied land, etc. The ownership of land can be of individual, joint, institutional or mixed. The land-relation not only affects the cultivation and its procedure but also affects the entire AVN. The complexity begins with the size of the operational holding of the land itself. In India, the largest number of agricultural plots are under the category of marginal (less than one hectare (ha)) followed by small (1-2 ha), and semi-medium (2-4 ha). Whereas, area wise, marginal, small, semi-medium and medium (4-10 ha) categories have the almost same share in the total agricultural land. The large land class (>10 ha) comprises more than one-tenth of the total agricultural area, but regarding the number of agricultural

plots, it is less than one percent. The tenurial status of land, terms of lease etc. are also distinguishing factors for the farming.

The irrigation too affects the characteristics of the land. The land can be divided based on irrigation status and sources of irrigation. Sources of irrigation are the key factor in the crop selection and successful cultivation. Canals, tanks, wells, tube-wells are the major sources of irrigation in India. In India, tube-wells are the largest source of irrigation for almost all size class of the land followed by canal and wells irrigation. The source of irrigation has its impact on the crop quality and the cost of cultivation and finally on the overall value of the crop.

Seed is not only about the crop selection, but even for the same crop, there are different varieties. For example, in India, there are hundreds of varieties of paddy and every variety has its general characteristics, morphological characteristics, agro-economic features, and reaction to pests and diseases. The different varieties also need a different level of irrigation, various sorts of pesticides, insecticides or weedicides, etc. These further affect the value of the final product. In the same way, other inputs have their unique impact on the overall value of the product.

The use of human labour, machine labour and animal labour differ as per the region. For example, in Punjab, agriculture is much more mechanised but in Bihar, human labour is substantial. The variation is also because of the variety of the crop. The value addition by different sorts of labour is one of the key factors to distinguish farming and the AVN.

The institutional supports such as agricultural loan, electricity etc. are deciding factors for the agricultural output and output linkages. The farmers can have formal or informal source of lending. It is noted in some studies that the source of agricultural credit has strong role in output market (Bhaduri, 1983). The access to electricity, on the other hand, decides farmers' dependence over the other sources of energy for irrigation, such as diesel. The better access to electricity has an impact on the cost of cultivation and the realisation of output share.

The farming is not untouched from other region specific externalities. For example, the flood is an aspect that adversely affects the farming of Kharif crops. Almost all districts of the northern Bihar are flooded every year.

Almost all the above-mentioned components for the farming are closely related with the size of the farm. In case of irrigation, the small and marginal farmers are more dependent on the surface irrigation, whereas, the large farmers afford the capital-intensive ground water irrigation (Kumar, 2015). The fertilizer used per hectare of land is inversely related to the farm size (Dev, 2012). The Smaller farm households are more indebted than the big farmers are. The big farmers have loans largely from formal sources. The small farmers are more indebted to the informal sources (Singh, Kaur and kingra, 2008; Jha and Acharya, 2011). The all India Input Survey of Ministry of Agriculture of the Government of India highlights the relation between different farm size and the use of various inputs. Evidently, the farm size can summarize the heterogeneity of the farming as a whole.

The next stage in the AVN includes traders, millers and other markets. The agricultural output can be traded to millers, moneylenders, public procurement agencies etc. These agencies are connected to different farmers through agricultural output linkages. The trading, milling agencies can be categorised based on their scale of business. In case of some crops, the role of mills in the AVN is quite significant (example; paddy). The further stages in the AVN depend upon the type of processing (example; in case of paddy the raw rice and Para-boiled rice exhibits different linkages, demands etc.). These kinds of processes can also be important factors for categorising this stage of the AVN. However, there are possibilities of different types of traders and millers (on the basis of capital), but this portion of the AVN is narrower than the farming because of the time taken to complete the production process at this stage and the number of actors involved. The time taken to complete the production process (example; trading i.e. transaction of commodity from one location to another, milling i.e. converting paddy to rice) on a certain amount of product varies based on the capital/labour employed to perform the task, whereas the time is constant in case of farming. Land again plays an important role in the linkages between farming and traders/millers. The control and the presence in

the market of agricultural output and marketable surplus are the reflection of control over land and non-land resources (Patnaik, U. 1975).

The last section of the second stage of the AVN deals with the trade of final commodity (example; paddy is output at the first stage of trade and rice is at the second stage). The rice can be traded within the domestic market or can be exported. The pricing structure in both these markets is as different as these markets. The pricing, structure of the market, demand and other political-economic conditions affect all the backward linkages (till farming), activities and their actors. The other important factor deciding the final sale of the agricultural output is the variety of the product (example; Basmati rice has larger demand in the international market than the non-Basmati rice). For some agricultural product, the export has a significant share. In the era of liberalisation, the export orientation of the agricultural product is not necessarily a win-win situation. It should also be examined that even if there are some gains then what is the direction of that flow. Utsa Patnaik noted the inverse relation between agricultural export and domestic food availability/security (Patnaik, U. 1996).

Intra-AVN Relations:

The pattern and involvement of all farming sections are not alike in the different sections of the AVN. The character of linkages reflects the pattern of power and the functioning of the linkages is such as to reinforce the pattern of power. Forces of tradition, customs, social norms and economic status all play an important role to determine the bargaining strength of the actors involve in the AVN. Bharadwaj writes,

> "*Three types of market involvements that may emerge, depending upon the economic position of the participants. There is, first, the category of operators with a clearly dominant 'bargaining' position like the big landlord in the land (lease) markets or the money lender in the credit market. These operators are powerful enough to be able to exploit the market from a position of vantage and, more importantly, are able to shape the character of the market relations themselves through contracts which interlock markets. Secondly, the category of the economically very weak section of the peasantry, landless agricultural labourers, very small owners or tenants, all of whom have an extremely weak bargaining position in the markets. As they do not have enough land to cultivate, they have to depend upon hiring out their labour and hence submit to the vagaries of the labour market. Given the uncertainty of employment they*

> *often prefer to lease in a tine plot of land even on extremely onerous conditions. Not having enough circulating capital to produce even their subsistence they have to rely on credit, thus depending precariously upon the credit market. The higher degree of monetisation of input and outputs on very small farms indicates this element of* ***compulsive involvement*** *in the markets, reflecting conditions of distress. The* <u>third</u> *category of peasants falls somewhere between these two; while not powerful enough to exploit markets like the large operators, they can be somewhat more self-reliant than the landless or very small farmers and may be able to protect themselves from markets if they turn unfavourable.*" (Bharadwaj, 1974; pp. 3-4)

The *compulsive involvement* mentioned by Bharadwaj is a form of the unequal exchange between different sections of AVN. Bhaduri describes the same by the term *forced commerce*, while mentioning the involuntary involvement of the small peasantry in the market under compulsion of debt. Bhaduri writes

> "*The extraction of surplus through merchant and money lending capital typically brings with it a contrived pattern of exchange relations. Its primary purpose is to facilitate the process of surplus extraction for mercantile groups as a part of expropriating class. Such contrived forms of exchange relations may also vary considerably in their specific forms and arrangements. Nevertheless, they all tend to exhibit one common feature: since small peasants are forced into these exchange relations through their regular dependence on consumption loans, the resulting exchange relations are basically of a forced nature.*" (Bhaduri, 1986, pp. 9)

The forced commerce may take place in the market of the agricultural produce and it can extend to all other markets/exchanges. That is why the full scope of the forced commerce cannot be captured by a single exchange or transaction. This further affects not only the peasantry but also the overall agrarian economy (Bhaduri, 1973). At every juncture of exchange in the AVN, actors are abstracted from their social context and power differences deriving from the different endowments of actors in terms of economic, social and symbolic capital (Harriss, 2006).

The difference in endowments/resources results in difference of power that further causes, in some cases, the forced commerce, or compulsive involvement. That is how the power difference led to the extraction of the surplus generated in one production process by another production in the process of the AVN. This remains a continuous process and any development in the further path affects different actors differently.

On the development of AVN in India, one of the views emphasises that around 94 percent of Indian farmer households are landless, marginal or small and urgent intervention is required to integrate the value adding actors so that India can achieve scale in production through creating value networks among farmers, corporate (domestic or foreign) and the government. This is created through the usage of the technical and managerial capabilities of the private sector in combination with private and public funding as well to achieve value network integration (CII, 2013). Technology, institutions, and the markets have a very crucial role to play which would enhance the value addition of agricultural product. The same view asserts that these are critical to agricultural value network, and its success will depend on how corporate sector can change the complexion of Indian agricultural system through organised food processing and retail with the motive of profit, based on the concept of competitiveness, inclusiveness, scalability and sustainability (CISS) (Gulati, 2010).

The other view, taking a cognizance of the on-going economic crisis in agriculture, claims that the fusion of big capital, corporate and farmers result in an unequal system where the risks are borne by the farmers while organised corporations control production and marketing (Chandrasekhar, 2013). According to Utsa Patnaik, the capitalist development in the backward agrarian system results in the interest of profit without sufficiently large-scale transformation, which can improve the economic and social condition of the mass of labourers and peasants (Patnaik, U. 1986). Critics of the agri-business promotion argue that the exploitative nature of these agri-activities transfer the decision-making powers of the farmers (Wilson, 1986; Reardon & Barrett, 2000). The studies also show that the organised value network excludes the small and marginal farmers who constitute the majority of the farming community in India. The corporations working under agriculture prefer medium and large farmers (with more than 5 acres) only to minimize the transaction costs, so the small and marginal farmers do not fit under their criterion (Singh, 2013). This further ascertains that agricultural value network results in adverse exclusion or inclusion of different landholding classes from the production processes, particularly, the small and marginal farmers. According to Amartya Sen, this example fits well with the idea of instrumental

adverse exclusion put forwarded by Adam Smith in The Wealth of Nations (Sen, 2000). It shows that people (i.e. marginal and small farmers) knowingly are put out of the market so that the production processes results in capability deprivation. Even if these small and marginal farmers are included in the value network, their say in the decision making (what to produce and how to produce) would be far minimal which would further marginalise them in the production processes and a crisis of adverse inclusion would loom before them. According to John Hariss, the integration of rural producers increases the vulnerability except in exceptional circumstances where entitlements are relatively equally distributed" (Harriss, 2006). The current literature is also in consistent with what V. I. Lenin wrote while analysing the capitalist development in American agriculture.

> "*Indeed the fundamental and main trend of capitalism is the elimination of small production by large scale production both in industry and in agriculture….. This elimination process also includes a process of ruination and deterioration of the conditions of farming of the small farmers, which may extend over years and decades. This deterioration manifests itself in overwork or underfeeding of the small farmers*" (Lenin, 1946, pp. 27).

Indian Agricultural Value Networks and its Determinants:

The Indian AVN can be broadly divided into two sections. The first part includes the processes and actors involved in input supply, cultivation, and production of output. The second part includes the post-harvest storing, procurement, milling, and sale. In India 51 percent of the total employment is in agriculture.[7] By including the allied sector, the share increases up to 60-70 percent. As per National Sample Survey 2014, 58 percent of the total rural households in India are agricultural households. Out of these agricultural households 25 percent are upper castes, 45 percent Other Backward Classes (OBCs), 16 percent are SC and 13 percent are ST. For more than 63 percent of the agricultural households, cultivation is the principal source of income. The human recourse engaged in the second section of AVN are lesser in number

[7] https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=IN

than the same in the first section. It is also very difficult to distinguish the human resource in the second section as sole part of the AVN. The difficulty arises because actors also participate in different other activities outside the AVN.

First Section

India is geographically very diverse and vast country, comprising the northern mountains, the peninsular plateau, Indo-Gangetic plains, dessert, and coastal regions. This is further divided in twenty-one agro-ecological zones.[8] The agro-ecology is responsible factor for the crop cultivation in a particular region. That is why AVN is not alike in all parts of India. The AVN is not same across all states also because of regional variation in social, political, and economic conditions. The crop selection is an integral part of the agricultural sociology, in which both; agriculture and society enrich each other. Agriculture is the subject in the 'State List' according to Indian Constitution. The State Government takes the major parts of the policy decisions related to agriculture. The overall economy of the state also affects the AVN of that particular state, directly or indirectly. It should also be noted that even in the same region, the AVN is different for different crops because of processes involved. The annexure 1.1 provides a detailed picture of the crop cultivated in different agro-ecological zones.

If there are 21 agro-ecological zones in India, there cannot be a single AVN in India because of regional as well as crop wise variation in the AVN. In India, the AVNs can be categorised based on three set of factor(s); factor(s), which is (are) common for all crops but different for different regions, factor(s) different for different crops as well as different for different regions and factor(s), which is (are) common across different regions but different for different crops. Apart from the above-mentioned set of factors, there are diversity according to social categories and land size class, but these two are the basis for different AVCs within the same AVNs.

[8] Agro-ecological zones are geographical areas exhibiting similar climatic conditions that determine their ability to support rained agriculture. At a regional scale, agro-ecological zones are influenced by latitude, elevation, and temperature, as well as seasonality, and rainfall amounts and distribution during the growing season. (Source: https://harvestchoice.org/maps/agro-ecological-zones-sub-saharan-africa)

Table 1.1: Number and Area of Operational Holding in India (2010-11)

	All Holdings		Schedule Caste Holdings		Schedule Tribes Holdings		Others Holdings		Institutional Holdings	
Size Class	**Number**	**Area**	**Number**	**Area**	**Number**	**Area**	**Number**	**Area**	**Number**	**Area**
Marginal (<1 ha)	92825 [67.10]	35908 [22.50]	13247 [77.47]	4866 [35.47]	6470 [53.9]	3144 [17.26]	72970 [66.94]	27852 [22.09]	138 [57.86]	44 [2.91]
Small (1-2 ha)	24779 [17.91]	35244 [22.08]	2464 [14.41]	3455 [25.18]	2877 [23.97]	4119 [22.61]	19404 [17.8]	27622 [21.9]	33 [13.84]	46 [3.03]
Semi Medium (2-4 ha)	13895 [10.04]	37704 [23.63]	1005 [5.88]	2677 [19.52]	1786 [14.88]	4831 [26.51]	11077 [10.16]	30122 [23.89]	26 [11.11]	73 [4.76]
Medium (4-10 ha)	5875 [4.25]	33827 [21.20]	330 [1.93]	1884 [13.74]	759 [6.33]	4363 [23.95]	4763 [4.37]	27448 [21.77]	21 [8.93]	131 [8.55]
Large (>10 ha)	972 [0.70]	16906 [10.59]	52 [0.31]	836 [6.09]	110 [0.92]	1762 [9.68]	790 [0.72]	13062 [10.36]	19 [8.27]	1244 [80.74]
All Classes	138348 [100] (100)	159591 [100] (100)	17099 [100] (12.36)	13721 [100] (8.60)	12004 [100] (8.68)	18220 [100] (11.42)	109006 [100] (78.79)	126108 [100] (79.02)	238 [100] (0.17)	1541 [100] (0.97)

Source: Agricultural Census 2010-11, Note: Area in '000 hectares and Number in '000, figures in big bracket are percentage distribution in different size class and figures in small bracket indicates percentage distribution in different categories

Only land belongs to the first set of factors. The table 1 provides information on the operational land holding by different social groups and different size groups in India. Out of the total 159591 thousand hectare operational holdings, 23 percent land is under marginal category, 22 percent in small, 24 percent in semi medium category, 21 percent in medium, and 11 percent is in large category class. The distribution of number of holdings does not reflect the same trend. 67 percent of the total farms in India are under marginal category, 18 percent in small, 10 percent in semi medium, 4 percent in medium and less than one percent in large category class. The land holding in India also has a social dimension. Only around 21 percent of the total number of the operational holding is with schedule castes and schedule tribes. In terms of area, the share is 20 percent. The category 'other' in the table includes other backward classes (OBC) and upper castes. Since the agriculture census does not categories 'other' in OBC and upper caste, so it is not possible to infer any distribution on that basis. The largest share of operational holding area is concentrated in marginal, small and semi medium categories whereas, the same in case of

schedule tribes are concentrated more in small, semi medium and medium categories. Almost 77 percent of the total operational holding area is with other castes.

The regional diversity of land is not only limited to the agro-ecology (as discussed in annexure 1.1) but also caused by several other social, economic factors. The access to land by different social categories and the distribution of different size-class of land clearly reflects the regional diversity. Annexures 1.2 A and 1.2 B provide information on the distribution of operational holdings *vis-à-vis* different social categories and different size class of the land. Almost 80 percent of the total operational area of land in India is concentrated in ten states; Rajasthan, Maharashtra, Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, Karnataka, Gujarat, Tamil Nadu, Bihar and West Bengal. In Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Maharashtra, and Gujarat, which comprise 40 percent of the total operational area in India, less than eight percent of the operational area belongs to SC communities. The share of operational area that belongs to SC communities is the highest in West Bengal. The share for ST communities in operational area is higher in Jharkhand, Chhattisgarh, Madhya Pradesh, Nagaland, and Assam. In Kerala, Bihar, West Bengal, Jammu and Kashmir, Uttar Pradesh, and Odisha, more than 40 percent of the operational area falls in to the marginal size class of land. In Odisha, Maharashtra, Andhra Pradesh, West Bengal, Jharkhand, and Himachal Pradesh, more than 25 percent of the total operational area is under small size class of land. In Rajasthan, Punjab, and Haryana, 23 to 33 percent of the total operational area is under large size class of land.

The second set (crop wise as well as regional variation) of factors that categorises the AVNs includes irrigation, fertilizers/pesticides/manure, labour (human/machine/animal), credit, and sale/procurement of output. Unlike other factors mentioned here, there are two features that signifies irrigation; sources of irrigation and amount of irrigation. The amount of irrigation depends on the crop variety and has regional variation for the same crop. The source of irrigation has regional variation. Apart from the regional and crop wise variation for the factors mentioned, every factor and features of factor depend on the social group of operational landholder and size class of land. The All

India Report on Input Survey- 2011-12 (GoI, 2016) presents the regional and crop wise variation of factors mentioned in second set of categories.

The third set of factors includes the policies, which are common across region but different for different crops; policies related to input, support price policies, external trade policies etc. However, there can be state-wise variation due to former sections of the AVNs and the State Government's policy interventions. All above-mentioned set of factors assist to differentiate the AVNs and the social group as well as size class of operational holding helps to differentiate the different chains within the same AVN.

Table 1.2: Major crops produced in India (2016-17)

Group of Crops	Crops	Area under Cultivation	Production	Major States
Food Grains	Rice	43.19	110.15	West Bengal, Uttar Pradesh, Punjab
	Wheat	30.60	98.38	Uttar Pradesh, Madhya Pradesh, Punjab
	Maize	9.86	26.26	Karnataka, Madhya Pradesh, Bihar
	Coarse Cereals	24.77	44.19	Rajasthan, Karnataka, Madhya Pradesh
	Pulses	29.46	22.95	Madhya Pradesh, Rajasthan, Maharashtra
Oilseeds	Groundnut	5.31	7.57	Gujarat, Rajasthan, Tamil Nadu
	Rapeseed and Mustard	6.02	7.98	Rajasthan, Haryana, Madhya Pradesh
	Soybean	11.32	13.79	Madhya Pradesh, Rajasthan, Maharashtra
	Sunflower	0.34	0.24	Karnataka, Haryana, Andhra Pradesh
Cash Crops	Sugarcane	4.39	306.72	Uttar Pradesh, Maharashtra, Karnataka
	Cotton*	10.85	33.09	Gujarat, Maharashtra, Telangana
	Jute and Mesta**	0.77	10.60	West Bengal, Bihar, Assam

Source: Agricultural Statistics at a Glance 2017

Note: Area in Million Hectares, Production in Million Tonnes, (*) Production in million bales of 170 kg. each, (**) Production in million bales of 180 kg. each.

The food-grains tops the list in terms of production and area under cultivation in India. In 2016.17, Indian production of food grain was 278.98 million tonnes. The gross area under cultivation of food-grains in India is 108.42 million hectare followed by pulses (29.46 million hectare), oil seeds (22.99 million hectare), and cash crops (16.01 million hectare). In the total production of the food-grains, the share of rice is the highest. In India, Paddy has the largest area under cultivation for almost every year.

There is a state wise variation in the rank of the area under paddy cultivation, but in most of the states, the area under paddy cultivation is at either the first or the second place. The cost of cultivation[9]of paddy is the highest among all food grains (opposite in for the cost of production[10]). The human labour required for paddy cultivation is greater than that of Maize, Barley, Bajra, Jowar and Wheat. The data of commission for agricultural cost and prices notes that the paddy cultivation also uses the second largest amount of animal labour.[11]

Second Section

The second portion of the AVNs continues to be dependent on crop as well as political economy of the region. The process of storing, the physical form in which grains are procured, the final sale etc. all are different for different crops. For example; in case of wheat, in most of the cases the final consumption is in the form of wheat flour, so milling comes after procurement; in case of paddy, the procurement is closely connected with milling. The regional variation of the same crop is also possible because of the political economy of the region/state. The overall policies, infrastructure etc., all are the determinants of the process at the second stage of the AVNs. For example; among the major paddy producing state the density of rice mills is more in Punjab than any other state (see Annexure 1.3). The procurement by the public agency, storing capacity with the state etc. are the result of the overall political economy.

The second stage of the AVN can be divided into three arms; consumption by the cultivators domestically marketed and export. The Marketed Surplus Ratio (MSR) reflects the consumption of output by the cultivators and the production for the sale.

[9] The cost required for the complete cultivation of a crop on one hectare land, is called Cost of Cultivation.
[10] The cost required to produce one quintal of the main output, is called Cost of Production.
[11] http://eands.dacnet.nic.in/Cost_of_Cultivation.htm

Table 1.3: Marketed Surplus Ratio (MSR) of the major food grains in States, 2014-15

States	Rice	Wheat	Maize	Jowar	Bajra	Barley
Andhra Pradesh	91.73	--	92.81	93.89	--	--
Assam	70.09	--	--	--	--	--
Bihar	86.16	82.26	91.04	--	--	--
Gujarat	--	97.24	--	--	74.38	--
Haryana	98.61	80.69	--	--	89.89	--
Himachal Pradesh	--	48.54	54.60	--	--	--
Karnataka	94.40	--	95.15	86.17	--	--
Kerala	84.70	--	--	--	--	--
Madhya Pradesh	93.09	73.58	91.52	98.53	--	--
Maharashtra	--	--	--	45.45	47.16	--
Odisha	77.35	--	--	--	--	--
Punjab	99.37	88.75	--	--	--	--
Rajasthan	--	78.29	67.48	67.07	60.21	87.50
Tamil Nadu	91.51	--	--	--	--	--
Uttar Pradesh	78.43	54.73	77.83	--	80.02	47.62
West Bengal	68.98	--	--	--	--	--
All-India	**84.35**	**73.78**	**88.06**	**66.64**	**68.42**	**77.67**

Source: Agricultural Statistics at a glance 2017 Note; figures in percentage

The above shown table number 3 provides the latest available state wise data of Marketed Surplus Ratio (MSR), which is the indicator of commercial aspects of the cultivation. The MSR is the share in the 100 unit of the output, which is for sale in the market. In 2014-15, MSR of paddy was highest in Punjab. In five states the MSR was more than 90 percent, which imply that the less than 10 percent of the paddy produced in the state was consumed at home of the cultivators. The MSR was lowest in West Bengal. In case of wheat, MSR is highest in Gujarat. MSR of maize, Jowar, Bajra and Barley were highest in Karnataka, Madhya Pradesh, Haryana, and Rajasthan, respectively. In India, MSR is highest for maize followed by rice. The same table also indicates the staple food of the state.

The second arm of the second stage of AVN is sale of the agricultural products in the domestic market. The public procurement agencies have a significant role to play in this segment. The key factor for the public procurement is storing capacity. In India, largest portion (60-70 percent) of the food grain produced is stored at home level only. Central Warehouse Corporation (CWC), Food

Cooperation of India (FCI) and state warehouse corporations have scientific storage structures. The public storing agencies also use Private Entrepreneurs Guarantee (PEG) Scheme and Private Warehouse Scheme (PWS)-2010 for storing different agricultural products. As on December 2016, CWC alone was operating 438 warehouses with a capacity of 96.94 hundred thousand MT[12] in India. The largest storing capacity in India is with FCI (128.2 lac tonnes) followed by 100.94 lac tonnes of PEG. The total storing capacity in India is 351.89 lac tonnes. In the country, Punjab has the highest storing capacity. Regarding capacity of the state warehouse corporation, Punjab is ranked first[13] (See Annexure 1.4).

In India, Governments (Union and State) play a fundamental role in the procurement of the major food items. Other than FCI, State Food Cooperation also procures the food products. The state agencies only procure food grains; mainly rice/paddy and wheat. In 2016-17, the procurement agencies could procure around 32 percent of the rice and 30 percent of the wheat produced in the country (chapter 2). However, the respective procurement does not reflect the share of farmers benefitted from the procurement. A committee constituted by FCI noted "*the direct benefit of procurement of wheat and rice does not go to more than 6 percent of 90.2 million agricultural households*" (FCI, 2015; pp. 16). According to the data provided by the Minister of the Consumer Affairs in Lok Sabha on 1 August 2017, suggests that in 2015-16, around 8 percent of the total number of farming household benefited from the procurement of rice and only around 3 percent benefited from the procurement of wheat. The proportion of agricultural households benefited from the procurement is largest in Punjab (see Annexure 1.5).

Table 1.4: Procurement of major food grains in major producing states (2016-17)

State	Rice	Wheat	Coarse Grains
Andhra Pradesh	3724	--	--
Bihar	--	--	--
Chandigarh	--	--	--
Chhattisgarh	4022	--	--

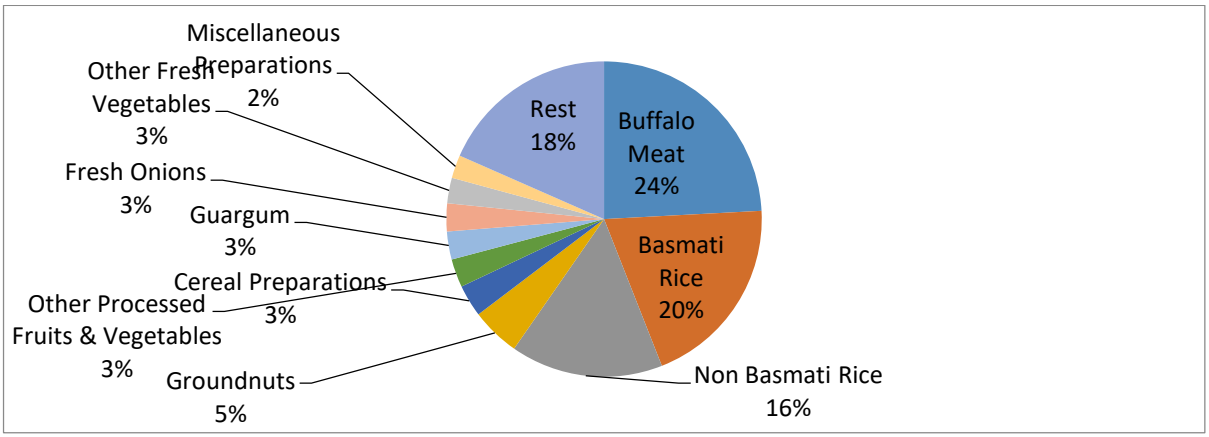
[12] http://dfpd.nic.in/storage-intro.htm
[13] http://fci.gov.in/app/webroot/upload/Storage/Stg.Cap.31.12.2016%20xls._1.pdf

Delhi	--	--	--
Gujarat	--	--	--
Haryana	3583	6752	6
Himachal Pradesh	--	--	--
Jammu & Kashmir	--	--	--
Jharkhand	--	--	--
Karnataka	--	--	--
Madhya Pradesh	1314	3992	238
Maharashtra	--	--	16
Odisha	3603	--	--
Punjab	11052	10649	--
Rajasthan	--	762	--
Tamil Nadu	144	--	--
Telangana	3595	--	--
Uttar Pradesh	2354	797	--
Uttarakhand	706	2	--
West Bengal	1923	--	--
Others	2085	8	--
All-India	**38105**	**22962**	**260**

Source: Agricultural Statistics at a glance 2017 Note; figures in '000 tonnes

The private traders/millers do the rest of the domestic trade of the agricultural products. This is very complicated in terms of tracing the movement of the product from one region to another, the terms of trade and the total number of actors involved. Roughly, the private traders trade around 50 to 60 percent of the total food grains. This is a matter of further investigation.

Figure 1.2: Share of Different Agricultural Product in Total Export Revenue (US$), 2016-17



Source: Analysis based on data obtained from Directorate General of Commercial Intelligence and Statistics

The third arm of the second stage of AVN is external trade. The amount of the export varies according to the agricultural product. The buffalo meat has the biggest share of the total export revenue of the agricultural product from India followed by basmati rice and non-basmati rice. By combining the both varieties, the proportion of rice in the total agricultural export becomes the largest (36 percent). India is also a significant exporter of fresh vegetables, fresh fruits, groundnuts, juice, etc. In 2016, the total production of paddy in the world was 748 million tonnes, and the same year India could produce 162 million tonnes or 22 percent of the total world's production of rice. India is the world's largest exporter of rice.[14] .Indian export of rice is almost 26 percent of the world's rice trade that is 42 million tonnes (FAO, 2016). In 2016-17, Vietnam, UAE, Saudi Arab, USA, Nepal, Iran, Iraq, Malaysia, Indonesia and Bangladesh were top ten-export destination for Indian agricultural products. These ten countries contributed more than 56 percent in the total export revenue because of agricultural product in 2016-17 (see Annexure 1.6).

Conclusion:

Agricultural products pass through several value adding activities from its conception to consumption, where several value-adding actors add value to the product. The sequence of process can be better conceptualised in terms of AVN. The AVN, unlike the linear concepts, captures the question of power relation and provides space to visualise the heterogeneous actors at any particular stage of value addition.

The AVN includes all activities/actors/processes from input supply to the final sale of the product. The heterogeneity of farming process is because of land size, irrigation status/source, seed varieties, fertilizers, various institutional supports, and type of labour employed. The region specific externalities also affect the AVN. The next stage of AVN includes traders, millers, and markets (domestic and international).

The involvement in the AVN is different for the different actors, which are related to their access to resources. The actors with lesser access to resources

[14]http://www.fao.org/fileadmin/templates/est/COMM_MARKETS_MONITORING/Rice/Images/RMM/RMM-Oct16_H.pdf

had to undergo compulsive involvement or forced commerce in the AVN. The development of the AVN on the capitalist line, as argued by some, leads to the integration of small and marginal producers but others argue that such development is exclusionary and leave small and marginal producers behind.

There cannot be a single AVN in India on two accounts, crop wise variation and regional variation. Land belongs to the first set of factors, which can be different for different regions but common for all crops. Irrigation, fertilizers, pesticides, manure, labour, credit, sale/procurement are different for different crops as well different for different regions. Pricing policies, policies related to external market etc. are same for all regions in the country but different for different crops (sometimes there are some regional variations as well). The social categories of the producers and/or their land size class are distinguishing factors for different AVCs in the same AVN.

The main agricultural crop in India is food grains. In terms of area under cultivation, quantity of production, value of production, export volume, the cost of cultivation, and largest use of human labour per hectare of land, paddy/rice is ranked first in India. The paddy has long range of varieties. For the purpose of MSP, the Government of India divides it into two groups; common and grade A. In terms of variety of paddy, it can be clubbed into two groups; Basmati and Non-Basmati. Basmati has huge demand in international market resulting in higher market value than the non-Basmati varieties. The mentioned unique characteristics of paddy makes it a good case study for analysing AVN.

Salient Features of Paddy Value Networks in India

Introduction:

As discussed in the previous chapter, Agricultural Value Networks depend upon agro-ecological condition of the region, regional agricultural and non-agricultural infrastructure and overall socio-economic and political situation of the region. Paddy is cultivated in almost every parts of India however, the value networks of paddy in every part exhibit exclusivity. Even within a state, the value networks of paddy are affected by the local factors. However, the macro picture of the actors/activities/links involved in the Indian Paddy Value Networks (PVN) can be presented with some cautions using macro data sets available at the country level. Annual Agricultural Statistics, data provided by Directorate of Economics and Statistics, Export Data and National Sample Survey 70th Round (Situation Assessment Survey of Agricultural Households) of Government of India are used in this chapter to present the PVN of India. The discussion in this chapter covers paddy production scenario in India, output linkages for paddy cultivators, Indian rice export, economic cost, export price, whole sale price and retail price of rice.

Paddy Production Scenario in India:

In 2016-17, 109.7 million tonnes of rice was produced in India. Eleven major paddy producing states mentioned in the table 1 produced almost 80 percent of the total rice produced in the country. The western part lags behind because of the region's agro-ecological reasons. The area under paddy cultivation is highest in Uttar Pradesh followed by West Bengal. In 2016-17, 44-million-hectare land was under paddy cultivation. More than 50 percent of the total area under paddy cultivation is in Uttar Pradesh, West Bengal, Odisha, Chhattisgarh and Bihar. The gap between top producers and cultivators can be observed easily given the difference in the yield rates of the states. There is a variation in the yield rate in India; states produce 1600 kg per hectare to 4000 kg per hectare. Punjab has the highest yield rate in India followed by Andhra Pradesh.

Table 2.1: State wise rice production, area under cultivation and yield rate, 2016-17

State/ UT	Area (Million Hectares)	Percentage of All - India	Production (Million Tonnes)	Percentage of All - India	Yield (Kg./ Hectare)
West Bengal	5.5	12.5	15.3	13.9	2784
Uttar Pradesh	6.0	13.6	13.8	12.5	2295
Punjab	2.9	6.6	11.6	10.6	3998
Odisha	3.9	8.8	8.3	7.6	2160
Bihar	3.3	7.6	8.2	7.5	2467
Chhattisgarh	3.8	8.7	8.0	7.3	2101
Andhra Pradesh	2.1	4.8	7.5	6.8	3540
Telangana	1.7	3.8	5.2	4.7	3075
Assam	2.5	5.6	4.7	4.3	1916
Haryana	1.4	3.2	4.5	4.1	3213
Tamil Nadu	1.4	3.3	2.4	2.2	1642
Rest	9.5	21.6	20.3	18.5	2133
All India	44.0	100	109.7	100	2494

Source: Directorate of Economics and Statistics, Ministry of Agriculture, Government of India

The cost of cultivation (CoC)and cost of production (CoP) vary across different states. In 2015-16, the cost of cultivation (C2[1]) was highest in Andhra Pradesh (Rs82059 per hectare) followed by Tamil Nadu and Punjab. Bihar recorded the lowest cost of cultivation (Rs42839 per hectare) in the same year among the major paddy producing states of India. The cost of production was lowest in Punjab (Rs1062 per quintal) followed by Bihar (Rs1276 per quintal).

[1] C2= Value of hired human labour + bullock labour + machine labour + value of seeds + insecticides and pesticides + manure + fertilizers + depreciation on implements and farm buildings + irrigation charges + land revenue, cesses, taxes + interest on working capital + miscellaneous expenses+ rent paid on leased in land + interest on value of own fixed capital asset (excluding land) + rental value of own land + imputed value of family labour. (Annexure 2.6)

Table 2.2: Cost of Cultivation and Cost of Production of Paddy of Major States, 2015-16

State	**COC**	**COP**
Andhra Pradesh	82059	1325
Assam	50525	1420
Bihar	42839	1276
Chhattisgarh	49952	1393
Haryana	82427	1544
Odisha	57444	1450
Punjab	74622	1062
Tamil Nadu	74672	1435
Uttar Pradesh	59416	1541
West Bengal	72235	1423

Source: Directorate of Economics & Statistics, Note; CoC in Rs per Hectare and CoP in Rs per Quintal

Unlike other food grains, paddy has an extended range of varieties regarding market value and its breeds. Broadly, the varieties of rice in India are clubbed in two groups; Basmati Rice and Non-Basmati Rice. Basmati rice carries a fragrance and is comparatively longer in size than the other varieties of rice. Basmati rice has its origin in the Himalayan foot of Indian sub-continent. In India, Punjab, Haryana, western Uttar Pradesh, Uttarakhand, Jammu and Kashmir and Himachal Pradesh are the leading Basmati producing states. As per the Indian Seeds Act, 1966, the notified varieties of Basmati are "*Basmati 386, Basmati 217, Ranbir Basmati, Karnal Local/Taraori Basmati, Basmati 370, Type-3 (Dehradooni Basmati), Pusa Basmati-1, Pusa Basmati 1121, Punjab Basmati-1, Haryana Basmati- 1, Kasturi and Mahi Sugandha".*[2] Other than this categorisation all other varieties of rice are called Non-Basmati. It is known that there are 10,000 varieties of rice in the world, out of which the most substantial number of varieties are in India.[3]

The Government of India's Manual of Standards of Paddy grades the variety of paddy as per the quality. The various parameters of the quality of rice as per the manual are wholesomeness, colour, appearance, organic or inorganic

[2] http://apeda.gov.in/apedawebsite/SubHead_Products/Basmati_Rice.htm
[3] http://apeda.gov.in/apedawebsite/SubHead_Products/Non_Basmati_Rice.htm

foreign matters, damaged grains, broken grains, immature grains, weevilled grains, admixtures and moisture content.[4] The best paddy is given grade 'A' as per the manual. The commission for agricultural cost and prices (CACP) provides different Minimum Support Price (MSP) for different grades (Common grade and A grade). The difference of MSP of two varieties is kept between Rs30 to Rs40 per quintal. For the paddy of 2016-17, MSP of the common grade was Rs1470 per quintal, and for 'A' grade paddy, MSP was Rs1510 per quintal.[5] It should be noted here that CACP does not specify different MSP for Basmati.

Table 2.3: Production of Basmati Rice in States of India, 2016

State	Area	Share of Basmati Area in Total Area under Paddy	Production Basmati Rice	Yield
Punjab	616	21	2796	4539
Haryana	720	53	2337	3246
Uttar Pradesh	266	5	817	3071
J & K	62	45	130	2097
Uttarakhand	16	12	41	2563
Himachal Pradesh	8	13	32	4000
Delhi	1	67	4	4000
India	**1688**	**4**	**6156**	**3647**

Source: FAO-RMM July 2017, Note: Production of Basmati in '000 tonnes and Area in '000 hectares, Share in percent and Yield - Kg./Hectare

Basmati rice constitutes almost 6 percent of the total rice produced in India. Punjab, Haryana and western Uttar Pradesh contribute nearly 97 percent of the total Basmati rice produced in the country. On an average, Punjab and Haryana top the list with almost 83 percent of the total Basmati rice produced in India. In 2016, Punjab cultivators produced 2796 thousand tonnes of Basmati rice. In Haryana, 2337 thousand tonnes of Basmati rice were produced. The total

[4] http://agmarknet.nic.in/Paddy_manual.htm
[5] http://eands.dacnet.nic.in/PDF/MSP-kharif-2016-17.pdf

amount of Basmati rice produced in India in the same period was 6156 thousand tonnes.

The Basmati producing states are also the region with higher share of medium and large land holders and higher share of production for commercial purposes. According to the Agricultural Census of India (2010-11), Punjab and Haryana also top the list of states that have the largest portion of agricultural land and have a higher share of medium and large operational holdings. Punjab ranks at the second place with 69 percent operational holding in medium and large categories. Haryana is at fifth place in the same list with 56 percent operational holding in medium and large land size groups. The other states in the top five positions are Nagaland, Rajasthan and Arunachal Pradesh with 89 percent, 66 percent and 65 percent respectively in the categories mentioned above. Nagaland and Arunachal Pradesh are hilly areas and Rajasthan has a large portion of the desert,[6] which makes it difficult to compare these lands with Indo-Gangetic plain. The Basmati cultivation is usually done for the commercial purpose and garners good demand in the international market. The top Basmati producer states also top the list of the marketed surplus ratio (MSR) of rice; an indicator to reflect commercial production. More than 99 percent of the rice produced in Punjab and close to 99 percent in Haryana reaches the market for sale. In other major paddy producing states the growers consume about ten percent of total rice produced.

Table 2.4: Marketed Surplus Ratio of Different States, 2015-16

State	**MSR (Rice)**	**State**	**MSR (Rice)**
Punjab	99.37	Bihar	86.16
Haryana	98.61	Kerala	84.70
Karnataka	94.40	Uttar Pradesh	78.43
Madhya Pradesh	93.09	Odisha	77.35
Andhra Pradesh	91.73	Assam	70.09
Tamil Nadu	91.51	West Bengal	68.98
All-India			**84.35**

Source: Agricultural Statistics at a Glance, 2017; Note: MSR in percent of total production in the state

[6] Table 6 of Agricultural Census 2010-11

Output Linkages for Paddy Cultivators:

Following the production of paddy, the cultivators approach different agencies to sell their produce. The selling of the product is a function of bargaining power or existence of power relation between actors of the various production processes. The rate at which one party transacts product to other party is a reflection of the power relation between actors. For the post-harvest transactions, the number of actors in the backward linkages is substantial, and this number too plays a vital role in the determination of the bargaining power. In India, according to the NSS 2012-13, there are 90.2 million agricultural households in India, out of which, more than 52 percent (47.1 million) cultivate paddy. The same NSS was conducted twice covering the period between July 2012 to December 2012 in the first visit and January 2013 to June 2013 in the second visit. 48 percent of the total paddy growers in India reported the sale of paddy to any agency (example; public, local private, market etc.) between July 2012 and June 2013.

The transaction of paddy between farmers and traders can be through both channels, that is, regulated and unregulated. The regulated channels are under the supervision of state and central governments. The states and central regulations provide guidelines for price determination, quality check etc. The unregulated channels are free from any supervision by the state or central government. The public procurement agencies and Regulated *Mandi* (Hindi word for market place) are the two regulated channels of trade between farmers and traders/wholesalers. Under the public procurement system, state and central government's agencies (FCI) procure Custom Milled Rice (CMR[7]) from farmers through cooperative systems/state/central agencies and rice mills. The procurement price in case of public procurement agencies is MSP. Since there are two MSPs for paddy (Common grade and A grade). The Directorate of Marketing and Infrastructure (DMI) of Government of India provides a five point scale to grade the paddy[8]; moisture, foreign matters, admixture, damaged/immature grain and uniformity. The commission agents or the cooperative societies that procure paddy from farmers for the public agencies

[7] Custom Milled Rice is manufactured by milling paddy.
[8] http://enam.gov.in/NAM/infrastructure/Paddy.pdf

grade the paddy. Further, the paddy is supplied to the Government notified rice mills. Finally, the paddy is supplied to warehouses of the public agencies or their notified warehouses.

The *Mandi* can be regulated as well as unregulated. There is no formal data source to provide number of regulated and unregulated *Mandis*. The Ministry of Agriculture, Government of India formed a committee of Ministers in-charges of Agriculture department of different states. The committee conducted a study and provided the number of functional regulated/unregulated *Mandis* in different states of India, in 2012. According to the report of the committee, there are 28,994 unregulated *Mandis* operating in India that includes 22,505 rural primary *Mandis* and 6489 Wholesale *Mandis*. The number of regulated *Mandis* is 7190 that includes 2456 regulated Principal *Mandis* and 4734 Sub-market Yards.[9] The regulated *Mandis* are guided by Agricultural Produce Market Regulation (APMR) Act. According to the DMI, most of the Indian states enacted APMR Act during the 1960s and 1970s.[10] The APMR Act makes the provision for setting Agricultural Produce Market Committee (APMC). All the APMCs are required to regulate the practices in the *Mandi* as per the State guidelines. In the *Mandi*, the farmers and buyers of the food grains interact, the commission agent facilitates, for which the agent gets commission fixed by the state government. Among the buyers, the public agencies also participate in some states of India. There are other taxes also applied on the sale of commodities. The *Mandi* infrastructure is considered inadequate in terms of number, the average density of regulated Mandi in India is one market per 487.4 square km. The highest density is in Punjab (one per 118.78 sq km) and lowest in Meghalaya (one per 11215 sq km). The APMCs went through several changes time to time. In 2003, the Government of India provided Model APMC Act. Many of the States have adopted the provisions of Model APMC Act (2003). Bihar repealed APMC Act in 2006, Kerala, Manipur, Jammu & Kashmir, Mizoram, D&N Haveli, Daman & Diu, Lakshadweep never enacted the Act.[11] Citing the problem of not having

[9] http://dmi.gov.in/Documents/stminprreform.pdf Annexure II, page 53.
[10] http://dmi.gov.in/Documents/Brief%20History%20of%20Marketing%20Regulation.pdf
[11] http://dmi.gov.in/Documents/stminprreform.pdf

uniform marketing system across different states, in 2015, the Government of India came up with the idea of National Agricultural Market (NAM) (Economic Survey, 2015). The idea was to establish an e-network so that farmers are aware about all markets in the country. Currently, there are 585 APMCs are part of NAM.[12]

The local private traders, Input Dealers, Processors are the unregulated channels of supply paddy from farmers to other end. The functioning of these channels are highly localised and dependent on many social, economic and regional practices. The table below provides a macro picture of output linkages for paddy cultivators in India.

Table 2.5: Land Size Group Wise Number of Paddy Growers who sold Paddy to Different Agencies

Land Size Group	Public	Local Private	Mandi	Input Dealer	Processors	Other
Marginal	732545 (2)	8435557 (24)	2182011 (6)	1063619 (3)	146492 (0)	950971 (3)
Small	576909 (8)	2829287 (37)	987480 (13)	488809 (6)	143846 (2)	247925 (3)
Semi-Medium	387690 (11)	1295647 (38)	588571 (17)	210200 (6)	60366 (2)	121192 (4)
Medium	234897 (24)	290115 (29)	268514 (27)	55162 (6)	18044 (2)	21840 (2)
Large	7387 (8)	25970 (29)	43875 (49)	7346 (8)	671 (1)	6421 (7)
All	1939428 (4)	12876575 (27)	4070451 (9)	1825136 (4)	369419 (1)	1348348 (3)

Source: NSS 70th Round, Computed by the author; Note: Figures are absolute numbers and figures in bracket are percentage of the total paddy growers in particular size group.

The table 5 provides the number of farmers in different land size groups, who sold paddy to different agencies as mentioned in the table at least once, provided the possibility of multiple sales. Approximately 4 percent of the total paddy growers reported the sale of paddy to public sector agencies. The highest number of paddy growers (27 percent) sold paddy to local private agencies. Almost 9 percent of paddy farmers sold their produce in the *Mandi*, 4 percent

[12] http://enam.gov.in/NAM/home/mandis.html

paddy farmers sold paddy to input dealers, 1 percent to processors and 3 percent to other agencies. 39 percent of the total Marginal paddy growers, 69 percent of the small size group paddy growers, 78 percent of the Semi-Medium, 89 percent of the Medium, 102 percent of the Large size group and 48 percent of the total paddy growers reported the sale of paddy. Considering the externalities related to quality of answers by the farmers are similar across different size groups, the inverse relationship between number of paddy growers and the land size groups indicate two things; the farmers with larger size of land have better access to marketing agencies, and the farmers with lesser size of land are dependent on their production for basic consumption. The higher number of reporting of sale is also because of selling to multiple agencies. Across all size groups, most of the paddy farmers are selling paddy to local private agencies except large paddy farmers; most of them sell paddy to *Mandi*. The reliance over local private agencies increases with the lesser size of land. 57 percent of the total paddy farmers, who reported the sale of paddy, sold it to local private agencies; the same for marginal, small, semi-medium, medium and large are 62, 54, 49, 33 and 28 percent respectively.

Table 2.6: Land Size Group Wise Quantity of Paddy sold to Different Agencies

Land Size Group	Local Private	Mandi	Input Dealer	Public Agencies	Processors	Other	Missing
Marginal	10703 (58)	3518 (19)	2218 (12)	1149 (6)	139 (1)	734 (4)	28 (0)
Small	8239 (51)	3359 (21)	1772 (11)	1836 (11)	414 (3)	476 (3)	10 (0)
Semi-medium	6389 (46)	3361 (24)	897 (7)	2418 (18)	355 (3)	362 (3)	10 (0)
Medium	3445 (29)	4377 (37)	576 (5)	3029 (26)	145 (1)	121 (1)	5 (0)
Large	455 (14)	1621 (50)	121 (4)	494 (15)	21 (1)	503 (16)	0 (0)
All	29229 (46)	16236 (26)	5583 (9)	8926 (14)	1074 (2)	2196 (3)	54 (0)

Source: NSS 70th Round, Computed by the author; Note: Figures are '00 Tonne and figures in bracket are percentage of the total paddy growers in particular size group.

Table 6 provides the quantity of paddy sold by the farmers to different agencies. According to the information provided in the table, the smaller size

group contributes more to the total sale of paddy. The share of different land size group in the total reported sale of paddy during the period of the survey are; 29 percent Marginal, 25 percent Small, 22 percent Semi-medium, 18 percent Medium and 5 percent large paddy growers. The most substantial quantity of paddy was sold to local private agencies followed by *Mandi* and then to Public procurement agencies. As reflected in the previous table, this table also suggests that the smaller size group are more reliant on the local private agencies to sell their product than the larger size groups. The reverse is seen in case of *Mandi* and Public procurement agencies. The larger size groups' paddy cultivators have better access to *Mandi* and public agencies. The proportion of the total quantity of paddy sold to Input Dealer and Processors are miniscule. The share of paddy sold to other agencies is small for all size group paddy farmers except for the large cultivators. The large size group paddy growers sold 16 percent of the total quantity sold by the same group to the agencies, which are reported as 'Other' categories. This possibly indicates a significant amount of sale of paddy by the large farmers more than trice and/or to more than three agencies and/or to agencies not mentioned in the survey questionnaire. The same finding supports the argument that the large farmers have greater access to diversified markets.

Table 2.7: Land Size Group Wise Mean Price of Paddy Received by the Farmers

Land Size Group	Local Private	Mandi	Input Dealer	Public Agencies	Processors	Other
Marginal	12	13	12	13	12	10
Small	12	13	12	14	13	9
Semi-Medium	13	15	13	13	12	11
Medium	14	14	12	13	14	13
Large	12	15	14	14	16	10
All	13	14	12	13	13	10

Source: NSS 70th Round, Computed by the author; Note: Figures are in Rs per Kg.

Table 7 provides information on the mean price of paddy received by the farmers in different size groups; this includes both visits and all sales. The highest mean price received by the marginal paddy farmers is Rs 13 per Kg in the year of survey. The small farmers received the highest price of Rs 14 per

kg from Public Agencies. Semi-medium, Medium and Large farmers received the highest price of Rs 15, Rs 14 and Rs 15 per Kg respectively from *Mandi*. The highest mean price was received from Public procurement agencies and *Mandi*. The *Mandi* provided the highest mean price of paddy. The prices in the 'Other' categories are very fluctuating.

The public procurement agencies purchase paddy at the Minimum Support Price (MSP). In this regard, the level 13.10 becomes crucial to look how this price was achieved by the paddy farmers of different size groups. In the year of survey (2013), the Government of India declared MSP of common grade paddy Rs 13.10 per Kg and Rs 13.45 per Kg for grade 'A' paddy.

Table 2.8: Percentage Distribution of the Different Size Group Paddy Farmers and Price Received, 2013

Price Range (Rs/Kg)	Marginal	Small	Semi-Med	Medium	Large	All
Less and Equal 13.10	85	84	76	72	64	83
Less than 13.10	75	70	58	42	54	70
Equal to 13.10	10	14	18	30	10	13
More than 13.10	15	16	24	28	36	17

Source: NSS 70th Round, Computed by the author; Note: Figures are in percentage

The highest number (70 percent of total) of paddy farmers, who sold paddy, got the price less than Rs 13 per Kg. 85 percent of the Marginal farmers, 84 percent of the Small farmers, 75 percent of the Semi-medium, 72 percent of the Medium and 63 percent of the Large paddy farmers received price less than or equal to Rs 13 per Kg. The information in the table indicates that the larger landholders not only have an access to the larger number of markets (discussed in table 5) but also have better access to higher prices.

The findings given above support Krishna Bharadwaj's thesis of 'Compulsive Involvement' or Amit Bhaduri's contention of 'Forced Commerce'. The compulsive involvement of a certain class of farmers in the market is a result of respective bargaining powers. The small and marginal farmers have lesser bargaining power than large farmers, that results in their compulsive

involvement in the market (Bharadwaj, 1974b). Smaller farming households are not only dependent on the local traders but also receive lower price for the same output than their counterparts in the larger size groups. Such transactions are possible because actors are abstracted from their social context and power asymmetries that are derived from the different endowments of actors in terms of economic, social and symbolic capital (Harriss, 2006).

Forced commerce may take place in the agricultural market as well as all other markets and exchanges. That is why the full scope of the forced commerce cannot be captured by a single exchange or transaction. This impacts on, not only the peasantry, but also the overall agrarian economy (Bhaduri, 1986). Forced commerce or compulsive involvement enables other actors to extract surplus through price squeeze. The price squeeze is greater for the small and marginal farmers that constitutes the largest portion in Indian farming community.

Domestic Rice Trade:

Rice Mills

Following the sale of paddy, milling is an important task. Rice mill is a key channel in the procurement by public procurement agencies, private firm etc. The public procurement agencies direct the PACS, commission agents or whoever procures for them to deliver the paddy to their notified rice mills and further they receive rice from the mills. In some parts of the country the rice mills also procure paddy through its own procurement centres in the different markets. Rice mills cannot be treated as a single category because of the fact that there are several types of milling possible. The milling process ranges from traditional ways to modern and high-tech mills. There are some rice mills which only perform hulling, some which also perform shelling with hulling. For the para-boiled rice, para-boiling unit is also available in some rice mills. Then there are some big rice mills which perform the polishing and modern packing.

The oldest system to get rice from paddy is hand pounding using wooden mortar or husking pedal system. The system used to be very labour intensive. It is almost obsolete now. However, in some parts of India this is still in use for some religious or cultural rituals. The output (rice)-input (paddy) ratio is very low in this technique. The other possibility to convert paddy into rice is through the use of husking mills. The husking mills just fabricate dried or boiled paddy using single huller. Then the husk, rice and dust materials are separated manually using winnowing technique. With the further innovation, multiple hullers, boiling units etc. were also added to the rice mills. The latest versions of rice mills include Sheller, polishers, and separators as well. With the advancement of the technology, output-input ratio increased. The power generator of the rice mills also varies in terms of use of the fuels. Rice mills in India uses electricity, diesel or paddy husk to generate power (Nandy, 2002).[13] The huge variation in types of the rice mills, make it difficult to get a country level data of all the rice mills. However, Economic Census or Annual Survey of Industries tries to capture the number of rice mills and their specifications with some limitations.[14] There are some big companies, which procure from farmers or from the commission agents and perform all tasks starting from milling to packaging and wholesaling. Generally, the business of the big companies is limited to Basmati rice only.

Inter-State Trade/ Intra-State Trade

As provided in the table 4 of this chapter, the marketed surplus ratio of paddy (indicator of the consumption and sale by producers) in some states is as high as 99 percent and in the top producing states the lowest is 69 percent. This means that a significant portion of paddy/rice is marketed in almost every parts of the country either within the state or outside. According to the Ministry of Statistics and Programme Implementation (MoSPI), the rail and road transport together account for a significant portion of the total inter-state freight

[13] http://shodhganga.inflibnet.ac.in/handle/10603/66051 Chapter 5.

[14] The Economic Census records the detail of firm at the three digits National Industrial Classification Code, which is a broader category, Rice Mill is defined at the five digits code. The Annual Survey of Industries on the other hand records data only for the organized manufacturing sectors (http://www.csoisw.gov.in/cms/En/1023-annual-survey-of-industries.aspx)

movement. The share of other modes of transport; air, sea and river is negligible. The road transport is currently prime mode of transporting goods. The data for the sea, air, river and rail borne trade is maintained by Directorate General of Commercial Intelligence and Statistics (DGCIS) and hence the quality is fine. The data generation system for the road borne trade is of poor quality because most of the goods road transport is in the private sector.[15] The poor data generation system leads to a lack of understanding of the value added through transportation of the product.

Wholesale/Retail of Rice

The wholesale and retail sale is last portion for the domestic segment of the Paddy Value Networks. The Department of Consumer Affairs (DCA), Government of India provides wholesale and retail sale price of rice.[16] The DCA collects data from 101 centres across five zones in India and also provides the national average of the prices. As provided in table 6, the largest quantity of paddy is sold to local private traders, *Mandi* and Public Sector Procurement Agencies. The total number of actors involved in case of paddy sale to local private traders or *Mandi* cannot be uniform across all states or regions. Secondly, the source of information related to number of actors and activities in case of sale of paddy to local private traders and *Mandi* is also not readily available; to solve the same problem, later chapters use primary case studies. However, in case of public procurement agencies, data is available to understand the cost involved after the procurement of paddy to the final sale of rice.

The public procurement agencies procure paddy at the MSP, decided by the Government of India. The MSP in its current form is based on the cost of production, demand and supply, price trends in the domestic and international market, intercrop parity, terms of trade between agriculture and non-agriculture and likely implications of MSP on consumers of the product.[17] Taking all factors into its account, the Commission for Agricultural Costs and Prices (CACP) recommends MSP. The MSP and its rationale are being debated since

[15] http://mospi.nic.in/63-inter-state-movementflows-goods
[16] https://fcainfoweb.nic.in/Reports/Report_Menu_Web.aspx
[17] http://cacp.dacnet.nic.in/content.aspx?pid=62

its inception. However, there is a very strong advocacy for the pricing system of agricultural products on the basis of cost incurred in the cultivation. There are two types of criticism for MSP; the one, which suggests that the MSP does not capture the cost of cultivation adequately (Sarkar et al., 2014) and the other questions the relevance of MSP or any price, which is biased towards supply-side factors (Chand, 2003; Raghwan, 2004). However, in both the criticisms the calculation of the cost of cultivation is undisputed. The details of debate around MSP is outside the scope of this paper but, here for the purpose of analysis, MSP can be taken as a minimum level of price.

In 2013, only 30 percent of the total paddy cultivators in India got a price equal to or more than MSP (table 8). After the procurement of paddy from farmers, the paddy goes through some transaction followed by milling (raw and par-boiled) and hence, the price of rice is decided. In the standard case, from the paddy procurement to the store of rice in the warehouses, the cost includes labour charges for loading/unloading, transportation charges, milling charges, packing charges, storing charges and other charges including local taxes. The Government procurement agencies procure paddy at MSP and further the Central Government also approves the different rates of Custom Milled Rice (CMR) to arrive at its "Economic Cost (EC)". The EC has two sub-sections; Acquisition Cost and Distribution Cost. The acquisition cost includes all charges from procurement of paddy to acquisition of rice from the rice mill. The distribution cost consists of all charges from collecting rice from different locations and storing it in the warehouses. The EC does not include any profit margin, and hence, it is the minimum level of the price of rice after making all costs. The charges in EC are minimum possible, and that is why the difference between rice equivalent MSP and EC can provide the minimum cost of turning paddy into marketable rice. The EC is discussed in table 9.

Indian Rice Export:

The export of the agricultural product is a significant contributor to the total export revenue of the country. A reasonable demand of the agricultural products in the international market, supposedly, helps the farmers. India is the

second largest producer of paddy in the World (FAO RMM, 2017). In 2016, India produced 164 million tonnes of paddy (or 109.2 million tonnes of rice), which was 22 percent of the total paddy produced (753 million tonnes) in the world. India is also the world's largest exporter of rice; precisely, 24 percent (10 million tonnes) of the total rice traded (41.4 million tonnes) in the world in 2016 (FAO RMM, 2017). India has been a significant exporter of rice since the early 1980s, but the country has observed a remarkable increase only after the implementation of New Economic Policies (NEP). Out of the total rice export, Basmati constitutes around 40 percent, and concerning the value of the exported rice, the share of Basmati is 56 percent (see detailed discussion in the later sections). The production of Basmati is limited in only seven states of India, whereas, farmers in more than 17 states do cultivate non-Basmati rice. The regions producing Basmati rice are relatively dominated by medium and large land size groups' farmers and commercial farming.

There are diverse opinions of the academic scholars on the issue of export orientation for agricultural products. Proponents of the liberalised trade argue that India comparatively has advantage in export of agricultural and labour intensive products and that is why there is a need for export promotion (Sachdev, 1993; Datta, 2000). It was also noted that the non-agricultural trade liberalisation rather than agricultural trade liberalisation is relatively more important for agriculture. However, they favoured moderate tariff along with export promotion and removal of subsidy in the sector with investment in irrigation being the only exception (Parikh et al., 1995). The supporters of export orientation, suggest that technology, institutions and markets (domestic as well as international) have a very crucial role to play in the enhancement of the value addition of agricultural produce. A similar viewpoint asserts that these components are critical to agricultural value network, and its success would depend on how corporate sector changes the complexion of Indian agricultural system through organised food processing and retailing with the motive of profit (Gulati, 2010).

Contrary to the above arguments, some also argue that in the era of liberalisation, export orientation of agricultural product is not necessarily a win-win situation as there are no indications to claim the increasing

competitiveness of India in the external market (Chandrashekhar and Ghosh, 2006). Further, there was an inverse relation between agricultural export and domestic food security as there was enough evidence to show that developing countries did not benefit from the trade liberalisation; in fact, this resulted in deterioration of food security in the developing countries (Patnaik U, 1996; 2012; 2015). While there has been a continuous rise in the production of food grains in India and its export, simultaneously, there is also a fall in the per capita cereal consumption (Chandrashekhar and Ghosh, 2013). As Prabhat Patnaik argues, under the economic liberalisation, state functions exclusively in support of the globalised capital and withdraws support concerning subsidy, that has adversely affected small and marginal farmers. The liberalised trade policies make petty producers more vulnerable towards the world price fluctuations (Patnaik P, 2012; 2016). It has been noted that the liberalisation, in general, has resulted in the higher inequality and regional imbalances (Ghosh, 2012).

The country's export is 24 percent of the world rice trade. The current position of India in the world rice trade is mainly due to the economic policies of 1990. However, the country was exporting rice, though in smaller quantity, even before the new economic policies (NEP) were adopted. But, indeed, the policies in favour of trade liberalization as a result of NEP gave a boost to Indian rice export. Before the NEP, the Indian rice export constituted primarily Basmati but during the liberalised economic policy regime, the Government lifted the ban on export of Non-Basmati rice, periodically.

In the last three decades, Indian agriculture contributed immensely to the global food production with the share of export value of rice being the highest in the export of agricultural products. India has been a significant exporter of rice since the early 1980s, but the country has observed a remarkable increase only after the implementation of New Economic Policies (NEP). Currently, it is the world's second largest producer of paddy. In 2016, India produced 164 million tonnes of paddy (or 109.7 million tonnes of rice), which was 22 percent of the total paddy produced (753 million tonnes) in the world. India is also the world's largest exporter of rice; 24 percent (10 million tonnes) of the total rice traded (41.4 million tonnes) in the world in 2016 (FAO RMM, 2017). Out of the total

rice export, Basmati constitutes around 40 percent, and out of the total value of the exported rice, the share of Basmati is 56 percent. The production of Basmati is limited to only seven states of India, whereas, farmers in more than 17 states cultivate non-Basmati rice (APEDA, 2017).

Basmati rice constitutes to be almost 6 percent of the total rice produced in India. Punjab, Haryana, and western Uttar Pradesh contributes nearly 97 percent of the total Basmati rice produced in the country. On an average, Punjab and Haryana are the highest producers with almost 83 percent share of the total Basmati production. In 2016, Punjab cultivators produced 2796 thousand tonnes of Basmati rice. In Haryana, 2337 thousand tonnes of Basmati rice was produced. The total amount of Basmati rice produced in India in the same period was 6156 thousand tonnes (*ibid*).

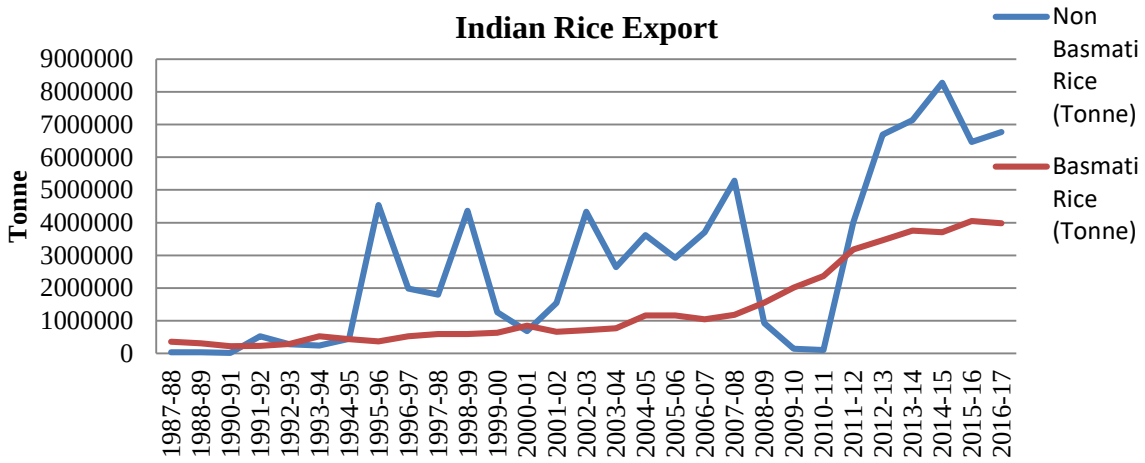
Medium and large farm holders and commercial farming relatively dominate the regions producing Basmati rice. According to the Agricultural Census of India (2010-11), Punjab and Haryana also have the largest portion of agricultural land and share of medium and large operational holdings in the country. Punjab ranks second with 69 percent of the medium and large operational holding and Haryana is at fifth place in the same list with 56 percent in the same category. Basmati cultivation is usually done for the commercial purposes and garners good demand in the international market. The top Basmati producing states also are at the top of the marketed surplus ratio (MSR) of rice; an indicator to reflect commercial production. More than 99 percent of the rice production in Punjab and close to 99 percent in Haryana reaches the market for sale. In the other major paddy producing states, the growers consume about ten percent of rice production (Annexure 0.3).

Therefore, the benefit of Basmati export, if any, is limited to some states and relatively to larger size groups agricultural households, whereas, export of non-Basmati rice has its impact on a larger agrarian community in the country. Data related to export of rice is inadequate to measure the share of different states in the total rice export of the country. However, a convenient movement of agricultural products across different states helps us to consider that there is an

impact of rice export in each rice producing states, though with different degree.

Further, trade liberalisation policies give a boost to Indian rice export. Before the NEP, the Indian rice export constituted primarily Basmati but during the liberalised economic policy regime, the Government of India lifted the ban on export of Non-Basmati rice, periodically. The figure below provides information on the export of Basmati and non-Basmati rice from India before and after NEP was adopted.

Fig. 2.1.



Source: Data (annexure 2.1) from APEDA, Ministry of Commerce and Industry, Government of India

In the last three decades, there are several changes in the trajectory of Indian rice export which are caused by a combination of national and international factors. Before 1994-95, the Government of India did not permit the export of non-Basmati rice (Gulati et al., 2003). Due to the policy changes, the export of non-Basmati rice increased after 1994 and India became the top exporter of rice in the world. However, even in the post-1994 period, the export of non-Basmati rice was not entirely free; the Government gradually withdrew several restrictions until 2011. Policy restrictions were used in the interim period to regulate the export and after 2008 crisis, the Government had put some restrictions on the export of non-Basmati rice for four years.[18] In September 2011, the Government allowed export of non-Basmati rice out of privately held

[18] http://www.thehindubusinessline.com/economy/agri-business/rice-exports-to-be-record-10-mt-in-201112-year-usda/article3968487.ece

accounts.[19] Later on, the Government also started allowing the Public Sector Units (PSUs) to export the non-Basmati rice to some countries. Following this complete removal of the ban, the export of non-Basmati rice is consistently on the rise. In case of Basmati rice, the export was allowed even before 1994. Prior to1994, the share of Basmati in the total export of rice was close to 80 to 90 percent, but the policy changes in 1994 resulted in the shift of larger share in total quantity in favour of non-Basmati rice. In the complete free trade periods, the quantity share of export of non-Basmati rice is more than that of Basmati rice in total. However, the same is not true concerning export revenue on account of both varieties of rice. In the period after 2007-08, the share of Basmati export revenue is higher than that of non-Basmati rice in total rice export revenue; this is mainly because of the higher market price of Basmati rice.

Whatever the current Indian rice export growth story is, the reciprocity of objectives of free trade policy and its realisation is questionable. The proponents of the export of agricultural products suggested that India has a comparative advantage in the rice production and that is why its export promotion could help to raise the export revenue. It was recommended that Indian rice is price competitive and had the potential to get the competitive strength in the world market (Datta, 2000). Supposedly, the rice trade liberalisation was to address the issue of poverty in India (Gulati et al. 2003). Through the analysis of comparative advantage, it was found that there are some short-run benefits, but in the long run, excessive specialisation on a narrow range of product makes the economy vulnerable. The export growth of the primary commodity has a very little secondary impact (such as export earnings and its likely implication on the overall economy) due to weak backward and forward linkages (Sekhar, 2003). Arguments in favour of the export of the agricultural products and in particular rice are based on the priority of earning foreign exchange through trade in 'so-called free world market' and undermines the need for buffer stock after a certain limit. This priority is wrong on two accounts; firstly, the buffer stocks on the one hand

[19]Notification No 71 (RE – 2010)/2009-2014, Department of Commerce, Ministry of Commerce & Industry, Government of India.

helped the economy from the outside crisis as it happened in 1974-75 and 1995-96 (*ibid*) and on the other hand helped the economy to combat the food insecurity (Patnaik U, 1996; 2012; 2015). Secondly, there is no free demand and supply in the world market as of now. Mutual trade agreements, the different trade relations between some countries and overall the political economy of the globe affects both demand and supply of the commodities. In case of rice trade, there are some recent examples, which do not support the assumption that no one alone can affect the world market. In October 2014, Iran, one of the significant Basmati importing countries, stopped issuing the license for the import citing reasons of high pesticides and self-sufficiency in the production of the same. Later on, the world leaders had to put a ban on Iran on the issue of 'Nuclear test', which was lifted only in August 2015.[20] These events affected the Indian rice export performances. In 2017, Iran had put a cap on the price of imported rice, which was between Rs 44 a Kg to Rs 50 a Kg. However, the earlier agreed price was Rs 65 per Kg and Rs 70 per Kg.[21] This artificial intervention in the so-called free world trade is not only from one country but also from the group of countries. In 2017, the European Union (EU) through a Commission Regulation dated 9 June, 2017 brought down the level of fungicide allowed in rice.[22] It had a potential to affect US$ 3 billion rice export from India.[23] The direct or indirect intervention by the different players of the global market raises the question on the assumption that no one can influence the world trade as a single entity.

The world price fluctuation is a further concern for Indian rice export. The world food prices are more volatile than the domestic prices (Nayyar and Sen, 1994). In the last two decades, there is a rise in the unit price of the exported Basmati and non-Basmati rice regarding nominal Rupees per Kg except for a period between 2008-09 and 2012-13.

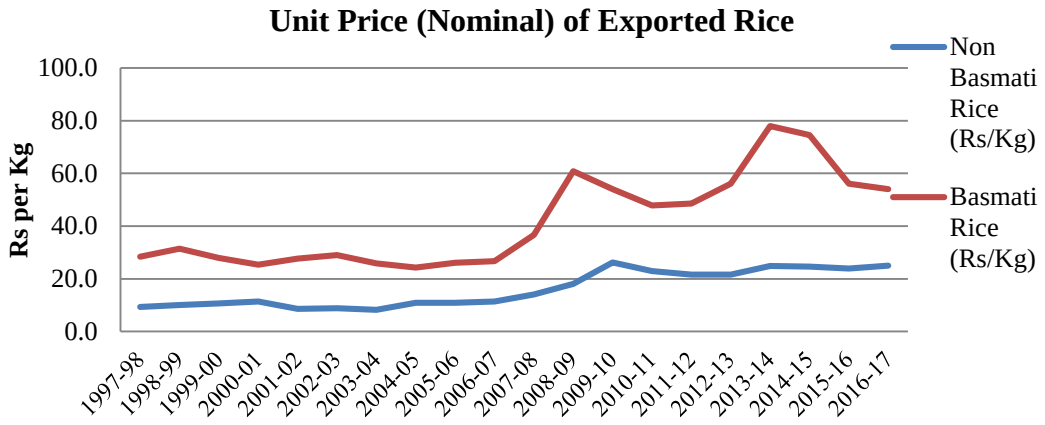
[20] http://www.business-standard.com/article/markets/Basmati-rice-exports-to-iran-via-dubai-soar-115111001536_1.html

[21] http://www.financialexpress.com/opinion/how-india-is-paying-the-price-of-rice-exports-to-iran-the-story-is-of-crashed-markets-reneging-buyers/833856/

[22] http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32017R0983

[23] http://www.thehindubusinessline.com/economy/agri-business/Basmati-exports-to-eu-face-fungicide-blockade/article9565837.ece

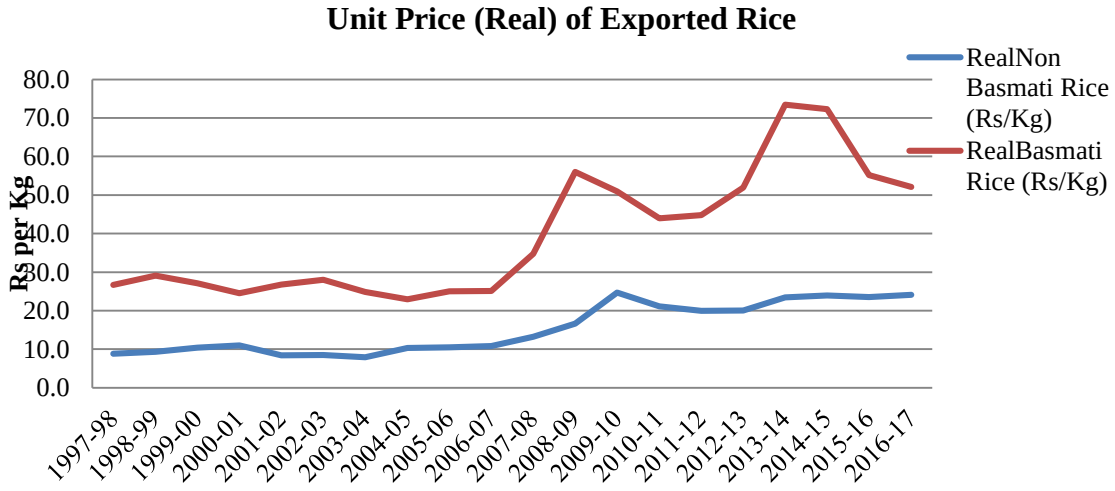
Fig. 2.2



Source: Ratio of Value and Quantity mentioned in Data (annexure 2.2) from APEDA, Ministry of Commerce and Industry, Government of India

The fluctuation of the nominal price of Basmati is more than that of non-Basmati. However, the nominal price of non-Basmati rice is almost stagnant and is close to Rs 25 per Kg since 2009-10 that includes two years of banning when a minimal amount of non-Basmati rice was supplied to selected neighbouring countries. The variation in the nominal price of Basmati rice is higher in the period since 2008, and there is a continuous decline since 2013-14.

Fig. 2.3.

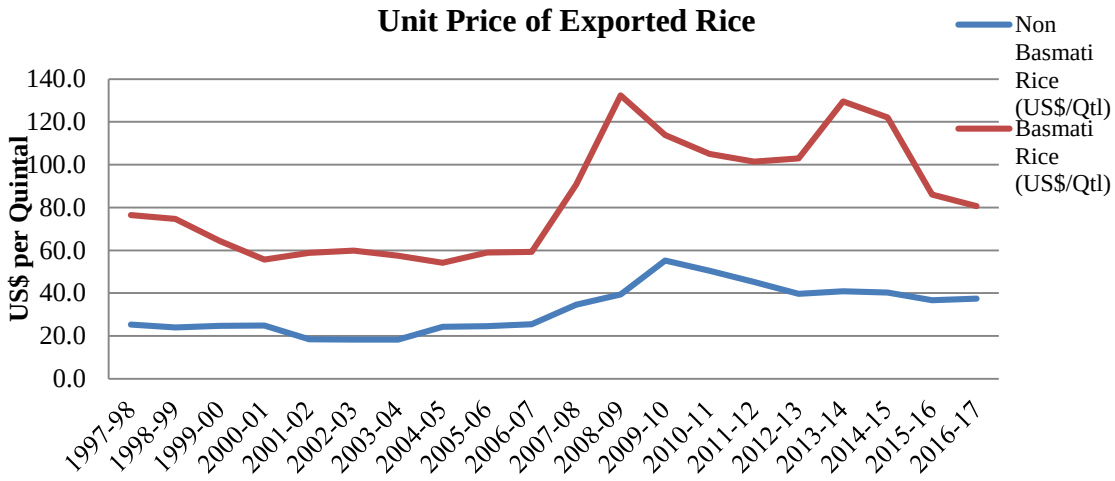


Source: Ratio of Value and Quantity mentioned in Data (annexure 2.3) from APEDA, Ministry of Commerce and Industry, Government of India; and Deflated with GDP Deflator (Source: World Bank)

Regarding the real price, the trend is almost similar, but the price of non-Basmati rice is close to Rs 24 per Kg in the period after 2009-10. The unit price

of Basmati rice reached at its peak in 2013-14 to Rs 73. 40 per kg after a decline in 2008 and thereafter there is a continuous fall till 2016-17.

Fig. 2.4.



Source: Ratio of Value and Quantity mentioned in Data (annexure 2.4) from APEDA, Ministry of Commerce and Industry, Government of India

The price in US$ per quintal reflects a different story, though with almost the same trend. In the period 2004-05, there is a rise in the price of Basmati and non-Basmati rice that continued till 2008-09. In 2008-09, the unit price of exported Basmati was US$ 132.4 per Quintal, which was highest so far. However, the unit price showed some revival in the period after 2011-12, but it could not continue for long and there is a continuous decline since 2013-14, after achieving unit price of US$ 129.5 per Quintal. In the case of non-Basmati rice, the unit price is witnessing a decline since 2009. In 2009-10, the unit price of non-Basmati rice was US$ 55.2 per quintal, which is highest so far.

Economic Cost of Rice and Export Price:

Along with the problems outlined with respect to the export of agricultural products, the real economic gain from the rice export is also questionable. Here an attempt is made to calculate the Economic Cost (EC) of rice for comparing the export revenue with the production cost, i.e. the cost involved at every stage of the production process. After the procurement of paddy from farmers, the produce goes through some transactions followed by milling (raw and par-boiled) before the price of rice is decided. In a standard case, from the paddy procurement to the storing of rice in the warehouses, the cost includes labour

charges for loading/unloading, transportation, milling, packing, storing and other charges including local taxes. Government procurement agencies procure non-Basmati paddy at MSP[24] and the Central Government approves the different rates of Custom Milled Rice (CMR) to arrive at its EC. The EC has two parts, Acquisition Cost and Distribution Cost. The acquisition cost includes all charges from procurement of paddy to acquisition of rice from the rice mill. The distribution cost consists of all charges from collecting rice from different locations and storing it in the warehouses. The EC does not include any profit margin or environmental cost in production[25] and subsidy provided for farming.[26] Hence, EC is the minimum level of production cost including all stages of rice production.[27]

Table 9 shows the costs of production of non-Basmati paddy and details the MSP and EC of non-Basmati rice. The cost of production is the total cost required to produce a Kg of paddy and includes value of labour (hired human, bullock, machines), the value of seeds, insecticides and pesticides, manure, fertilizers, depreciation on implements and farm buildings, irrigation charges, land revenue, cesses, taxes, interest on working capital, miscellaneous expenses, rent paid on leased in land, interest on value of own fixed capital asset (excluding land), rental value of own land and imputed value of family labour.

[24] The public procurement agencies procure paddy at the MSP, decided by the Government of India. The MSP in its current form is based on the cost of production, demand and supply, price trends in the domestic and international market, intercrop parity, terms of trade between agriculture and non-agriculture and likely implications of MSP on consumers of the product (nic.in/content.aspx?pid=62http://cacp.dacnet). Taking all factors into its account, the Commission for Agricultural Costs and Prices (CACP) recommends MSP. The MSP and its rationale are being debated since its inception. However, there is a very strong advocacy for the pricing system of agricultural products on the basis of cost incurred in the cultivation. There are two types of criticism for MSP; the one, which suggests that the MSP does not capture the cost of cultivation adequately (Sarkar et al., 2014) and the other questions the relevance of MSP or any price, which is biased towards supply-side factors (Chand, 2003; Raghwan, 2004). However, in both the criticisms the calculation of the cost of cultivation is undisputed. The details of debate around MSP is outside the scope of this paper but, here for the purpose of analysis, MSP can be taken as a minimum level of price.

[25] It is estimated that in production of 1 Kg of rice 2500 litre of water is used (IRRI, 2009).

[26] Government of India provides fertilisers subsidy and many state Governments provides subsidy on electricity for agricultural use.

[27] The analysis of economic cost does not cover Basmati rice because, (1) CACP do not provide Cost of Production of Basmati and (2) public procurement agencies generally procure non-Basmati rice only, and hence the calculation of economic cost is difficult.

Table 2.9: Cost of Production[28], MSP and Economic Cost of Rice (Rs per Kg)

Year	2013-14	2014-15	2015-16	2016-17
Cost of Production (Paddy)	12.60	13.90	14.92	--
Cost of Production (Rice)	18.80	20.70	22.26	--
MSP (Paddy Common)	13.10	13.60	14.10	14.70
MSP (Paddy Grade A)	13.45	14.00	14.50	15.10
MSP (Rice Common)	19.55	20.30	21.04	21.94
MSP (Rice Grade A)	20.07	20.90	21.64	22.54
Economic Cost (CRR)	24.25	25.01	25.84	27.31
Economic Cost (ARR)	24.84	25.68	26.51	27.98
Economic Cost (CPBR)	23.92	24.62	26.03	26.84
Economic Cost (APBR)	24.50	25.27	26.70	27.49
Export Price of Non-Basmati	24.88	24.69	23.95	25.00
All India Average Retail Price	27.93	27.50	27.32	29.23
All India Average Wholesale Price	25.13	24.67	24.51	26.18

Source: Cost of Production (Paddy): CACP, Cost of Production (Rice): Computed, MSP (Paddy): Department of Food and Public Distribution, Government of India, MSP (Rice): Computed, Economic Costs: Department of Food and Public Distribution, Government of India, Export Price: Ratio of Value and Quantity of non-Basmati rice export from APEDA, Ministry of Commerce and Industry, Government of India. Note: All figures are in Rs per Kg. All India Average Retail Price and Wholesale Price: The Department of Consumer Affairs

The cost of production of rice is computed using the widely accepted conversion rate of 1:0.67, i.e. in 100 kg of paddy, 33 kg is husk, and 67 kg is rice.[29] The MSP of rice is also based on the same ratio. The EC is different for different states of India, and that is why the figures given in the table are weighted average for All India. The weight of any state is equal to that state's share in the total production of paddy in India. The produced paddy, concerning quality, is divided into two sets; common and Grade A and MSP of Grade 'A' are generally kept higher. The different methods of milling lead to two types of rice; raw and par-boiled. Therefore, the final outputs are; common raw rice (CRR), A grade raw rice (ARR), common par-boiled rice (CPBR) and A grade par-boiled rice (APBR). The data of EC could not be accessed for the year before 2013-14 and the latest data on the cost of production is for the year

[28] Cost of Production, given in the table 9 is weightage average of state-wise CoP. The weight is based on states' share in national paddy production in respective years.

[29]Percentage of De-husked grain = (N X 100)/W; where N= Number of de-husked grain in 5 gram of sample and W= Total number of grain in 5 gram of sample. Source: http://www.foododisha.in/download/policy-2013-14.pdf

2015-16. The analysis in the table is limited to four years because of mentioned limitations.

Table 2.10: Summary of Table 2.9

Year	2013-14	2014-15	2015-16	2016-17
Farmers' Share (if given MSP for Common Rice)	0.75	-0.40	-1.22	--
Farmers' Share (if given MSP for Grade A Rice)	1.27	0.20	-0.62	--
Middle Cost CRR (excluding profit)	4.70	4.71	4.80	5.37
Middle Cost ARR (excluding profit)	4.76	4.78	4.87	5.44
Middle Cost CPBR (excluding profit)	4.37	4.32	4.99	4.90
Middle Cost APBR (excluding profit)	4.43	4.38	5.06	4.95
Difference Between Export Price and EC of CRR	0.64	-0.32	-1.89	-2.30
Difference Between Export Price and EC of ARR	0.05	-0.99	-2.56	-2.98
Difference Between Export Price and EC of CPBR	0.96	0.07	-2.08	-1.84
Difference Between Export Price and EC of APBR	0.38	-0.58	-2.75	-2.48

Source: Table 2.9

The distributional aspects of the value discussed in Table 10 suggest that the farmers get Rs 0.75 per Kg for common rice and Rs 1. 27 per Kg for 'A' grade rice in 2013-14. The share is Rs -0.40 and Rs 0.20 per Kg respectively for the year 2014-15. In 2015-16, farmers' share is negative for both varieties of rice. Firstly, this share for the farmers is possible only if the farmers get MSP for paddy. As shown in Table 8, 83 percent of total paddy cultivators, who sold paddy, got price equal or less than MSP. The same share for marginal, small, semi-medium, medium and large cultivators are 85 percent, 84 percent, 75 percent, 72 percent and 64 percent, respectively. The result implies an inverse relationship between land size and the share in the value of rice. In 2013-14, at the MSP, the share that farmers derived was between 3.13 percent and 5.30 percent of the EC (depending on the final output). In 2014-15, the maximum ratio decreased to 0.8 percent and the minimum ratio is negative (farmers made loss). Given the accessibility of MSP or price more than that, the smaller farmers' share of surplus in the total value of rice is further smaller. At the disaggregated level, EC is more than the export price of rice in the last five years for the major rice producing states except Punjab, Haryana and Tamil Nadu (annexure 2.5). Secondly, the cost of production mentioned here does not include the managerial cost of the farmer. The Commission for Agricultural

Cost and Prices recommends C3 cost which includes managerial cost at the rate of 10 percent of C2 cost.[30] Taking C3 cost into account, the farmers, on an average, made loss even at the MSP for the non-Basmati varieties of both grades.

From Tables 9 and 10, this is clear that (1) export price is less than the economic cost of rice, (2) in some years, wholesale price is also less than the economic cost, (3) in most of the years, the wholesale price is more than the export price and (4) the retail price is always higher than the wholesale price. Three important questions emerge from the summary of the tables.

1. If the export price is less than the economic cost, then what explains the export of non-Basmati rice?
2. Why is wholesale price less than the economic cost in some years?
3. Why is there export of non-basmati rice if the wholesale price is more than the export price in most of the years?

Rice is the product of various production processes starting from the cultivation of paddy. The EC compiles, in the best possible manner, all the costs involved in the production processes till storing rice in the warehouses. In such a situation, the comparison of EC with the export unit price of rice could be an essential tool to understand the rate of gain that country makes through export of rice in the simplest form. For the country as a whole, the cost of producing one unit of rice includes cost of producing one-unit rice equivalent paddy (c) and middle costs (a). The economic cost as mentioned above is sum of MSP and middle cost (msp + a). As discussed above MSP is very close to the cost of production (msp $\approx$ c) and sometime former is less than later (msp$<$ c). Therefore, the economic cost is (c + a). Now, if the unit export price of rice is x, then as given is table 9 and 10, x $<$ (c + a). The result implies that the country as a whole is making loss through export of non-Basmati rice.

The results relating to export, discussed above, can be seen if and only if one considers country as a single unit of analysis. However, the reality is contrary to this; the country does not operate as a single unit. There are several segments

[30] http://eands.dacnet.nic.in/Cost_Concept/Cost_Con.pdf

in the country (here Paddy Value Networks of India), which operate separately. For the interaction among themselves, they use their bargaining power (power relation) to maximise their personal economic gain. For the sake of simplicity let's assume that there are three segments in the economy; (1) Government that sometimes procures paddy, (2) private exporters that procure from farmers and export, and (3) farmers.

For the Government of India, if cost of production is equal to the export price, then it will make losses only if it makes some expenses on the middle processes (i.e. after procurement and before export). If the Government does not make the middle cost (i.e. the cost incurred on middle processes), there is no added economic burden on the Government at any export price.[31]

For the private exporters of paddy, business is all about getting some returns on the expenditure made, and though the profit margin may fluctuate, exporters are not likely to incur a loss. However, apart from the exporters, other actors in the value systems may face a situation, where their cost are not fully met from the price they receive from the exporters for non-Basmati rice. Here, it can be assumed that the private exports will be in business only in case of profit > 0 (the later chapters substantiate the assumption through case studies).

Suppose, p_1 is the price received by the farmers for one unit of rice equivalent paddy, 'a' is the middle cost per unit of rice; 'x' is the export price per unit of rice.

So, the total expenditure of exporter per unit = $p_1 + a$

According to the positive profit assumption[32]

$p_1 + a < x$ …… (1)

[31] This conclusion is based on a discussion with Prof Prabhat Patnaik in Summer School of Sam Moyo African Institute of Agrarian Studies, Harare, January 2018.

[32] The assumption gets strength from the Kalecki's (1971) analysis that price of agricultural products (paddy) are demand determined and price of industrial output (rice) are cost-determined.

Now, according to the result of table 9 and 10, export price is less than the economic cost. Or,

$x < c + a$ ……. (2)

From (1) and (2)

$p_1 + a < c + a$

or, $p_1 < c$

or, $p_1 - c < 0$

In other words, if exporters are making positive return and the export price is less than the economic cost of production then this is only possible through causing loss to the farmers.

Similarly, in case of domestic trade, if the wholesale price is less than the economic cost then also it is possible if and only if farmers get a price, which is less than the cost of production. The only difference is that in the former case the country as a whole was making direct economic loss.

The rising export of non-Basmati rice despite the fact that wholesale price is more than the export price can be explained through a number of factors. The figure reported in the table is for the country as a single unit for a year. However, the wholesale and export price varies on a day-to-day basis. Similarly, the wholesale price in one part of the country is not necessarily equal to the price in other parts. The export price for one country may be different from another country. Therefore, the wholesale as well as export prices are diverse in terms of geographic locations and at different time periods. This diversity makes it difficult to treat the wholesale domestic market as a substitute for the export market for any business entity. For example, in 2016-17, Indian exporters exported non- Basmati rice to 137 countries out of which 99 percent was exported to 61 countries. The export prices for the same year were between Rs 18.75 per Kg to Rs 52.45 per Kg. The detail is in the table below.

Table 2.11: Annual Average Export Prices of Non-Basmati Rice for Different Countries, 2016-17

Price Range (Rs per Kg)	No of Countries	Quantity %	Revenue %
> 50	3	0.69	1.44
40 – 50	4	0.81	1.37
30 – 40	11	14.78	19.53
25 – 30	11	8.02	8.24
20 – 25	28	63.80	59.50
15 – 20	4	10.74	8.08
Total	**61**	**98.94**	**98.16**

Source: APEDA, Ministry of Commerce and Industry, Government of India

In case of the domestic wholesale market for the same period the price was between Rs 21. 92 per Kg in North Zone and the month wise difference between the highest and lowest price was between Rs 3.99 and Rs 8.60. This is the average at the zonal level, the price multiplicities increase further at the centre level. There are 101 centres in five zones of India.

Table 2.12: Wholesale Price in Different Zones, 2016-17

Zone	Apr 16	May 16	Jun 16	Jul 16	Aug 16	Sep 16
North Zone	23.25	22.19	22.58	21.92	22.80	22.89
West Zone	24.09	23.76	24.16	23.78	24.10	24.16
East Zone	23.50	22.94	24.15	23.50	23.27	23.90
North East Zone	20.40	23.06	23.93	24.00	25.30	24.50
South Zone	26.62	26.91	27.39	26.30	27.63	27.18
Zone	**Oct 16**	**Nov 16**	**Dec 16**	**Jan 17**	**Feb 17**	**Mar 17**
North Zone	25.89	23.38	22.24	23.69	23.75	23.74
West Zone	25.13	23.48	22.82	23.40	23.27	23.67
East Zone	23.68	24.16	24.36	23.60	23.87	24.32
North East Zone	25.45	25.52	24.00	24.90	25.12	25.33
South Zone	27.67	29.72	30.82	31.72	31.24	32.34

Source: Department of Consumer Affairs, Government of India

The second explanation for the difference between wholesale price and export price of non-Basmati rice lies at the policy level. In regulated and unregulated wholesale markets, there are some market specific charges and taxes. The wholesale price mentioned in the table includes all taxes etc. and the price of food grains includes market fees, development charges, purchase tax,

commission charge, infrastructure cost, and Government taxes. In some states, this works out to be 15.5 percent of the total price.[33] On the other hand, multiple tax relaxations are provided for the export of rice. Currently, the export of non-Basmati rice is not only free but the exporters also get incentives in terms of *Duty Drawbacks* that allows the export of rice to take back the custom and excise duty paid on the input used for the exported material. Since February 2016, the *Duty Drawback* on rice ranges between Rs 30 and Rs 70 per MT depending on the packing size, if the exporter does not avail Cenvat facility.[34] The range is between Rs 4.5 and Rs 10.5 if the Cenvat facility is not availed.[35]

The third possible explanation of lower export price can be from the perspective of accounting. It is possible that there are some mis-invoicing of the trade value by exporters. The literature suggest the existence of mis-invoicing in case of India's international trade.[36] However, there is no rice specific study to claim the same. Even if there is a possibility of mis-invoicing in rice export or the diversification in domestic and international markets, it does not contradict the finding of the study that the benefits of rice export does not reach farmers especially in a situation where the economic cost of producing rice is more than the export or wholesale price.

Conclusion:

In the last two decades, the Basmati export price has experienced huge variation, and since 2013-14, it is continuously declining. The demand for Basmati in the international market is also not constant, it faces policy level interferences (examples; Europe, Iran etc.). The variation in the demand and price of Basmati raises risk and uncertainty. However, it is worth noting that the share of Basmati in the total rice produced in India is close to 5 percent, the

[33] http://dmi.gov.in/Documents/stminprreform.pdf
[34]The Cenvat (Central Value Added Tax) facility allows the exporters to take input credit.
[35] Notification No. 22 / 2016 - CUSTOMS (N.T.) New Delhi, dated the 8th February, 2016, Government of India, Ministry of Finance (Department of Revenue). The principal notification No. 110/2015-Customs (N.T.) dated the 16th November, 2015 was published in the Gazette of India, *vide* G.S.R. 861 (E), Extraordinary, part II, Section 3, Subsection (i) dated the 16th November, 2015.
[36] See https://thewire.in/trade/india-profit-trade-misinvoicing-un-report and http://unctad.org/en/PublicationsLibrary/suc2016d2_en.pdf

Basmati export has a very small and indirect link with the very vast Indian farming community; and that link is concentrated primarily in only two states. Out of total Basmati produced in India, 97 percent is cultivated in Punjab, Haryana, and western Uttar Pradesh. The Basmati producing areas are relatively dominated by the larger land size groups and higher share of marketed surplus.

The cultivation of non-Basmati paddy is spread all over the country (except for a few states and that too because of agro-ecological reasons). The maximum number of the paddy farmers in India are selling paddy at a price, which is less than the cost of production. The forward linkages are weaker for the marginal and small landholder farmers. The small and marginal farmers relatively get lesser price for paddy than the large and middle size group farmers. In 2012-13, 83 percent of the total paddy cultivators in India received price less than the MSP; in this way as well, the small and marginal farmers are more deprived than the large size group farmers. The Government procurement agencies have minimal coverage, which is generally preferred by the farmers because of the guaranteed MSP. With reference to the export segment of PVN, it has been observed that even at the MSP, the share of surplus that farmers get is smaller out of the total market value of the rice and sometimes negative and those who get less than MSP are certainly making the deficit.

The export unit price of rice is less than its economic cost; the export unit prices of the non-Basmati rice in the recent years are not sufficient to cover the cost of production, milling charges, transportation charges, storing charges and other basic costs involve in the production processes of rice. This calculation does not include other costs involved (such as environmental costs, subsidy provided to farmers etc.) and profit. Hence, even in the narrowest economic sense, the export of non-Basmati rice does not make positive surplus for the country in the years under consideration.

In addition to the points mentioned above the fluctuating export prices are inevitable in the case of open trade, therefore, the falling price results in the larger gap between actual and potential realisation through export of rice. In a situation where farming community is already facing the deficit and not able

to cover the cost of production, the recent export prices are an additional concern. Since, an exporter of any country cannot alone change the world price, so to make export profitable, even with a lower margin, the squeeze is possible only in the backward linkages in general and from farmers in particular.

An Overview of Paddy Value Networks in Bihar

Introduction

Bihar is generally characterised as a backward economy in India. Currently, the economy of the state is primarily dependent on service sector. However, the agriculture's contribution continues to be critical for the economy of the state. Agriculture contributes almost 12 percent in the total Gross State Domestic Product (GSDP) of Bihar, which is very close to national average (RBI, 2018). The main economic contribution of Bihar's agriculture is regarding employment. Despite being very small in proportion of the total wealth of the state, agriculture provides employment to 70 percent of the workers in Bihar, which is twenty percent more than the national average.[1] The 'technocratic' explanations of backwardness of Bihar agriculture focuses on poor irrigation, low level of input (mainly fertilizers) use, land fragmentation, lack of credit and extension services (Jha, 1995). Referring to the poor irrigation base of the state as main reason of backwardness of Bihar agriculture, policy makers encouraged the ground water irrigation through increasing tube-well density during 1980's. It resulted in high yield of output during 1981-82 to 1991-92 (Kishore, 2004). However, it was also observed that the increase in yield was accompanied by increase in the use of fertilisers (Jha, 1995). The impressive expansion of the yield during the mentioned period could not sustain despite increased tubewell density (Kishore, 2004). Even if the major technocratic efforts are required for the growth of agricultural output, it may not result in the improvement of livelihood of the actors (example; agricultural workers) of agricultural value systems (Jha, 1995), that suggests the limitations of technocratic efforts to overcome agricultural backwardness of Bihar. There must be something that is required to be done in order to provide the permanent solution of the backwardness of agriculture. For the later period, based on the primary data, it was argued that between 1981-82 and 2009-10, the average yield of paddy and wheat increased by 99 percent (2.5 percent per year) and 91 percent (2.3 percent per year) respectively. But, because of the continuing dependence of the population of Bihar on agriculture, the growth did not

[1] Census of India, 2011.

translate in overall 'productivity' of the workforce (Sharma and Rodgers, 2015). The another study, using secondary data and literature contradicts the claim that agriculture sector in Bihar is growing. The study finds that the GSDP in agriculture (at constant price) in Bihar has not had two consecutive years of growth since 1993–94 (Shah, 2016). The argument is consistent with the finding that Bihar is among the states where yield of major food grains is lowest in India as discussed in the previous chapter.

The other explanations of backwardness of agriculture in Bihar includes poor public provisioning as argued by Amartya Sen and 'semi-feudal' hypothesis put forward by Amit Bhaduri. In Bihar, in the post 1960s, substantial land was sold by privileged castes (Bhahmins, Bhumihars, Rajputs and Kayasthas) to middle castes (Yadavs, Koeris and Kurmis). The reason behind the transfers were relatively disinterest of privileged caste in the agriculture because of non-agriculture source of income and their bulky expenditures. The land helped the middle caste to challenge the social and political supremacy of the privileged castes. Hence, the change led to the weakening of the 'semi-feudal relations of production' (Jha, 1995). Despite such transfer of the land, the land reform launched in 1962, is considered incomplete till date. In 2006, a Commission was formed under the chairmanship of D Bandyopadhyay. The commission noted that "*there is a structural bottleneck in Bihar agriculture due to very queer pattern of land ownership and very extortion ate system of tenancy-at-will which are causing great impediment to accelerated rate of agricultural growth*" (Bandyopadhyay, 2009). Currently, the land ownership is skewed towards middle and large land owning class. According to National Sample Survey, 2003, the 96.5 percent of the land owning class are small and marginal agricultural households and owns 66 percent of the total agricultural land. The same survey reveals that the remaining 3.5 percent of the land owning class are large and middle agricultural households and they own 33 percent of the total land (*ibid*). The commission made several recommendations, but, the subsequent Governments of Bihar avoided to implement the same because of short-term political agenda and electoral gains (Thakur, 2013).

In the light of the above factors, that shapes the paddy value networks (PVN) of Bihar, the chapter discusses the actors, activities and links of the PVN. The

discussion begins with the land, production of paddy, cost of cultivation/production, output linkages and various markets available for rice (in and outside Bihar). Finally, the chapter provides the distributional analysis with reference to final output along the various chains of the PVN.

Tillers and the Land

According to the census of India, 2011, 25 percent of the total workforce in Bihar are classified as cultivators and 45 percent as agricultural workers.

Table 3.1: Area of Land Holding by Size Group and Social Groups in Bihar, 2010-11

Size of holding(in ha.)	SC	ST	Other Castes	Institutional	Total
Marginal	443154 (12) [75]	55752 (2) [53]	3162656 (86) [56]	7166 (0) [27]	3668728 (100) [57]
Small	87817 (7) [15]	22757 (2) [22]	1070435 (90) [19]	4685 (0) [17]	1185695 (100) [19]
Semi-Medium	47994 (4) [8]	20579 (2) [19]	999013 (93) [18]	5383 (1) [20]	1072969 (100) [17]
Medium	12810 (3) [2]	5875 (1) [6]	391905 (94) [7]	4351 (1) [16]	414941 (100) [6]
Large	2081 (5) [0]	574 (1) [1]	37382 (83) [1]	5190 (11) [19]	45228 (100) [1]
All Classes	593856 (9) [100]	105537 (2) [100]	5661391 (89) [100]	26776 (0) [100]	6387561 (100) [100]

Source: Agricultural Census of India, 2010-11, Note: All figures are in hectare, figure in small brackets are horizontal proportion of total and figures in big brackets are vertical share in total.

The agricultural census of India, 2010-11, reports that Bihar has 6.38-million-hectare agricultural land, out of which 76 percent are marginal and small and 24 percent are semi-medium, medium and large land holdings. The other castes (includes OBC and privileged castes) have the 89 percent of the total area, SC

has 9 percent and ST has 2 percent. Across all social categories, most of the land is concentrated in marginal and small land size group. However, the concentration of land in marginal and small size group is highest for SC. 76 percent of the total land is concentrated in marginal and small categories, 23 percent in medium and semi-medium categories and 1 percent in the large category. In terms of number of holding, 96 percent are in the marginal and small categories and 4 percent in the semi-medium and medium categories. The high number of holdings result in 0.3 hectare per holding in marginal and small size groups and 3 hectares per holding in medium and semi-medium size groups (Annexure 3.1).

Table 3.2: Agricultural Households and Different Types of Land in Bihar, 2013

Particulars	ST	SC	OBC	Privileged Castes	Total
Agricultural Households (‘000)	84	955	4850	1207	7096
Total Land Possessed (‘000 Ha)	48	383	2838	964	4233
Total Land Leased Out (‘000 Ha)	3	2	49	21	75
Total Land Leased In (‘000 Ha)	20	122	496	119	757
Total Land Owned (‘000 Ha)	30	261	2348	852	3490
Land neither owned nor leased in (‘000 Ha)	2	1	41	16	60

Source: NSSO 70th Round, Situation Assessment Survey, Unit Level Data, Computed by Author

The National Sample Survey (NSS), 2013, reports that the total number of agricultural households during the period of survey was 7.1 million in Bihar. The total number of agricultural households includes 13.5 percent scheduled castes (SC), 1.2 percent scheduled tribes (ST), 68.3 percent other backward classes (OBC) and 17 percent privileged castes. The survey also reveals that out of the total 4.2-million-hectare land possessed by the agricultural households in Bihar, SC, ST, OBC and privileged castes have 9 percent, 1 percent, 67 percent and 23 percent respectively.

The total land possessed as reported by NSS in Bihar (4.2 million hectare) does not match with the total agricultural land (6.3 million hectare) reported by

Agricultural Census. The mismatch is because of total land reported in agricultural census includes irrigated as well as unirrigated land. Almost 48 percent of the total land reported by agricultural census receives irrigation in the period 2010-11. The problem with the NSS data is that there is a huge difference between total owned land and total possessed land. For the state as a whole, the leased in and the leased out land (with the assumption that all lands are in the state) must be equal, which makes total land possessed equal to the sum of total land owned and land from other sources. However, the sum of own land and the other land is far lesser than the total land possessed. The difference is possibly because of misreporting of own land and leased out land. But, still the finding in table 2 provides some insights about the social dimension of agricultural land ownership and its exchange.

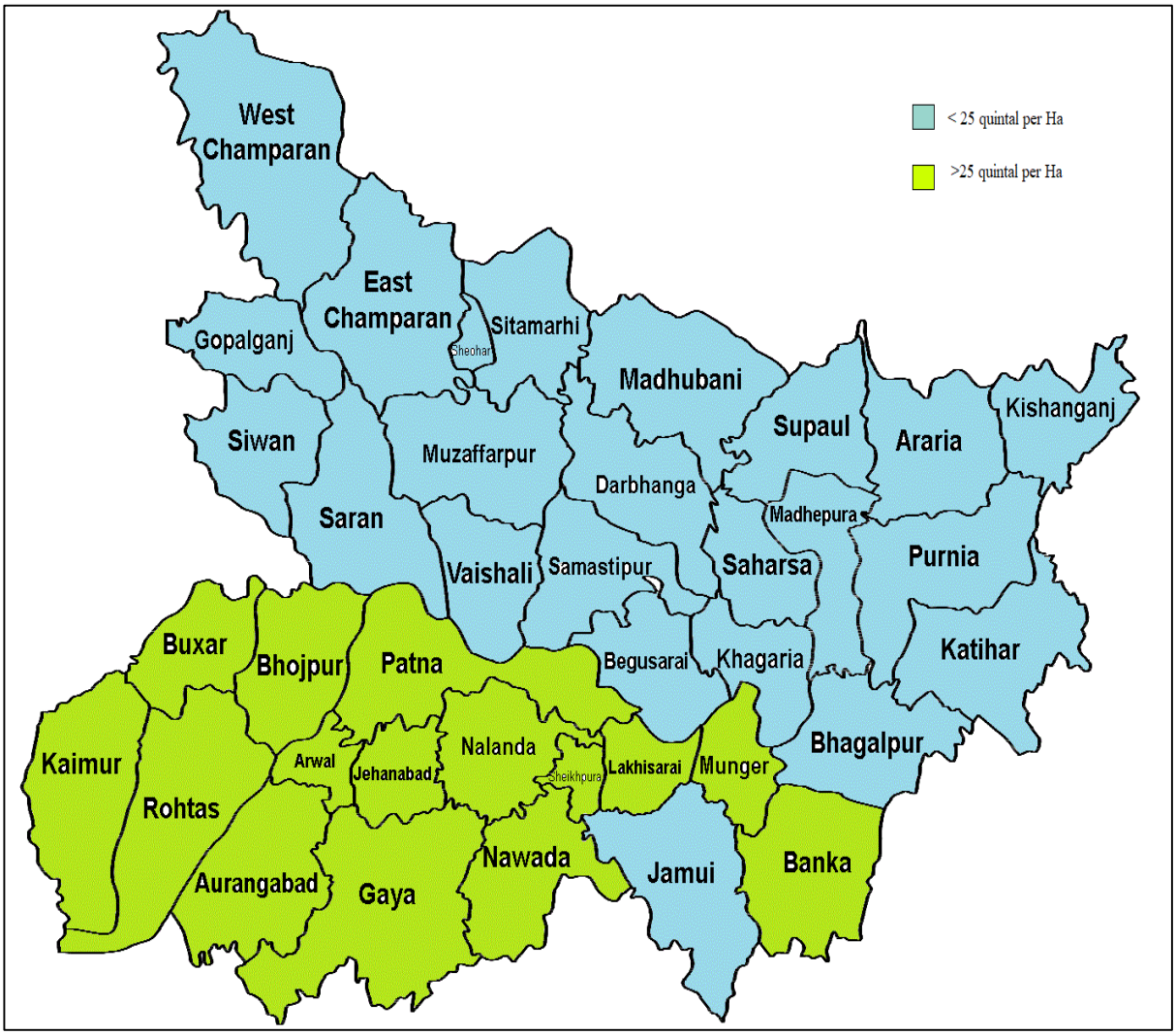
The agricultural households surveyed by NSS reported that 18 percent of the total land possessed are leased in. The land possessed by ST, SC, OBC and Privileged Castes include 40 percent, 32 percent, 18 percent and 12 percent leased in land. The number reflects that the social categories at the bottom of the social hierarchy needs to pay rent more than the castes on the top of the social hierarchy. Since, NSS does not ask the question that from which social categories land is leased in, so, it is not possible from the findings of the same survey to claim that rent is being transferred from social categories at the bottom to the social categories at the top of the social hierarchy. However, the share of leased out land in total owned land, which is 0.5 percent for SC, 2 percent for OBC and 3 percent for Privileged Cates, reflects that castes at the top of social hierarchy tends to lease out land more than the castes at the bottom. But, as mentioned earlier, the figure of leased out land seems highly underreported.

Production of Rice

The production of rice in Bihar commands an important position in state's agriculture. According to NSS, almost 85 percent of the total agricultural households reported the cultivation of paddy on their operational land. The land used for paddy cultivation, according to the same survey, is 95 percent of the

total operational land in the state. Agricultural census, 2010-11, reports that paddy is cultivated on 56 percent of the agricultural land in Bihar, which is the highest for any crop in the state.

Figure 3.1: Map of Bihar, Yield of Paddy



In the last five years (between 2012-13 and 2016-17) Bihar produced 34.4 million tonnes of rice, that is 6.5 percent of the total rice produced in India during this period.

The river Ganga divides Bihar into two parts, which are very different from each other in many ways, and the same have implications on the overall PVN originated in these regions. The southern part contributes to 52 percent of the paddy produced in the state in the last five years. Whereas, northern part of Bihar covers 62 percent of the total area under paddy cultivation in the state.

The mentioned calculation is accurately reflected in the yield of rice in these regions. The districts of Bihar coloured in green, in figure1, are those where yield of rice is more than 25 quintals per hectare and blue coloured districts have yield less than 25 quintals per hectare (Annexure 3.2).[2] Soil fertility in the southern Bihar ranges between medium and high. This is because of historically better irrigation system in the region. The Sone Canal System, built during British era, was the most important source of irrigation. *Ahar-Pynes* (artificial irrigation channels connected with the river) existed for a long time as traditional means of irrigation in the South Bihar (Jha, 2007). The *Ahar-Pynes* system has seen a decline in recent past due to negligence and lack of maintenance (Pant, 1998).

However, the frequent floods in Northern Bihar puts Southern part of the state in a relative better position. The Northern part of the Bihar has witnessed frequent flood during *Kharif* season. The flood then damages paddy the most. That is why, despite having very good soil and cultivation condition, the region lags behind in terms of yield. The damage caused due to the flood is more concentrated in Kosi region of the state (Sinha, 2008).

In the recent past, drought also has emerged as one of the major hindrances to agricultural productivity in the state. The southern part of Bihar is facing severe drought almost every year during *Kharif* season. The main reason behind the drought is "monsoon onset and uneven spatial distribution". A shifting pattern of pre and post-monsoon drought has been observed. Ten districts of Bihar that are mostly affected by drought are: Kaimur, Rohtas, Aurangabad, Buxar, Bhojpur, Gaya, Jahanabad, Patna, Siwan and Gopalganj (Ghosh and Mukhopadhyay, 2014).

[2] The figures reported here are based on data provided by Ministry of Agriculture, Government of Bihar. However, there are some discrepancies in the said data; the figures for the year 2012-13, 2013-14 and 2015-16 do not match with the data provided by Directorate of Economics and Statistics, Government of India. Since, the data of Government of Bihar discusses district level production, area and yield, so for the purpose of district level analysis, the former data is used.

Table 3.3: Production, Area and Yield of Rice in Bihar, 2012-13 to 2016-17

Year	Area ('000 Hectares)	Production ('000 Tonnes)	Yield (Kg./Hectare)
2012-13	3299	7529	2282
2013-14	3131	5506	1759
2014-15	3263	6357	1948
2015-16	3232	6802	2104
2016-17	3340	8239	2467

Source: Directorate of Economics and Statistics, Government of India

The frequent floods as well as droughts have become Bihar's main geographical characteristics in the recent past. Almost 72 percent area of the state are flood prone and 68 percent of the area is vulnerable to drought conditions (Kumar et. al., 2013). The floods and droughts have its severe impacts on the production of paddy in the state. In the last five years (2012-13 to 2016-17), farmers in Bihar produced 6887 thousand tonnes of rice annually on an average. The production of rice in the referred period experienced some variation. As given in table 3, the production falls in 2013-14 and then again rises. However, the area under paddy cultivation remains almost same every year.

The year 2013 was very odd agriculturally, that year Bihar experienced severe drought as well as floods. Government of Bihar has declared 33 out of total 38 districts drought affected, that includes all the districts in Southern Bihar. In the affected districts rainfall was recorded 20 percent less than the normal during monsoon.[3] The same year, 1680-thousand-hectare agricultural land was affected due to the flood and according to the estimates of the Government of Bihar, crop of value Rs 2228 million was damaged.[4] In the year 2014, apart from a few districts, the flood and drought was not severe. The normalcy continued till 2015. However, in 2015, farmers were demanding to declare

[3] https://www.livemint.com/Politics/xjGieAQhZs8P0kKq1nZfLM/After-flood-Bihar-declares-33-out-of-38-districts-drought-a.html

[4] Disaster Management Department, Government of Bihar http://www.disastermgmt.bih.nic.in/Statitics/from%20ix%20(Final%202013).pdf

some districts as drought affected however, the Government did not take the demand as seriously as in 2013.[5]

Flood in the northern Bihar has caused an overall decline in the yield of paddy. However, the production of paddy on the both sides of the river Ganga are affected by the drought in the recent past. South Bihar, contributes immensely in the total production of state because of its historically well-established irrigation system; has experienced the irrigation problem and as a result of this, the share of the region in the total paddy production of the state has declined. The natural disasters such as flood and the drought impact can be seen on the total cost of production and through the backward linkages; these calamities also squeeze the farmers' earning.

Cost of Cultivation and Production:

Table 3.4: Cost of Cultivation of Paddy in Bihar, 2011-12 to 2015-16

Operational Costs (Rs per Ha)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Human Labour	13020	14840	14354	15282	16052
Animal Labour	876	1114	683	242	81
Machine Labour	2435	2463	3123	3590	3801
Seed	1175	1282	1346	1784	1803
Fertilizer & Manure	1884	2535	2670	3093	3125
Insecticides	0	0	0	19	38
Irrigation Charges	140	684	2482	1703	3625
Miscellaneous	0	0	0	0	0
Interest on Working Capital	403	536	578	596	681
Fixed Costs (Rs per Ha)					
Rental Value of Owned Land	6245	5612	6620	10994	10485
Rent Paid For Leased-in-Land	0	0	0	0	0
Land Revenue, Taxes, Cesses	29	23	30	48	65
Depreciation & Farm Building	433	295	327	507	521
Interest on Fixed Capital	1194	1264	1144	2240	2410
Total Cost (Rs per Ha)	**27834**	**30647**	**33357**	**40097**	**42686**

Source: Directorate of Economics and Statistics, Government of India

On an average for the period mentioned in the table 4, the operational and fixed costs of cultivation constitutes 70 and 30 percent respectively, of the total cost

[5] https://www.livemint.com/Politics/1XPsxftUe5NZKZo5ycxifK/States-delay-notifying-drought-even-as-farm-distress-peaks.html

of cultivation of paddy in Bihar. In the period between 2011-12 and 2015-16, the average annual growth rate (AAGR) of total costs of cultivation was 11 percent.[6] The AAGR for operational costs and fixed costs were 10 percent and 18 percent, respectively.

Human labour cost is the largest portion of the operational costs as well as total costs; it constitutes, on an average, 43 percent in the total cost and 60 percent in the operational costs. However, the share of human labour in the operational cost has declined from 65 percent to 55 percent in the mentioned period. The human labour cost of cultivation recorded AAGR of 6 percent, that is almost half of the AAGR for total costs. Within the human labour cost, the share of family labour is 44 percent on an average. The share of attached labour is negligible and that of hired casual labour is 56 percent. In the mentioned period, the share of family labour cost in the total has declined from 51 percent to 42 percent and share of casual labour increased from 49 percent to 58 percent. The total human labour hours per hectare has seen a decline in the mentioned period. The AAGR of human labour hours per hectare is -6 percent. The decline is highest for family labour and lowest for the casual labour (table 5).

The share of animal labour cost in the total cost is just 2 percent; the same has recorded a decline from three percent to zero percent in the mentioned period. The machine labour cost is the second largest component of the operational costs with a contribution of 12 percent, on an average. The AAGR of machine labour cost is 12 percent, which is equal to the same of total costs. Within the machine labour cost, the share of the hired machine is 99 percent. The share of hired machine cost out of total machine cost in the mentioned period remains the same.

The combination of human labour, animal labour and machine labour presented in table 4 and 5, suggests that in the period mentioned, the share of cost of human labour in total cost decreased, the share of animal labour became negligible and the share of machine labour cost remained same. The share of

[6] The average of annual inflation for the mentioned period is around 7 percent.

human labour cost declined due to decline in the human labour hours in general and family labour hours in particular.

Table 3.5: Breakup of the Human Labour Cost and Machine Labour Cost, 2011-12 to 2015-16

Labour	Type	2011-12	2012-13	2013-14	2014-15	2015-16
Human Labour (Rs per Ha)	Family	6637	5765	6155	6643	6726
	Attached	34	35	30	32	41
	Casual	6349	9040	8169	8607	9285
	Total	13020	14840	14354	15282	16052
Machine Labour (Rs per Ha)	Hired	2408	2442	3087	3538	3777
	Owned	27	21	36	52	24
	Total	2435	2463	3123	3590	3801
Human Labour Hours per Ha	Family	392	310	310	275	265
	Attached	2	2	1	1	2
	Casual	403	496	424	357	358
	Total	797	808	736	633	625

Source: Directorate of Economics and Statistics, Government of India

The seed constitutes 4 percent and fertilizers and manures constitute almost 12 percent, on an average, in the total cost of cultivation in the mentioned period. The share of seed, fertilizers and manures remain same for the five years mentioned. The input, which depicts a massive jump is, irrigation. The AAGR for irrigation cost is 183 percent. In the mentioned period, the share of irrigation costs in total costs has increased from one percent to 12 percent in the five years. On an average, irrigation cost is 5 percent of the total costs of cultivation.

The fixed costs constitute 28 percent in the total cost of cultivation of paddy in Bihar. On an average, 80 percent of the fixed cost is rental value of the land. The Commission for Agricultural Costs and Prices (CACP) calculates rent on the basis of existing rate in the village.[7] The AAGR of rent is 17 percent for the period mentioned. In the mentioned five years, proportionally, rent and irrigation charges have increased, whereas, the human labour cost in total costs has declined. The rise in rent and fall in human labour cost is also reflected through the proportion of the same in the total value of the paddy.[8] The rent

[7]http://mospi.nic.in/sites/default/files/publication_reports/manual_cost_cultivation_surveys_23july08_0.pdf

[8] The Directorate of Economics and Statistics, Government of India, provides Value of the main product and by-product along with the cost of cultivation. The value of the product

paid on the leased in land is negligible, which suggest that on an average the proportion of leased in land in the total operational land under paddy cultivation is negligible. However, the said conclusion has various limitations; the first is the possibility of under reporting of the land data as discussed in the previous section and the second is wrong/inappropriate/incomplete land record. The land records in India, by all accounts, are not trustworthy. The various Expert Committee report for the Planning Commission and different ministries of Government of India[9], records relating to land are not in good shape. The records hardly reflect the reality regarding ownership of land (Jha, 2007). Even concerning narrowest calculation, as provided in table 2, the leased in land constitute 18 percent. The primary survey suggests that there is enough ground to believe, that the share of leased-in land is quite high in Bihar in comparison to what reflected in the secondary data.[10] The higher proportion of leased-in land supports the view that there is significant existence of 'rentier class' in the mode of production in Bihar agriculture.

The rent, which is 'ground rent', in words of Karl Marx, includes absolute ground rent and differential ground rent. The concept of the absolute ground rent was originally given by Adam Smith, which says that absolute ground rent is the result of private ownership of the land and that ownership is monopolised in a few hands. So, the absolute ground rent exist because there is monopolised private property in land and large numbers of land-poor have to derive their livelihood from land. The concept of differential rent originated from the Ricardo's writings, which says that rent is the result of the difference in the quality of the land. Ricardo termed rent as extra profit over the average profit, which is because capitalist producers in agriculture obtain through production at lower than average cost. The production at the lower than average cost is

according to the manual of the Directorate, is calculated using the existing price of the product in the village. So, the value of the product is not necessarily the revenue received by the farmers.

Value	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Main Product (Rs per Ha)	22881	23695	27212	35100	31359
By-Product (Rs per Ha)	3973	4023	4303	8382	6943
Total (Rs per Ha)	26854	27718	31514	43483	38302

[9] http://dolr.gov.in/sites/default/files/Committee%20Report.pdf
[10] The figures are discussed in the chapter on primary data.

possibly because of better fertility or investment of more capital to raise productivity (Patnaik U, 1999).

In the calculation of the cost of cultivation, the indicators of capital investment in the land are '*Depreciation on Implements & Farm Building'* and '*Interest on Fixed Capital*'. In case of Bihar, in the mentioned five years, the share of two indicators of capital investment increased from six percent to seven percent of the total cost. However, the increase in the rent is from 22 percent to 25 percent. The increase in rent in the referred period is largely not because of the increase in the capital investment in the land. The macro data for the state as a whole does suggest that increasing rent causes shifting of the surplus outside the agriculture in the state as the capital investment is not increasing in the same proportion. The same point convinces that the rent mentioned in the secondary data is 'ground rent', largely composed of absolute ground rent.

The absolute rent is, by its very nature, a barrier to productive investment in the land. Because of the monopoly of the landownership, the entrepreneur would be prepared to grow crops on land if she/he can produce a surplus over and above the average profit to pay as the Absolute rent (*ibid*). The tenant farmers in such a situation would prioritise the production for subsistence and capital investment in the land would hardly be a possibility. In the paddy value network of Bihar, the farmers as community losses a significant amount of surplus to the backward linkages through the channels of land.

Output Linkages:

According to NSS 70th round, 2013, 85 percent of the Bihar agricultural households reported cultivation of paddy. Out of the total paddy growers in Bihar, 84 percent are the marginal, 12 percent are small, four percent are semi-medium and less than one percent are medium and large agricultural households. Since, the share of large and medium agricultural household is negligible, it is very difficult to make any generalised statement for these categories.

In Bihar, out of the total marginal paddy cultivators, only 37 percent reported sale of paddy. The same share for small, semi-medium and medium are 47, 86 and 72 percent respectively; this is because of the rate of consumption out of

total production is higher for the smaller landholders than the larger size groups. The share of marginal paddy growers, who could access the public agencies, is quite negligible. Only, two percent of the small paddy growers could reach the public agencies for sale of paddy. For the semi-medium and medium paddy cultivators, the same share is nine percent and 20 percent, respectively. The finding suggests that the access to public procurement agencies are more for the larger size group than the smaller. For state as a whole, only one percent of the paddy growers could reach public agencies.

Table 3.6: Land Size Group Wise Number of Paddy Growers Who Sold Paddy to Different Agencies in Bihar, 2013

Land Size Group	Public	Local Private	Mandi	Input Dealer	Processors	Other
Marginal	11704 (0)	935081 (19)	110058 (2)	188379 (4)	1550 (0)	617389 (12)
Small	14770 (2)	171821 (25)	23708 (3)	42961 (6)	310 (0)	74650 (11)
Semi-Medium	19218 (9)	126257 (58)	8969 (4)	21185 (10)	0 (0)	11521 (5)
Medium	9281 (20)	17077 (37)	3494 (8)	3365 (7)	0 (0)	78 (0)
Large	0 (0)	1222 (45)	0 (0)	0 (0)	0 (0)	0 (0)
All	54973 (1)	1251457 (21)	146228 (2)	255890 (4)	1860 (0)	703638 (12)

Source: NSS 70th Round, computed by the author; Note: Figures are absolute numbers and figures in bracket are percentage of the total paddy growers in particular size group.

Government of Bihar repealed Agricultural Produce Market Committee Act in 2006; that is why the *Mandis* in the state are not regulated. Only 2 percent of the total paddy growers went directly to the *Mandi* to sell their produce. Out of the total paddy growers, in marginal, small, semi-medium and medium categories, two, three, four and eight percent respectively went directly to the *Mandi*. Bihar does not have any regulated market; there are 1794 non-regulated agricultural markets in the state, which includes 1469 rural primary and 325

wholesale markets.[11] The numbers discussed here implies, that Bihar has one rural primary agricultural market on every 67.5 km square and one wholesale agricultural market on every 305 km square, which is one of the lowest for Indian states. However, the lower density of agricultural markets seems one of the main reasons.

The local private traders command highest share in the total possibilities of disbursal of paddy in Bihar. Across all land classes, the share of paddy growers who sold paddy to local private trader is the highest. The 'other categories' of output sale are the second largest in terms of the share in total. However, the 'other categories' are open ended and may contain several possibilities. 12 percent of Marginal land owning paddy growers reported sale to 'the other categories', for the small and medium paddy growers, the shares are 11 percent and 5 percent respectively. Negligible number of paddy growers reported sale of paddy to processors. The number of paddy growers who reported sale of paddy to input dealers appears significant in the state. A total of 4 percent paddy growers reported sale of paddy to input dealers, the shares for marginal, small, semi-medium and medium categories are four, six, ten and seven percent respectively.

Table 7 describes the quantity of paddy sold to different agencies by the farmers who cultivated paddy and reported sale. Across all land size groups, the highest share of the total sale is for local traders. The report of sale to unidentified procurers are highest for marginal farmers and decreases with increasing land size groups. The share of total quantity of paddy sold in Mandi is highest for marginal farmers followed by small farmers. The portion of paddy sold to public procurement agencies increases with increase in the land size group. The share of paddy sold to input dealer is 10-11 percent for the marginal, small and semi-medium categories land class.

[11] Lok Sabha, Unstarred Question No. 3525, dated 11.08.2015

Table 3.7: Land Size Group Wise Quantity of Paddy sold to Different Agencies, 2013

Land Size Group	Local Private	*Mandi*	Input Dealer	Public Agencies	Processors	Other	Missing
Marginal	804 (51)	175 (11)	167 (11)	5 (0)	0 (0)	416 (27)	1 (0)
Small	355 (59)	40 (7)	62 (10)	34 (6)	0 (0)	107 (18)	1 (0)
Semi-medium	401 (66)	25 (4)	69 (11)	83 (14)	0 (0)	30 (5)	0 (0)
Medium	298 (60)	27 (5)	21 (4)	138 (28)	0 (0)	10 (2)	0 (0)
Large	35 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All	1893 (57)	267 (8)	320 (10)	261 (8)	1 (0)	563 (17)	2 (0)

Source: NSS 70th Round, computed by the author; Note: Figures are '000 Tonne and figures in bracket are percentage of the total paddy growers in particular size group.

The public procurement is the only formal arrangement of linkages between farmers and buyers in the state. The 'formal' arrangement is because of the guaranteed MSP. The access to public procurement agencies is higher for larger land size groups. The access to public procurement agencies in a setup of mostly informal output linkages, is a reflection of relative power position. The larger land size appears as a major factor, which enables the farmers to access a secured price. However, the overall coverage of public procurement agencies is miniscule. The lesser coverage of formal linkages also gets reflected in the prices received by the farmers for paddy. Only one percent of the paddy growers in Bihar could get more than the MSP and 96 percent got less than MSP. In the price band of less than MSP, the farmers of lesser land size group are more than larger land size group. Selling at price less than MSP reflects the inability of Bihar's farmers to retain surplus or profit from the paddy cultivation. The inability increases with the decreasing landholding of the farmers. 97 percent of the small and marginal farmers and 90 percent of the medium farmers received price less than MSP of that year. Only one percent

of the marginal and small farmers and 5 percent of the semi-medium farmers received price more than MSP.

Table 3.8: Percentage Distribution of the Different Size Group Paddy Farmers and Price Received, 2013

Price Range (Rs/Kg)	Marginal	Small	Semi-Med	Medium	Large	Total
Less and Equal	99	99	96	95	100	99
Less than 13.10	97	97	90	82	100	96
Equal to 13.10	2	2	6	12	0	3
More than 13.10	1	1	4	5	0	1

Source: NSS 70th Round, computed by the author; Note: Figures are in percentage

The proportion of the paddy farmers in Bihar who accessed public procurement agencies in different land size groups, is consistent with the share of farmers in respective land size groups, who could get price either equal to or more than the MSP. As discussed in the previous chapter, MSP is the minimum level of price and any price less than that results in deficit for the farmers. Hence, the fact that 96 percent of the paddy farmers in Bihar receives price less than MSP, indicates a shift of surplus through the output linkages under the framework of value networks. The capacity of the entire farming community in Bihar to retain surplus is weaker than the other processes in the paddy value networks. Firstly, the power position of the farmers to hold the surplus generated in the agriculture is weaker than the actors of other production processes in the PVN. Secondly, the smaller landholders are relatively weaker with reference to the power position in the network than the larger landholders.

Further Channels:

Rice is one of the main foods in Bihar; the marketed surplus ratio of rice in the state is 86 percent. As discussed in the previous section, all farmers in the state did not report the sale of paddy. The share of reported sale of paddy is smaller for smaller land size groups. So, for the section of the farmers and for the share of production, where paddy is consumed by the agricultural households themselves, the length of the value network is small. In Bihar, a significant portion of the total paddy produced, comes under a very small value system, in which the most of the production processes of the value networks are within the agricultural households. However, the largest portion of the total paddy

produced in the state, reaches markets. The markets can be clubbed in three groups; domestic, export to other states and export to other country. The Indian data system does not provide any information on the trade of goods by road transportation.[12] Thus, the cross state trade cannot be estimated using available secondary data. The state specific data of export to abroad is available only for rice and from the port, where the exporters report about the state of origin of the product. Hence, the secondary data is not adequate to evaluate the share of paddy traded in three segments mentioned above.

Post procurement of paddy, other than public procurement, wholesale market is linkage between processing units (rice mills) and procurement agencies. As per Agricultural Minister's reply in the Parliament (*Lok Sabha*) on, there are 1794 wholesale markets in Bihar by March 2017.[13] As per another reply by the same ministry in the Parliament, the number of wholesale market was same by March 2014; this included 1469 unregulated rural primary wholesale market and 325 other unregulated wholesale markets.[14] Bihar does not have any regulated market because the Government of Bihar repealed the Agricultural Produce Market Committee Act (APMC Act) in 2006. The Government of Bihar repealed the APMC act on the pretext that the act failed to achieve its objectives. It was viewed that the repealing of the act would provide efficiency in the market system and can create policy environment for private investments. However, there has been no noticeable capital expenditure by the state Government on development of infrastructure in the agricultural markets after 2006 (Intodia, 2012).[15] There is no source to know the year-wise increase in the wholesale markets in the states, except a few replies of the Agriculture Ministry in the Parliament and some Governments' report. At least from the limited number sources, it is clear that there is no increase in the number of agricultural produce market between 2012 and 2017. By March 2012, the total number of wholesale market in Bihar was 1794,[16] which is equal to the numbers in 2014 and 2017 as mentioned above.

[12] http://mospi.nic.in/63-inter-state-movementflows-goods
[13] Lok Sabha Unstarred Question No. 4097, dated on 20.03.2018.
[14] Lok Sabha Unstarred Question No. 3525, dated 11.08.2015.
[15] https://ccsniam.gov.in/images/pdfs/Final_report_of_Bihar_research_study.pdf
[16] http://dmi.gov.in/Documents/stminprreform.pdf

Followed by the trade of paddy either directly from the farmers (negligible) or from traders or from wholesalers, rice mills have crucial role in the value networks of paddy. In Bihar, as per the latest available data (December, 2014) there are 1948 rice mills in the state. 70 percent (1359) of the total rice mills in the state are in southern part and remaining 30 percent (589) in the northern part of the state (Annexure 3.3). The secondary data does not provide any information regarding value addition by the rice mills. The primary data is used in the later chapter to estimate the costs and prices at this stage of the value networks.

End Markets for Rice

The major end markets for rice in Bihar are domestic, export to other states, export to abroad and public procurement. The secondary data is available only for two segments; public procurement and export to abroad.

Table 3.9: Production, Export to Abroad and Public Procurement of Rice in Bihar. 2012-13 to 2016-17

Year	Production	Basmati Export (Abroad)	Non-Basmati Export (Abroad)	Total rice Export (Abroad)	Public Procurement
2012-13	7529	0.0	161	161	682
2013-14	5506	0.0	156	156	942
2014-15	6357	0.0	287	287	1614
2015-16	6802	0.2	162	162	1223
2016-17	8239	0.8	202	203	1234

Source: Production: Directorate of Economics and Statistics, Procurement: Department of Food and Public Distribution, Export: Agricultural and Processed Food Products Export Development Authority. Note: Unit is '000 tonnes.

In the last five years, Bihar produced 34,433 thousand tonnes of rice, out of which public agencies procured 17 percent. The annual procurement shares in total production, in the referred period vary between nine percent to 25 percent. The export of Basmati varieties is quite negligible because Bihar is not Basmati producing hub. The total export of rice in the last five years is close to three percent from the state. The rest 80 percent of rice produced in the state was

consumed or stored within the state or exported to other states in the referred period.

Table 3.10: Wholesale, Retail and Export Price of Rice, 2012-13 to 2016-17

Year	Wholesale Price (Rs/Kg)	Retail Price (Rs/Kg)	Basmati Export Price (Rs/Kg)	Non-Basmati Export Price (Rs/Kg)
2012-13	25.3	27.3	--	12.1
2013-14	25.8	28.1	45.3	16.2
2014-15	21.5	24.7	--	17.4
2015-16	21.9	24.3	47.8	19.5
2016-17	24.0	27.2	46.6	18.4

Source: Wholesale and Retail Price; Department of Consumer Affairs, and Export Price; Calculated using Agricultural and Processed Food Products Export Development Authority data

The Department of Consumer Affairs, Government of India provides wholesale and retail price for some markets in Bihar. The nominal wholesale and retail prices mentioned above are the average of prices in Purnia, Patna and Bhagalpur. As given in the table, the wholesale and retail prices declined between first three years of the mentioned period and then it rises. The Compound Annual Growth Rate (CAGR) of wholesale and retail price in the state are -1.1 and -0.1 percent respectively. The retail price is Rs2 to Rs3 higher than wholesale price, which seems obvious. However, the puzzle is lower unit export price of non-Basmati rice than wholesale and retail prices in the state. The inconsistency indicates that the export and domestic wholesale market are mutually exclusive. The price movements in these two segments also supports that these are disjoint sets. The export unit price is rising in the period mentioned above with a CAGR of 8.7 percent, that does not indicate any impact on the fluctuating wholesale price, at least in the referred period. Secondly, the share of export to abroad is minor out of total production of rice in the state, which makes it incomparable with the wholesale market in Bihar. It is also possible that the actors involved in the export segment of value network in Bihar control over processes from procurement to export, that enables them to

extract surplus and keep the unit price low. However, the secondary data is not available to support the hypothesis.

Table 3.11: Cost of Production, MSP and Economic Cost of Rice, in case of Public Procurement in Bihar

Year	2013-14	2014-15	2015-16	2016-17	2017-18
Cost of Production (Paddy)	12.8	11.6	14.0	NA	NA
Cost of Production (Rice)	19.1	17.3	20.9	NA	NA
MSP (Paddy Common)	13.1	13.6	14.1	14.7	15.5
MSP (Paddy Grade A)	13.5	14.0	14.5	15.1	15.9
MSP (Rice Common)	19.6	20.3	21.0	21.9	23.1
MSP (Rice Grade A)	20.1	20.9	21.6	22.5	23.7
Economic Cost (CRR)	24.8	25.8	26.7	27.9	28.6
Economic Cost (ARR)	25.4	26.4	27.4	28.6	29.3
Economic Cost (CPBR)	24.4	25.4	26.3	27.4	28.2
Economic Cost (APBR)	25.0	26.0	27.0	28.1	28.8

Source: Cost of Production (Paddy): Directorate of Economics and Statistics, Cost of Production (Rice): Computed, MSP (Paddy): Department of Food and Public Distribution, Government of India, MSP (Rice): Computed, Economic Costs: Department of Food and Public Distribution, Government of India, Note: Figures are in Rs/Kg, NA: Not Available

The only segment of PVN in Bihar, where secondary data is available from procurement to final sale, is public procurement. In Bihar, the State Food Cooperation (SFC), procures from the farmers through Primary Agriculture Credit Society (PACS). The Food Cooperation of India (FCI) procures almost 70 percent of the rice for central pool.[17] As discussed in the previous chapter, followed by procurement of paddy, the public procurement agency make several expenditures to arrive at Economic Cost (EC) of rice.

In the period between 2013-14 and 2017-18, EC of rice in the state for four different types were between Rs 24 per Kg and Rs 29 per Kg. In each category, the EC rises by almost Re one per Kg for every next year. The lowest cost is for common parboiled rice followed by common raw rice. It is worth noting

[17] http://fci.gov.in/procurements.php?view=86

that the minimum EC of rice, i.e. of common parboiled rice is more than the average wholesale price in the state except for 2013-14.[18]

Table 3.12: Margins under Different Heads

Year	2013-14	2014-15	2015-16	2016-17	2017-18
Farmers' Margin (if given MSP for Common Rice)	0.4	3.0	0.1	--	--
Farmers' Margin (if given MSP for Grade A Rice)	1.0	3.6	0.7	--	--
Middle Cost CRR (excluding profit)	5.2	5.5	5.7	6.0	5.5
Middle Cost ARR (excluding profit)	5.3	5.5	5.8	6.0	5.6
Middle Cost CPBR (excluding profit)	4.8	5.1	5.3	5.5	5.0
Middle Cost APBR (excluding profit)	4.9	5.1	5.3	5.6	5.1
Difference Between Wholesale Price and EC of CRR	1.0	-4.3	-4.8	-3.9	-3.7
Difference Between Wholesale Price and EC of ARR	0.4	-4.9	-5.5	-4.6	-4.3
Difference Between Wholesale Price and EC of CPBR	1.4	-3.9	-4.4	-3.4	-3.2
Difference Between Wholesale Price and EC of APBR	0.8	-4.5	-5.1	-4.1	-3.8

Source: Table 10 and 11.

If a farmer receives MSP, then the margin received by them in 2013-14 is 40 Paisa per Kg for common rice and Re 1 per Kg for grade-A rice, which are 2 percent and 4 percent of wholesale price respectively. In 2014-15, the same was Rs 3 (14 percent of wholesale price) and Rs 3.6 (17 percent of wholesale price) per Kg respectively. In 2015-16, the latest available data, the margins received by the farmers are 10 Paisa (0.5 percent of wholesale price) and 70 Paisa (3 percent of wholesale price) per Kg. Other than 2014-15, the margins received by farmers are less than three percent of EC in all possible scenario and less than 3.5 percent of total cost of production. In other words, from total labour and investment made in producing a particular amount of rice, in the

[18] Data of EC is not available for the period before 2013-14.

span of five months, farmers earn less than 3.5 percent return. Such is the condition, when farmers are getting MSP. However, as mentioned earlier in this chapter that 96 percent of the farmers in Bihar get price less than MSP; given the scenario, the margin received by the farmers would be miniscule or even negative. As discussed in the previous chapter, if the wholesale price is less than the economic cost then it is possible if only if farmers get a price which is less than the cost of production. If not, then wholesalers are making loss, which is less likely as shifting out of loss making business is not as impossible as post-harvest shifting out of agriculture.

An Overview of Paddy Value Networks in Punjab

Introduction

Punjab is generally characterised as an advanced economy among major Indian states in terms of per capita income, infrastructure etc. The contribution of agriculture in Punjab's economy is more than the average of the rest of the country. In Punjab, agriculture contributes 15 percent in the gross state domestic product (GSDP), which is almost three percent more than the national average (RBI, 2018). According to the Census of India, 2011, Punjab's agriculture provides employment to almost 35 percent of the working population of the state;15 percent less than the national average.[1] Punjab has a significant position in the total food grain production in India with a contribution of 11 percent, that is second largest after Uttar Pradesh. However,, Punjab holds first position regarding per hectare production of food grains in the country.[2]

Punjab's position in the food grain production, to a large extent, is due to state-led 'Green Revolution' (GR) in the early 1960s. The state was one of the main hubs of GR in India. The high yielding varieties (HYV) of seeds, increased use of fertilisers and secured as well as regular supply of water were the important factors for the GR. These requirements of the GR of the 1960s restricted it to a few affluent states including Punjab (NCERT, 2006). The GR led to an increase of food grain production in Punjab by 6.4 percent between 1961-62 and 1985-86; the increase was highest in India. By the year of 1985, farmers in Punjab were using 95 percent HYV out of total seeds, the state therefore became the highest user of fertilizers and the second highest user of pesticides per hectare in India (Singh and Kohli, 1998).

On the one hand, the GR was appreciated widely for increase in the food grain production, but on the other hand, concerns were raised ever since the commencement, of it. Immediately after the adoption of new technologies related to GR in Punjab, it was noticed that the income of landed farmers with the source of irrigation increased. The increase in income was noted to be

[1] Census of India, 2011
[2] http://www.mospi.gov.in/statistical-year-book-india/2016/177

proportional to the size of land ownership. The rent started rising and hence, GR could not benefit the tenants. The demand for casual labour as well as wage was rising, along with the increase in income gap between rural rich and rural poor (Ladejinsky, 1969).

The 'state led assured irrigation' was considered a driver of the equitable distribution of the benefit of the GR across all land size group of the farmers. However, the earlier finding could not be denied that the benefit of the new technology had been proportional to land holding size. The inequitable land distribution in Punjab was considered as the main reason behind inequitable gain distribution of the GR (Bhalla and Chadha, 1982). The criticism of the GR became stronger by the end of 1980s. The GR was seen the reason behind two major crises during 1980s. The first was ecological crisis and the second was cultural and ethnic crisis. The GR led to the destruction of genetic diversity of the seeds and allowed the entry of required pesticides in the agriculture. The high use of fertilisers had direct impact on the soil fertility and the intensive irrigation requirement led to water conflicts. The ecological changes became very much apparent in Punjab by the beginning of 1980s that also led to the changes in social and political situation in the state. The GR resulted in the shift from internal to externally purchased inputs. The scarcity of externally purchased inputs led to the conflict between classes and regions (Shiva, 1991).

The crisis in Punjab became apparent with the empirical evidences of stagnating yields, increasing cost of cultivation, fall in the input use efficiency, and decline in the number of operational holdings (Singh, 2000). According to existing literature, the nature of crisis in Punjab's agriculture becomes visible in two ways; increase in indebtedness and farmers' suicides and unsustainability of intensive irrigation. Though, there is a rise in the institutional credit in the state but the access to such credits, and terms and conditions remained questionable. The significant share of small and marginal cultivators suffers from inadequate access to short term and long term institutional credit. The indebtedness of the farmers in Punjab as a contextual factor is a reason behind the immediate causes (such as crop failure and high cost of the modern inputs) of the suicide (Singh, 2006). Close to 90 percent of the farmers in Punjab are indebted and the indebtedness of the smaller farmers

are more than the larger landholders. The institutional loan as proportional of the total loan is more for the big farmers owning tractor than the small farmers with tractor (Singh et. al. 2008).

Because of GR, farmers in Punjab adopted new technologies as well as intensive irrigation and State promoted the same. However, the regions of GR, including Punjab, became water scarce because of the introduction of rice as main crop (Singh, 2011). The maximum amount of water is utilised for paddy cultivation out of the total required demand of water (Gill, 2016). As per available estimates, in Punjab the water requirement for paddy is almost 180 cm, which is the highest in comparison to all other crops grown in the region. Given the overall cost-benefit calculus, farmers have tended to opt for paddy cultivation on a large scale, which has implied very high demands for underground water, leading to severe decline in water table (Dhawan, 1993). In 1973, 97 percent of area in Punjab could access water at an average depth of less than ten meters. In the 2004, it was reported that access to ground water in case of 90 percent of area was on an average above the depth of more than ten meters. Further, it is projected that the water table is likely to decline by 27-30 percent in the next five years (Bhullar and Sidhu, 2007). By all accounts, the state is already exploiting its water resources in a manner, and to the extent, that is not sustainable. Out of the 137 blocks in the state, five are critical, four semi-critical and 103 overused.[3] This has serious implications for the ecology of the region and prospects of sustainable agriculture.

The depleting groundwater is contributing to an increase in the economic cost of paddy cultivation because of higher capital investment required to extract ground water and the power subsidy to finance free electricity for agriculture is rising in the state. The small and marginal farmers are at huge disadvantage, compared to the other categories of farmers, as they generally fail to invest in technology upgradation and deepening of irrigation wells, and hence are excluded from using the state-financed free electricity (Sarkar, 2011). However, farmers continue to cultivate paddy in Punjab because of better margin than alternative crops, which is due to well-functioning public

[3] http://cgwb.gov.in/documents/papers/incidpapers/paper%2011-%20sushil%20gupta.pdf (Central Ground Water Board, Government of India), 2011

procurement and other markets. The diversification of crops with a focus on concerns of the farmers may be a possible way forward (Sidhu, 2002; Singh, 2004). The various nutrients in the soil have recorded a decline in the recent years (Singh and Bendi, 2016; Bhullar and Sidhu, 2007). Therefore, the declining health of soil is another ecological problem that Punjab is facing currently.

In light of the above factors, that constitute the background of the Paddy Value Networks (PVN) in Punjab, the chapter opens a discussion of the actors, activities and links of the PVN. The discussion begins with land, production of paddy, cost of cultivation/production, output linkages and various markets available for rice (in and outside Punjab). The chapter also provides the distributional analysis with reference to final output along the various chains of the PVN.

Land in Punjab Agriculture:

According to the census of India, 2011, 35 percent of the total working population of Punjab are dependent on agriculture that includes 21 percent cultivators and 14 percent agricultural workers.

Table 4.1: Area of Land Holding by Size Group and Social Groups in Punjab, 2010-11

Size of holding(in ha.)	SC	ST	Other Castes	Institutional	Total
Marginal	13363 (13) [11]	0 (0) [0]	87603 (87) [2]	40 (0) [0]	101006 (100) [3]
Small	19113 (7) [15]	0 (0) [0]	249845 (93) [7]	124 (0) [1]	269082 (100) [7]
Semi-Medium	35176 (4) [28]	0 (0) [0]	819548 (96) [21]	388 (0) [3]	855112 (100) [22]
Medium	45324 (3) [36]	0 (0) [0]	1665434 (97) [44]	2101 (0) [18]	1712859 (100) [43]
Large	13990 (1) [11]	0 (0) [0]	1005607 (98) [26]	8979 (1) [77]	1028575 (100) [26]
All Classes	126966 (3) [100]	0 (0) [0]	3828037 (97) [100]	11631 (0) [100]	3966634 (100) [100]

Source: Agricultural Census of India, 2010-11, Note: All figures are in hectare, figure in small brackets are horizontal proportion of total and figures in big brackets are vertical share in total.

According to agricultural census of India, 2010-11, Punjab has 3.96-million-hectare agricultural land, out of which 10 percent are marginal and small, 22 percent are semi-medium, 43 percent are medium and 26 percent large land holdings. The other castes (includes Other Backward Classes (OBC) and upper castes) have the 97 percent of the total area, and Schedule Castes (SC) has 3 percent. For SC, the concentration is more in the smaller size group and other castes are more concentrated in the larger land size groups. However, the concentration of land across all size groups is largest for other castes. In terms of number of holding, 35 percent are in the marginal and small categories and 59 percent in the semi-medium and medium categories. 7 percent of total number of plots covers 26 percent of area in the state under large land size group. The concentration of land is such that average holding of marginal size group is only 0.6 hectare, the average for small, semi-medium, medium and large groups are 1.4, 2.6, 5.7 and 15 hectares respectively (annexure 4.1).

Table 4.2: Agricultural Households and Different Types of Land in Punjab, 2013

Particulars	ST	SC	OBC	General	Total
Total Number of Agricultural HH	205	372072	142837	893233	1408347
Total Land Possessed (Ha)	829	104221	171405	1884378	2160833
Total Land Leased Out (Ha)	0	1161	6303	142535	149999
Total Land Leased In (Ha)	166	63961	48676	412212	525015
Total Land Owned (Ha)	664	40944	121439	1573528	1736574
Land neither owned nor leased in (Ha)	0	477	7593	41173	49243

Source: NSSO 70th Round, Situation Assessment Survey, Unit Level Data, Author's calculation

According to the National Sample Survey (NSS), the total number of agricultural households during the period of survey was 1.4 million. The proportion of the scheduled tribes (ST) in the state is negligible. The scheduled castes (SC), other backward classes (OBC) and upper castes in the total agricultural households are 26 percent, 10 percent, and 63 percent respectively. The survey also reveals that out of the total 2.2-million-hectare land possessed by the agricultural households of Punjab, SC have 5 percent share, ST have

less than 0.05 percent share, OBC have 8 percent share and upper castes have 87 percent.

The total land possessed as reported by NSS in Punjab (2.2 million hectare) does not match with the total agricultural land (4 million hectare) reported by Agricultural Census for the state. As discussed in the last chapter, the mismatch in the figures is because the total land reported in agricultural census includes irrigated as well as unirrigated land. The problem with the NSS data is due to the huge difference between total owned land and total possessed land. For the state as a whole, leased in land and leased out land (with the assumption that all lands are in the state) must be equal, which makes total land possessed equal to the sum of total land owned and land from other sources. However, the sum of own land and the other land is far lesser than the total land possessed. The difference is possibly because of misreporting of own land and leased out land.

The agricultural households surveyed by NSS reported that 24 percent of the total land possessed are leased in. The land possessed by SC, OBC and Upper Castes include 61 percent, 28 percent and 22 percent leased in land. The number reflects that the social categories at the bottom of the social hierarchy needs to pay rent more than the castes on the top of the social hierarchy. Using NSS data, it is not possible to recognise the social categories of the owner of the land regarding who has leased in the land, hence, from the findings of the same survey, it is difficult to claim that rent is being transferred from social categories at the bottom to the social categories at the top of the social hierarchy. The share of leased out land in total owned land, which is 3 percent for SC, 5 percent for OBC and 9 percent for Upper Cates, does reflect that castes at the top of social hierarchy tend to lease out land more than the castes at the bottom. However, as mentioned earlier, the figure of leased out land seems highly under-reported.

There is a much literature available that reports about reverse tenancy in Punjab, i.e. smaller landowners leasing out land to larger landholders (Singh, 2000; 2006; 2012a; Sarkar, 2011). The fact that the upper castes in the social hierarchy tend to lease out more does not contradict the findings of reverse tenancy because the proportion of ST, SC and OBC in total agricultural

households are very less and the upper castes are almost uniformly present across all land size groups. In fact, for the paddy growers, the share of leased in land in total land possessed with the agricultural households in marginal, small, semi-medium, medium and large size groups are 3, 16, 17, 32 and 35 percent respectively.[4] The proportion of leased in land in total land possessed across categories, as per NSS, is in consistence with the reverse tenancy hypothesis.

Production of Rice: The Punjab Scenario

The land used for paddy cultivation, according to NSS, is 97 percent of the total operational land in the state. Agricultural census, 2010-11, reports that total area under paddy cultivation (2.9 million hectare) in Punjab is 74 percent of the net sown are and 38 percent of the gross cropped area.

Table 4.3: Production, Area and Yield of Rice in Punjab, 2012-13 to 2016-17

Year	Area('000 Hectares)	Production ('000 Tonnes)	Yield (Kg./Hectare)
2012-13	2845	11374	3998
2013-14	2851	11267	3952
2014-15	2894	11107	3838
2015-16	2975	11823	3974
2016-17	2898	11586	3998

Source: Directorate of Economics and Statistics, Government of India

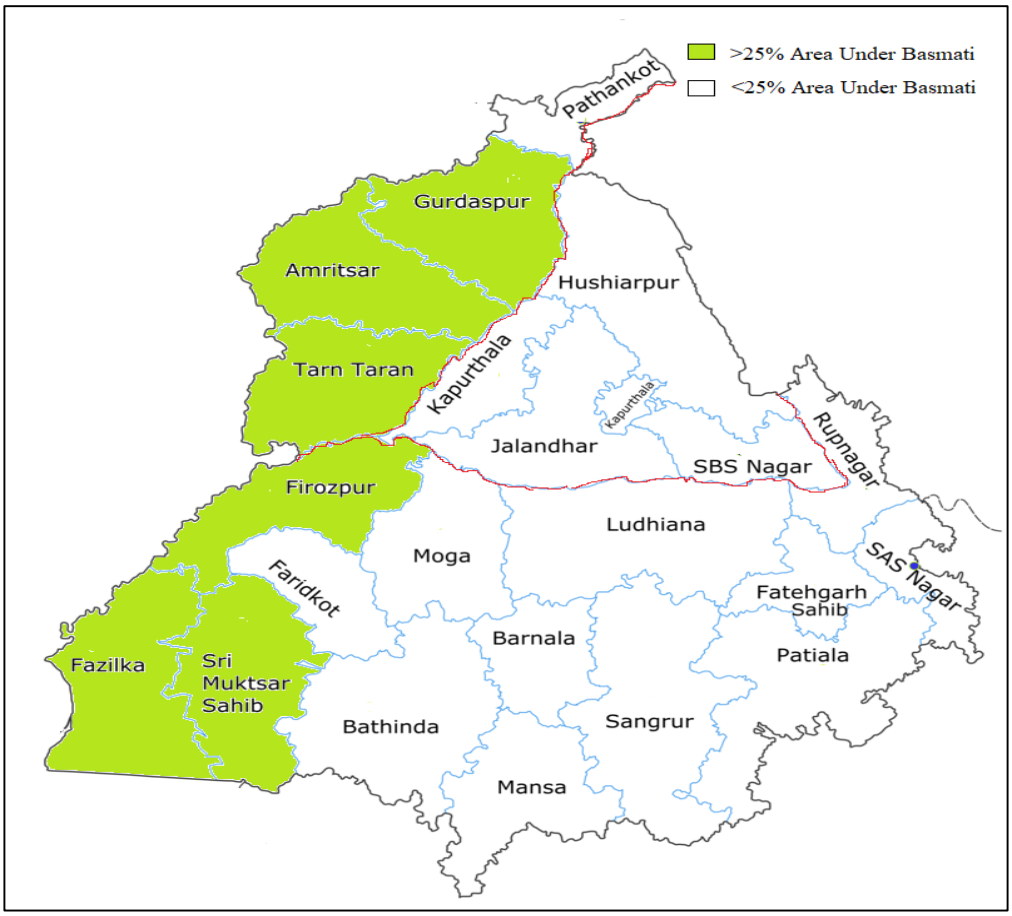
In the last five years, Punjab produced almost 57 million tonnes of rice, that is highest and close to 11 percent of the total production in India. On annual basis, there are minor changes in the total area under paddy cultivation in the state. However, the average annual growth rate (AAGR) of area under paddy cultivation is 0.5 percent. The AAGR of production is also 0.5 percent and that puts AAGR of yield close to zero percent.

Geographically, Punjab is divided into four regions (Majha, Malwa, Doaba and Poadh). The Malwa region of the state constitute 62 percent in the total area under paddy cultivation in the state and contributes 66 percent in the total rice production. Poadh region constitutes 5 percent in the area under paddy

[4] NSS 70th Round, Author's Calculation.

cultivation and contributes 6 percent in the total production of rice. Majha region covers 19 percent of the area under cultivation of paddy and provides 15 percent of the total rice produced in the state. The Doaba region covers 14 percent of the total area under paddy cultivation in the state and provides 13 percent of total paddy produced in the state.

Figure 4.1: Area under Basmati and non-Basmati in Punjab



The average yield of rice in Majha is lesser than other parts of the state, because the entire region of Majha is main producers of Basmati rice in the state and average yield of Basmati is less than non-Basmati. The western districts of Malwa are also significant contributors in the total Basmati rice produced in the state. In the six districts; Amritsar, Taran Taran, Gurdaspur, Firozpur, Fazilka, and Sri Muktsar Sahib, more than 25 percent of the total area under paddy cultivation produces Basmati varieties. A total of 20 percent of the total area under paddy cultivation in the state produces Basmati rice (APEDA, 2017a). Out of total production of rice, Basmati varieties constitute 17 to 19 percent (APEDA, 2017d).

The production of non-Basmati rice is more in the eastern part of Malwa region of the state. The region is also at the top in terms of yield of rice; all districts of Malwa had yield of more than 4000 Kg per hectare between 2012-13 and 2016-17. In the last five years, Sangrur, Patiala and Ludhiana remained top rice producing district in the state (annexure 4.2).

Table 4.4: Area under Cultivation, Production and Yield of Basmati Rice in Punjab, 2017

Districts	Area ('000 Ha)	Production ('000 Tonnes)	Yield (Kg per Ha)	Area Share (%)	Production Share (%)
Amritsar	103.6	420.1	4055	18.5	19.6
Tarantaran	75.6	284.3	3761	13.5	13.3
Fazilka	66.8	273.2	4090	11.9	12.8
Muktsar	50.7	190.2	3751	9.0	8.9
Firozepur	48.3	173.6	3594	8.6	8.1
Gurdaspur	42	152.5	3631	7.5	7.1
Sangrur	32	127.9	3997	5.7	6.0
Ludhiana	22.7	89.8	3956	4.0	4.2
Faridkot	20.5	83.6	4078	3.7	3.9
Patiala	19.8	81.5	4116	3.5	3.8
Moga	18.1	45.4	2508	3.2	2.1
Jalandhar	10.4	36.7	3529	1.9	1.7
Bhatinda	9.6	32.2	3354	1.7	1.5
Fatehgarh Sahib	9.5	39.3	4137	1.7	1.8
Kapurthala	7.7	27.2	3532	1.4	1.3
Hoshiarpur	6.6	24.8	3758	1.2	1.2
Nawanshahar	4.9	17.5	3571	0.9	0.8
Mohali	3.9	11.9	3051	0.7	0.6
Rupnagar	2.8	9.6	3429	0.5	0.4
Pathankot	2.7	7.6	2815	0.5	0.4
Barnala	2.3	9.5	4130	0.4	0.4
Mansa	0.9	3.2	3556	0.2	0.1
PUNJAB	561.2	2141.8	3816	100	100

Source: APEDA, 2017a and 2017c.

Amritsar and Tarantaran are the top producer of Basmati rice in Punjab. The Majha region contributes 40 percent in total production of Basmati rice produced in the state. In Amritsar, Basmati varieties constitutes 58 percent in the total area under paddy cultivation. Including all districts in Majha, the share of Basmati area is 35 percent. According to the survey by Agricultural & Processed Food Products Export Development Authority (APEDA), 2017, the

yield of Basmati rice in Punjab on an average was 38 quintals per hectare. The state produced 2142 thousand tonnes of Basmati rice, that is38 percent of total Basmati produced in the country.

I. Cost of Cultivation and Production:

The Directorate of Economics and Statistics provides data on cost of cultivation and production of various agricultural products in different states of India. The directorate only provides data of non-Basmati varieties of paddy. In the period between 2011-12 and 2015-16, on an average the operational and fixed costs of cultivation constitute 47 and 53 percent respectively, of the total cost of cultivation of paddy in Punjab. In the mentioned period, the average annual growth rate (AAGR) of total costs of cultivation was 9 percent.[5] The AAGR for operational costs and fixed costs were 7 percent and 10 percent respectively.

Table 4.5: Cost of Cultivation of Paddy in Punjab, 2011-12 to 2015-16

Operational Costs	2011-12	2012-13	2013-14	2014-15	2015-16
Human Labour	12117	13321	14221	14719	15529
Animal Labour	44	46	46	41	42
Machine Labour	4372	5098	5576	6371	6020
Seed	1328	1509	1563	1771	1838
Fertilizer & Manure	3335	4130	4240	3705	3648
Insecticides	2672	3159	3716	3928	4459
Irrigation Charges	2029	2638	2164	2623	2400
Miscellaneous	35	10	37	29	15
Interest on Working Capital	667	774	819	854	857
Fixed Costs					
Rental Value of Owned Land	19744	24826	25586	30201	29901
Rent Paid For Leased-in-Land	4334	6167	7042	5284	5993
Land Revenue, Taxes, Cesses	0	0	0	0	0
Depreciation on Implements & Farm Building	314	252	263	306	337
Interest on Fixed Capital	2821	2813	3110	3423	3584
Total Cost	**53814**	**64743**	**68383**	**73254**	**74622**

Source: Directorate of Economics and Statistics, Government of India

On an average for the period between 2011-12 and 2015-16, the cost of human labour is 44 percent of the operational cost. The AAGR of human labour cost

[5] The average of annual inflation for the mentioned period is around 7 percent.

in the mentioned period is 6 percent. The share of family labour, attached labour and casual labour in total human labour are 39 percent, 10 percent and 51 percent respectively on an average for the mentioned period. The AAGR of family labour hour, attached labour hour and casual labour hour per hectare was, - 1 percent, 6 percent and – 6 percent respectively; this indicates that share of casual labour declined with a rate more than the share of decline of family labour's whereas the share of attached labour in total increased. Though, the total human labour hour per hectare also experienced a decline, with an AAGR of -3 percent.

The share of animal labour in Punjab in total cost of cultivation is negligible and constantly declining. The share of machine labour cost is 8 percent of the total cost and 17 percent of the operational cost of cultivation. The AAGR of machine labour cost is 8 percent. Out of total machine labour cost, the share of hired machine labour cost is 62 percent and that of own machine labour is 38 percent on an average for the referred period. The AAGR of machine labour cost per hectare is 9 percent.

Table 4.6: Breakup of the Human Labour Cost and Machine Labour Cost, 2011-12 to 2015-16

Labour	Type	2011-12	2012-13	2013-14	2014-15	2015-16
Human Labour	Family	4589	5155	5346	5863	6519
	Attached	1013	1359	1322	1728	1754
	Casual	6515	6806	7553	7127	7256
	Total	12117	13321	14221	14719	15529
Machine Labour	Hired	2954	2933	3170	4081	3777
	Owned	1418	2166	2406	2290	2243
	Total	4372	5098	5576	6371	6020

Source: Directorate of Economics and Statistics, Government of India

The share of cost on seed, fertilisers, insecticides and irrigation was 17 percent of the total cost and 36 percent of the operational cost of cultivation. In the period between 2011-12 and 2015-16, the AAGR of cost of seed, fertilisers, insecticides and irrigation per hectare were 9, 3, 14 and 6 percent. The irrigation and fertilisers in Punjab receives substantial amount of state support.

In the mentioned period, the average share of fixed cost in total cost of cultivation of paddy in Punjab is 53 percent. Out of the fixed cost of cultivation, 90 percent is the rental value of land and rest 10 percent is depreciation on implements, farm building and interest on fixed capital. The AAGR of rent of land in the period between 2011-12 and 2015-16 is 11 percent and the same for depreciation and interest on fixed capital are 3 percent and 6 percent respectively.

As discussed, the share of rent in total cost of cultivation is very high, but the other costs are also higher than the national average. So, for the smaller land holders making investment in the cultivation of smaller plot is not viable and hence they prefer to lease out or sell their land in Punjab. However, in recent period, as discussed in the previous section, the share of marginal and small farmers is very less (10 percent), and land is more concentrated in larger size groups. So, the higher proportion of rent and existence of reverse tenancy should not be interpreted in a manner that a significant proportion of surplus generated in agriculture is going to small land owners. Moreover, the agricultural households (the rural households that own some plot of land) in Punjab are almost 50 percent[6], the rest of the rural households do not own land and hence the movement of surplus, if any, through rent is not going to larger population of the countryside.

On rent, David Ricardo wrote, "*rent is that portion of the produce of the earth, which is paid to the landlord for the use of the original and indestructible powers of the soil*" (Ricardo, 1817, Chapter 2). According to Ricardo, the rent is paid because of the productivity of the land and that is why the productivity (yield) of the land and rent must follow the same trend. However, for the period between 2011-12 and 2015-16, the AAGR of rent of land is 11 percent (or 4 percent after adjusting with average annual inflation of 7 percent) and the AAGR of yield is 1.4 percent (table 3). Undoubtedly, when the GR began in Punjab, the sudden rise in rent could be explained by the sudden rise in the yield (Ladejinsky, 1969). However, the Ricardian theory of rent or differential rent (term used by Marx) is not sufficient to explain its increase in the recent

[6] Situation Assessment Survey Report, NSSO 70th Round.

period. As discussed in the previous chapter, the rent is mixed of absolute ground rent and differential rent. The ownership of land in Punjab is highly skewed towards medium and large size groups (Singh, 2012b). Accordingly, the component of absolute ground rent is more in the total rent.

In the mentioned period, the AAGR of seed cost, machine labour cost, insecticides cost and rent in the total cost were more than the average annual inflation (GDP deflator). However, the AAGR of other items, including human labour cost, were less than the inflation. The pattern is indicating the concentration of agriculture's return with owner of machines, other inputs and land. The irrigation charges mentioned in table 5 is very less in comparison with other paddy producing states because the Government of Punjab provides 100 percent subsidy on electricity for agriculture. So, apart from centrally subsidised fertilisers, farmers in Punjab also benefit from the electricity subsidy and hence, the state becomes an important contributor in the value system of paddy towards its backward linkages. So, even if we consider "*original and indestructible powers of the soil*" as source of rent then also the contribution of state through irrigation subsidy cannot be ignored. In other words, the productivity (yield) of the land is largely because of the contribution of the state.

The above mentioned description is only for the non-Basmati Paddy cultivated in Punjab. For Basmati varieties, APEDA conducted survey in association with *Geotrans Technologies Private Limited* in the major Basmati producing states in India. The authority provided cost of cultivation of Basmati in major paddy producing states, in the 6th report, released on 18 December 2017. The methodology of cost calculation is not provided in the report. The average cost of cultivation of Basmati mentioned in the report is Rs 52000 per hectare. However, for the same year the cost of cultivation of non-basmati paddy in Punjab was almost Rs 74600 per hectare. There are enough reasons to believe that the cost of cultivation of Basmati varieties is more than the non-Basmati varieties. The same report also mentions that farmers prefer manual harvest for Basmati, whereas, the harvest of non-Basmati in most of the cases is done mechanically and hence, the cost of cultivation of the manually harvested variety must be higher because of the unit cost of human labour. The cost of

seed is another obvious factor, due to which the cost of Basmati cultivation must be more than the non-Basmati. Therefore, it seems that the mentioned figure of the cost of cultivation of Basmati by the APEDA report is either operational cost or underestimated. That is why the analysis of primary data becomes more important.

Table 4.7: Cost of Cultivation of Basmati in Punjab, 2017

Varieties of Basmati	*Pusa Basmati 1121*	*Pusa Basmati 1509*	*Pusa Basmati 1*	Weighted Average
Cost of Cultivation (Rs per Ha)	52500	45500	51500	51968

Source: APEDA, 2017f

The data mentioned in the table 7 indicates the cost of cultivation of the different varieties of Basmati in Punjab. Pusa Basmati 1121, was cultivated on almost 90 percent of the area under Basmati cultivation. Pusa Basmati 1509, is the second most popular variety among the farmers. The cultivation of a particular variety of Basmati in a particular year depends on price received in the previous year and yield (APEDA, 2017f).

II. Output Linkages:

According to NSS, 70th round, 669 thousand agricultural households reported cultivation of paddy that includes 22 percent marginal, 19 percent small, 25 percent semi-medium, 31 percent medium and 2 percent large agricultural households. Out of the total paddy cultivators, 26 percent of paddy growers sold paddy to Public agencies, 13 percent to local private traders, 56 percent to the *Mandi*, 2 percent to input dealers and 5 percent to others.[7]

[7] The sum of all may not be equal to 100 percent as a farmer can sale paddy to more than one agency.

Table 4.8: Land Size Group Wise Number of Paddy Growers Who Sold Paddy to Different Agencies in Punjab, 2013

Land Size Group	Public	Local Private	*Mandi*	Input Dealer	Processors	Other
Marginal	18624 (13)	40655 (28)	59114 (40)	12172 (8)	0 (0)	11738 (8)
Small	18301 (14)	16454 (13)	94420 (72)	0 (0)	1469 (1)	7102 (5)
Semi-Medium	48517 (28)	21917 (13)	101482 (60)	2506 (1)	1233 (1)	11751 (7)
Medium	82890 (40)	9887 (5)	113058 (54)	875 (0)	0 (0)	4821 (2)
Large	5267 (40)	1039 (8)	8443 (63)	276 (2)	0 (0)	225 (2)
All	173598 (26)	89952 (13)	376518 (56)	15829 (2)	2702 (0)	35637 (5)

Source: NSS 70th Round, computed by the author; Note: Figures are absolute numbers and figures in bracket are percentage of the total paddy growers in particular size group.

Across all categories, the share of agricultural households, who reported sale of paddy, is highest to *Mandi*. The share of paddy growers, who reported sale of paddy to public agency, increases with increasing land size groups. A contrasting trend is observed in case of sale of paddy to the local traders.

Almost a similar trend is observed in terms of quantity of paddy sold to different agencies. Out of the total paddy sold to all agencies, marginal farmers contributed 4 percent, small farmers 11 percent, semi-medium farmers 24 percent, medium farmers 49 percent and large farmers 11 percent. The highest proportion of paddy was sold to *Mandi* (57 percent), followed by public agencies (34 percent). Local private traders procured 8 percent of paddy sold by farmers and input dealers, one percent. Out of the total paddy sold by marginal farmers, the highest share is for *Mandi* (36 percent), followed by local private traders (35 percent). The share of input dealers and public agencies in the total paddy sold by marginal farmers were 13 and 14 percent respectively. For small farmers, paddy sold in *Mandi* has highest proportion (77 percent) in

the total paddy sold by farmers in the particular category. Share of local private traders and public agencies are 12 percent and 11 percent respectively. For the semi-medium, medium and large size groups, the public agencies are the second highest procurer of paddy unlike previous two categories, where local private traders are ranked second. Semi-medium agricultural households sold 60 percent paddy in *Mandi*, 31 percent to public agencies and seven percent to local traders. For medium agricultural households, the share of *Mandi* in total is 54 percent, public agencies have 39 percent and local private agencies have 6 percent share. For the large farmers, the share of *Mandi* is 52 percent, the share of public agencies are 44 percent and share of local private traders are 3 percent only.

Table 4.9: Land Size Group Wise Quantity of Paddy sold to Different Agencies, 2013

Land Size Group	Local Private	*Mandi*	Input Dealer	Public Agencies	Processors	Other	Missing
Marginal	114 (35)	118 (36)	44 (13)	45 (14)	0 (0)	4 (1)	0 (0)
Small	109 (12)	717 (77)	0 (0)	100 (11)	9 (1)	2 (0)	0 (0)
Semi-medium	138 (7)	1207 (60)	25 (1)	618 (31)	2 (0)	5 (0)	0 (0)
Medium	233 (6)	2171 (54)	21 (1)	1590 (39)	0 (0)	28 (1)	0 (0)
Large	31 (3)	488 (52)	13 (1)	413 (44)	0 (0)	0 (0)	0 (0)
All	625 (8)	4701 (57)	103 (1)	2767 (34)	10 (0)	39 (0)	0 (0)

Source: NSS 70th Round, computed by the author; Note: Figures are '000 Tonne and figures in bracket are percentage of the total paddy growers in particular size group.

It should be noted here that the sum of quantity of paddy sold (8245 thousand tonnes) by all agricultural households does not match with the figure mentioned for the same year in table 3 (11374 thousand tonnes). The mismatch

could be because of the consumption of paddy by the agricultural households. However, the marketed surplus ratio of paddy in Punjab is close to 99 percent, and hence the large gap between the above mentioned two figures cannot be explained by household consumption. The NSS does the sample survey, and that is why, there is difference between two tables.

In Punjab, agricultural markets are regulated by the Agricultural Produce Market Committee (APMC) Act. The public procurement agencies (state as well as central) procure paddy through the commission agents in the regulated markets, therefore, the figure of public procurement also does not match (figure of procurement provided by the public agencies, is discussed in the next section). Hence, the clear demarcation between *Mandi* and public procurement agencies, becomes difficult using secondary data. It is possible that the procurer of paddy in the *Mandi* is either private or public agency. But, in both the situations, the reported sale of paddy to public agency and in the *Mandi* can be regarded as formal sale. Therefore, two clear trends emerged from the table 8 and 9; (1) the sale of paddy to local private traders (informal) increases with the decreasing land size groups and (2) the sale of paddy through the formal setups increases with the increasing land size groups.

Table 4.10: Percentage Distribution of the Different Size Group Paddy Farmers and Price Received, 2013

Price Range (Rs/Kg)	Marginal	Small	Semi-Med	Medium	Large	Total
Less than 13.10	26	28	17	32	11	26
Equal to 13.10	38	53	61	59	47	54
More than 13.10	35	19	22	9	42	20

Source: NSS 70th Round, computed by the author; Note: Figures are in percentage

The table 10 provides the percentage distribution of the agricultural households in Punjab, who could access a price equal to/less than/more than the MSP, at least once. However, the table does not provide the clear trend but, the farmers accessibility for price equal to MSP increases with the land size group of the farmer. A total of 54 percent farmers in Punjab could get price of paddy equal to MSP. 20 percent of the farmers in Punjab could get price more than MSP

and 26 percent farmers got price less than MSP. A total of 74 percent farmers accessed price either equal to or more than MSP.

III. Further Channels:

In Punjab, paddy is produced mainly for the purpose of sale and hence, the marketed share out of total production of paddy in Punjab is close to 99 percent. The agricultural markets play an important role in the case of Punjab. According to *Committee of State-Ministers, In-charge of Agricultural Marketing to Promote Reforms, 2012*, there were 2196 agriculture markets in in Punjab by March 2012. The figure includes, 425 regulated markets, 1346 rural primary markets and 425 wholesale markets.[8] By March 2015, the number of agricultural markets increased to 2223.[9] The large number of markets, places Punjab at the top in the list of state-wise market density. The market arrangements in the state is used for the public procurement of non-Basmati Paddy. Since, the contract farming of Basmati rice in Punjab was very short lived,[10] the market becomes the main place for the exchange of Basmati rice as well, whether for export or for domestic sale.

From the agricultural markets in Punjab, agents of rice companies/mills procure paddy. The secondary data is not available to identify the actors between rice mills and the sale of paddy in the markets. There is no secondary information available on production processes and value addition by the rice mills. The recent available data projects that, there are 3199 rice mills in the state; highest in Sangrur district followed by Patiala (annexure 4.3). The secondary data does not provide any information regarding value addition by the rice mills. The primary data is used in the chapter to estimate the costs and prices at this stage of the value networks.

[8] http://dmi.gov.in/Documents/stminprreform.pdf
[9] Lok Sabha Unstarred Question No. 3525, dated 11.08.2015.
[10] There no secondary data of Contract Farming of Basmati in Punjab after 2011, Punjab Statistical Abstract, 2017

End Markets for Rice

The public procurement, export to other states, export to abroad and domestic sale are major end markets for rice in Punjab. The secondary data is available only for two segments; public procurement and export to abroad.

Table 4.11: Production, Export to Abroad and Public Procurement of Rice in Punjab ('000 Tonnes) 2012-13 to 2016-17

Year	Production of Rice	Production of Basmati Rice	Basmati export	Non-Basmati export	Total rice export	Public Procurement
2012-13	11374	2293	1104	302	1407	8558
2013-14	11267	3499	1153	346	1499	8106
2014-15	11107	3541	1012	297	1310	7786
2015-16	11823	2337	1025	124	1148	9350
2016-17	11586	2142	1162	122	1284	11052

Source: Production: Directorate of Economics and Statistics, Procurement: Department of Food and Public Distribution, Export: Agricultural and Processed Food Products Export Development Authority. Note: Unit is '000 tonnes.

In the period between, 2012-13 and 2016-17, Punjab produced 57 million tonnes of rice. Out of the total production, the 78 percent was procured by the public procurement agencies. The share of public procurement out of total production in the mentioned five years varies between 70 percent and 95 percent. The export of rice is 12 percent of total production in the five years, including 10 percent Basmati and 2 percent non-Basmati rice. The share of Basmati export in total production of Basmati in Punjab is close to 40 percent. Out of total rice production in Punjab, consumption or stock within state or export to other states is 10 percent, according to the figures mentioned in the table 11.

Table 4.12: Wholesale, Retail and Export Price of Rice (Rs/Kg), 2012-13 to 2016-17

Year	Wholesale	Retail Price	Basmati	Non-Basmati
2012-13	25.7	29.7	56.3	27.6
2013-14	25.6	29.7	80.5	32.8
2014-15	24.0	27.4	75.5	30.2
2015-16	24.7	27.9	56.7	31.5
2016-17	24.7	30.2	53.8	31.8

Source: Wholesale and Retail Price; Department of Consumer Affairs, and Export Price; Calculated using Agricultural and Processed Food Products Export Development Authority data sentence gap use standard throughout

The Department of Consumer Affairs, Government of India provides wholesale and retail price for some markets in Punjab. The nominal wholesale and retail prices mentioned above are the average of prices in Amritsar, Ludhiana and Bathinda. As mentioned in the table, the wholesale and retail prices declined between first three years of the mentioned period followed by a rise. The Compound Annual Growth Rate (CAGR) of wholesale and retail price in the state are -0.8 and -0.3 percent, respectively. The retail price is Rs 3 to Rs 5 higher than wholesale price, which seems obvious. Since, the secondary data is not available for the wholesale and retail price of Basmati rice, it is difficult to compare the same with export prices. For the non-Basmati varieties, the average wholesale price is less than the export unit price for all the years under consideration that suggests that the export market is more profitable than the local markets in the state. The retail price is also less than the export price of non-Basmati rice. Except for non-Basmati rice, which grew by 2.8 percent per annum (CAGR) in the mentioned period, the other prices recorded a negative growth rate.

Table 4.13: Cost of Production, MSP and Economic Cost of Rice, in case of Public Procurement in Punjab

Year	2013-14	2014-15	2015-16	2016-17	2017-18
Cost of Production (Paddy)	11.5	12	11.7	NA	NA
Cost of Production (Rice)	17.2	17.9	17.5	NA	NA
MSP (Paddy Common)	13.1	13.6	14.1	14.7	15.5
MSP (Paddy Grade A)	13.5	14.0	14.5	15.1	15.9
MSP (Rice Common)	19.6	20.3	21.0	21.9	23.1
MSP (Rice Grade A)	20.1	20.9	21.6	22.5	23.7
Economic Cost (CRR)	24.0	24.8	25.9	27.4	28.0
Economic Cost (ARR)	24.6	25.5	26.6	28.1	28.7
Economic Cost (CPBR)	23.6	24.4	25.5	26.9	27.5
Economic Cost (APBR)	24.2	25.1	26.2	27.6	28.2

Source: Cost of Production (Paddy): Directorate of Economics and Statistics, Cost of Production (Rice): Computed, MSP (Paddy): Department of Food and Public Distribution, Government of India, MSP (Rice): Computed, Economic Costs: Department of Food and Public Distribution, Government of India, Note: Figures are in Rs/Kg, NA: Not Available

As discussed in the previous chapter, followed by procurement of paddy, the public procurement agency makes several expenditures to arrive at Economic Cost (EC) of rice. In the period between 2013-14 and 2017-18, EC of rice in

the state for four different types were between Rs 24 per Kg and Rs 29 per Kg. In each category, the EC rises by almost Re one per Kg for every next year. The lowest cost is for common parboiled rice followed by common raw rice. It is worth noting that the minimum EC or rice, i.e. of common parboiled rice is more than the average wholesale price in the state except for 2013-14.

If farmers of paddy receive MSP, which is the case for 74 percent of the paddy cultivators in the state, then the farmers earn between Rs 2.4 and Rs 4.2. For the grade A paddy, farmers earing on per Kg of rice is 50 paisa more than the common varieties. According to the Department of Food and Public Distribution, Government of India, the economic cost (excluding the MSP payment), is between Rs 4 and Rs 5.5.

Table 4.14: Margins under Different Heads

Year	2013-14	2014-15	2015-16	2016-17	2017-18
Farmers' Share (if given MSP for Common Rice)	2.4	2.4	3.6	NA	NA
Farmers' Share (if given MSP for Grade A Rice)	2.9	3.0	4.2	NA	NA
Middle Cost CRR (excluding profit)	4.4	4.5	4.9	5.4	4.9
Middle Cost ARR (excluding profit)	4.5	4.6	5.0	5.5	4.9
Middle Cost CPBR (excluding profit)	4.0	4.1	4.5	5.0	4.4
Middle Cost APBR (excluding profit)	4.1	4.2	4.5	5.1	4.4
Difference Between Wholesale Price and EC of CRR	1.6	-0.8	-1.2	-2.7	-2.3
Difference Between Wholesale Price and EC of ARR	1.0	-1.5	-1.9	-3.4	-3.0
Difference Between Wholesale Price and EC of CPBR	2.0	-0.4	-0.8	-2.2	-1.8
Difference Between Wholesale Price and EC of APBR	1.4	-1.1	-1.5	-2.9	-2.5

Source: Table 4.12 and 4.13

At the MSP level, farmers' share in the wholesale price rice in 2013-14 is 9 percent and 11 percent for common and grade A rice, respectively. The next year, the same shares are 10 and 12 percent respectively, and in 2015-16, the share increases to 14 and 17 percent respectively. The export of non-Basmati rice produced in Punjab has very small share in total production (2 percent).

So, the export price does not have much impact on the local market decisions. As far local markets for non-Basmati rice are concerned, the public procurement is the major segment and hence, the comparison of different end markets for non-Basmati rice, from the profit perspective of procurer does not arise. In the last five years, the public procurement agencies procured nearly entire amount of the non-Basmati rice produced in the state. So, the negative difference between wholesale price and the economic cost, reflects that the expenditure made by the public procurement agencies on all process involved, is more than the market price. If the processes between procurement and wholesale is done by the any private party, then for these to be a profitable business, procurement price must be less than the MSP.

At the MSP level, the farmers' share is 14 percent of total cost of production of common rice and 17 percent of grade A rice, in 2013-14. The shares in the next year are 13 percent and 17 percent respectively. In 2015-16, it increased to 20 percent and 24 percent respectively, that is maximum for the period under consideration. The shares reflect that the farmers get a return on the investment in paddy cultivation between 15 percent and 22 percent in five months.

Findings from the Field – I (Bihar)

Introduction

The region in Bihar, considerably the south of Ganga River and northern part are very different regarding paddy value networks. Irrigation channels, soil fertility and the yield of paddy are better in southern part than the northern part of the state. For the primary survey, two villages have been selected from Bihar; one from southern part, namely *Kharbhaiya* and *Kuraitha* were selected from northern part of the state. Floods are frequent in the northern part and that affects the paddy value system in the region.

In north Bihar, *Kuraitha* village of Katihar district was badly affected by flood in 2017. It was the time when all operations of paddy cultivation were almost over except harvesting, hence there was damage caused to the crop. After the floodwater passed away, the harvesting could be done only on a small area, in the southern part of the village. Katihar district was badly affected with flood for three consecutive years between 2015 and 2017. In the period between 2010 and 2017, except for two years, the district witnessed flood every year.[1] Since, flood has become regular factor for the state paddy cultivation; hence, the district was selected to understand flood's impact on paddy value networks. In south Bihar, *Kharbhaiya* village of Patna district was selected for the field study. The yield of paddy in Patna district is close to average yield of the southern Bihar. The number of rice mill in Patna district also makes it a representative of the rice mill density of south Bihar.

Kuraitha Village, Katihar District, Bihar

Kuraitha village is a part of Mansahi block of Katihar district. According to the census of India, 2011, there are 909 households with a population of 4265 in the village. The total population of the village includes 16 percent Schedule Caste (SC) and 7 percent Schedule Tribes (ST). In the village, 1752 person were reported as workers, that includes 387 cultivators and 1126 agricultural workers, i.e. 86 percent population are directly dependent on agriculture (DCOB, 2011b). The total area of the village is 410 hectares that includes 28-

[1] https://www.hindustantimes.com/interactives/bihar-floods-2017/

hectare barren and uncultivable land, 10-hectare permanent pastures, and 65-hectare fallow lands. The net sown area in the village is 307 hectares (DCOB, 2011a).

Figure 5.1: *Kuraitha* Village in the Map of Katihar District

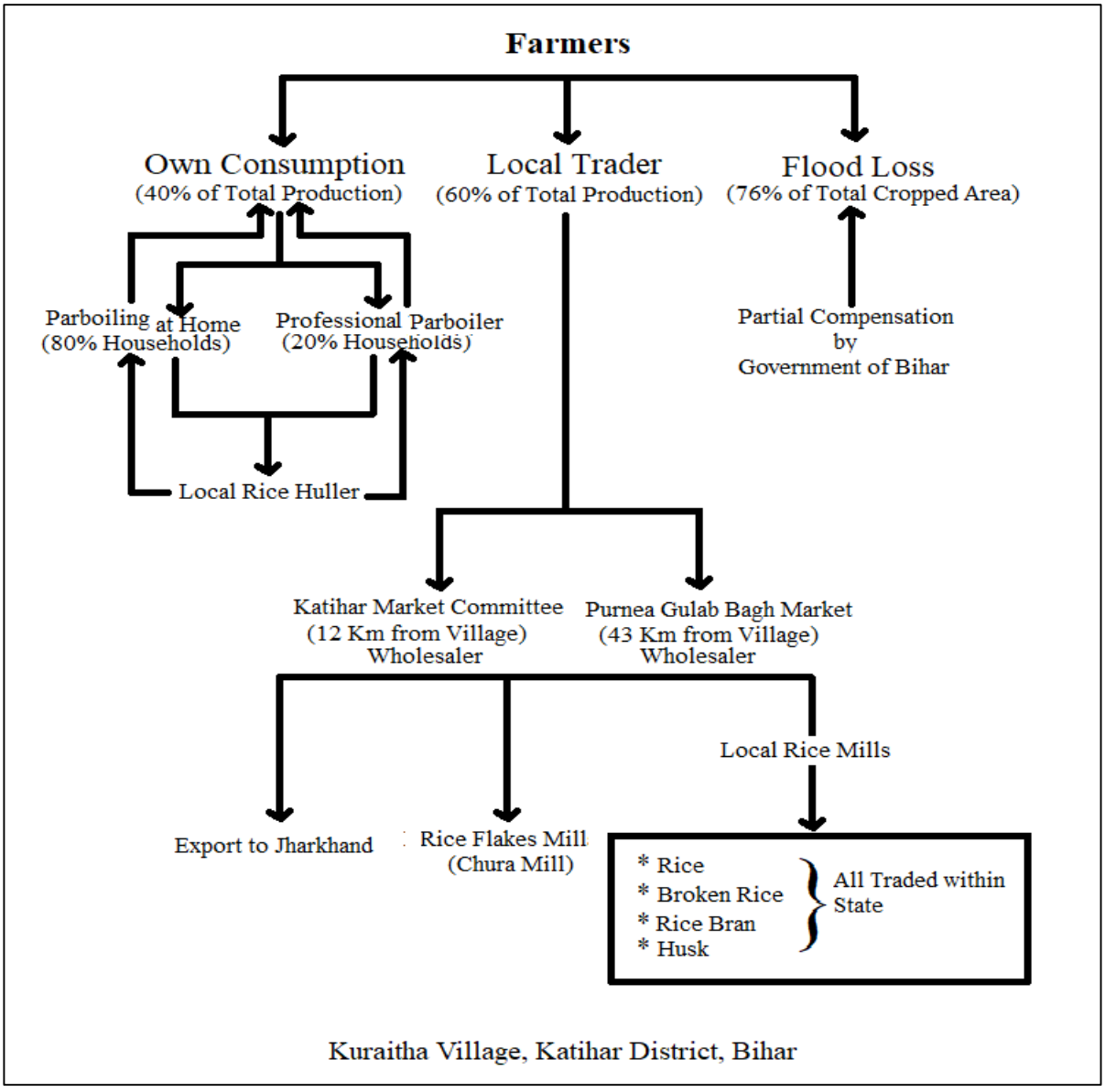
Source: Google Map, 2019

In *Kuraitha* village, 15 smallholder agricultural households were interviewed who cultivated a total area of 32 hectares during the 2017-18 crop season. The surveyed farmers used only tube well as a source of irrigation with the help of diesel operated engines. Among the total agricultural households, 10 were Other Backward Classes (OBC) and five were Schedule Tribes (ST). In the village, 20 percent of the total surveyed cropped area was leased-in. The farmers reported that they had bought inputs from the open market. The Primary Agriculture Credit Society (PACS) is available in the village, but none

of the surveyed households reported to have either accessed it for procuring inputs or for selling output.

It is noted from the field survey that 66 percent of the surveyed farmers were aware of subsidies provided by the government on fertilizers and agricultural machinery. 53 percent of the surveyed households were aware of Minimum Support Price (MSP) and 73 percent of the households were aware of the Government procurement agencies. However, none of the surveyed smallholder agricultural households could access the public procurement agencies in the village.

Figure 5.2: *Paddy Value Network in Kuraitha Village, Katihar District, Bihar*



Source: Primary Survey by Author (2017-18)

Among the total surveyed households, 80 percent reported that they are aware of the credit support through Government schemes and 53 percent used them. All the surveyed households who could use the Government sponsored credit scheme had Kisan Credit Card (KCC). 53 percent of the surveyed households were indebted and except one household, all had borrowed money from institutional sources at an interest rate of 12.5 percent per annum. Because of the 2017 flood in the state, the Government of Bihar provided monetary support to 66 percent of the total surveyed households.

The surveyed farmers in *Kuraitha* village had planted Swarna and BB11 varieties of paddy; both varieties are short size non-Basmati. All farmers had sowed paddy in the month of June. As a result of flood, farmers faced complete loss of crop on the 76 percent of the total surveyed area under paddy cultivation. The yield of paddy on the remaining 24 percent of the total cropped area was 1364 kg per hectare, which is less than half of the state's average. The Government of Bihar did provide some compensation against the loss of the farmers, which was just a fraction of the total loss made by farmers.

The surveyed smallholder households produced a total of 69 quintals of paddy and 6200 bundles of paddy-straw. 40 percent of paddy straw was kept for household use and the rest of it was sold and 60 percent of paddy was traded with the local traders. The local traders procure paddy from the field and make all expenditure on transportation, loading/unloading and packing.

Farmers kept 40 percent of the total paddy produced for consumption. Almost every household reported that they eat parboiled rice, which involves two fundamental processes; parboiling and hulling/de-husking. Regarding parboiling of paddy, a new practice has emerged in the recent past. There are five to six professional parboiler women in the village, who collect paddy from the households, parboil and dry it and then take it to the huller. The parboilers pay the hulling charge at Re1 per kilogram. Then return the nine-tenth share of rice to the households and keep the one-tenth with themselves as a payment for the labour process. However, only 20 percent of the total surveyed households reported receiving the service of professional parboilers. The remaining 80 percent of households themselves executed the parboiling operation, and after

drying paddy, they get de-husking done by the huller at the same price. In both the cases, farmer keeps the paddy husk to use it as a fuel for cooking.

There are total four hullers in the village operated by the diesel engine. Out of them, three hullers are stationary and one, which is very recent, is mobile. The farmers need to take parboiled paddy to the stationary shop, but the mobile huller provides a doorstep service. The de-husking charges are the same in all cases. There are scope and requirement for the functional upgrading to mill paddy properly so that farmers can maximise the return from by-products as well.

Kharbhaiya Village, Patna District, Bihar

Kharbhaiya village is part of Daniawan block of Patna district. According to the Census of India, 2011, there are 631 households with a population of 3713 in the village. The total population of the village includes 18 percent Schedule Caste (SC) and there is no Schedule Tribes (ST). In the village, 1506 person were reported as workers, that includes 137 cultivators and 1128 agricultural workers, i.e. 84 percent population are directly dependent on agriculture (DCOB, 2011d). The total area of the village is 284 hectares that includes 71-hectare barren and uncultivable land and 213-hectare net sown area (DCOB, 2011c).

Figure 5.3: *Kharbhaiya* Village in the Map of Patna District

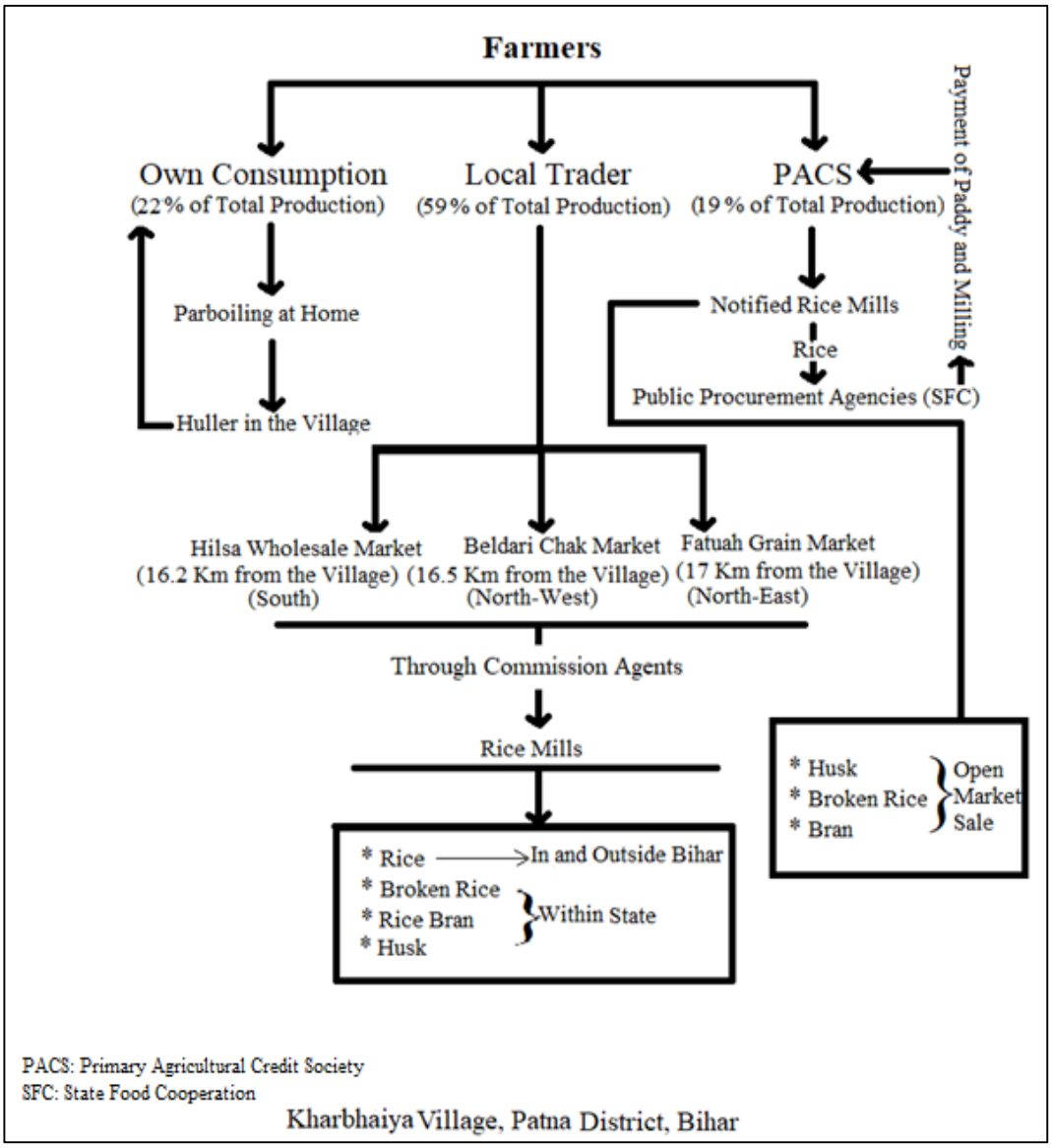
Source: Google Map, 2019

The 15 smallholder agricultural households were interviewed in *Kharbhaiya* village, who cultivated 16.3-hectare land for paddy during 2017-18 season. All surveyed agricultural households used tube-well and pit-water for irrigation using diesel operated engine. Almost every agricultural plots have nearby pit that collect rainwater, which is the main source for irrigation in the village. In the absence of rain, households use tube-well. Out of the total surveyed households, four were SC and 11 OBC. All the farmers bought all inputs from the open market. It is noted from the field survey that 47 percent of the surveyed farmers were aware of subsidies provided by government on fertilizers and agricultural machinery. Only 27 percent of the surveyed households were aware of Minimum Support Price (MSP) and 47 percent of the households were aware of the Government procurement agencies. However, only 27 percent of the surveyed smallholder agricultural households could access the public procurement agencies in the village, which was Primary Agricultural Credit Society (PACS).

Among the total surveyed households, 67 percent of the surveyed households reported to be aware of the credit support through Government schemes and 53 percent used them. All the surveyed households who could use the Government sponsored credit scheme had Kisan Credit Card (KCC). 53 percent of the surveyed households were indebted and all had borrowed money from institutional sources at an interest rate of 11 percent per annum.

The surveyed households cultivated long and short grain non-Basmati varieties. All farmers sowed paddy in the month of July and harvested in either the last week of October or first week of November. The surveyed households produced 485 quintal of paddy and close to 80 thousand bundles of paddy-straw. The yield of paddy in the village was 3031 kg per hectare for the studied period, which was quite higher than the state average in the preceding year.

Figure 5.4: *Paddy Value Network in Kharbhiya Village, Patna District, Bihar*



Source: Primary Survey by Author (2017-18)

In the *Kharbhaiya* village, 56 percent of the total surveyed area was leased-in land. Post-cultivation, the surveyed households kept 22 percent of the total production of paddy and almost 60 percent of the paddy straw at home for the household use. The paddy for household consumption was parboiled by farmers themselves and then was taken to the huller in the village. The huller operators charge Re 1 per kilogram of paddy. The agricultural households use husk as fuel for cooking.

The surveyed households sold 59 percent of total paddy to the local traders. The local traders procure paddy from the field. After that, the local traders pack and transport paddy to different wholesale markets. The rice millers do not procure directly from the wholesalers but through agents. The agents fix a deal between wholesalers and rice millers; in return, the agent gets the half percent of the value of trade from rice miller and the same amount from the wholesaler.

Table 5.1: Cost per Hectare of Land and per Quintal of Paddy in Surveyed Villages, 2017-2018

	Village → **Cost Heads (Rs Per Hectare) ↓**	***Kuraitha*** (Katihar)	***Kharbhaiya*** (Patna)
1	Human Labour	11267	24012
2	Total Machine	5341	8890
3	Seed Value	2206	2707
4	Fertilizers	2803	3302
5	Manure and Insecticides	800	1000
6	Irrigation Charges	1899	6065
7	Rent (Imputed/Actual)	12345	24993
8	Depreciation	304	506
9	Interest of Fixed Capital	1346	2240
	Operational Cost (Sum of 1 to 6)	**24316**	**45976**
	Fixed Cost (Sum of 7 to 9)	**13995**	**27739**
	Total Cost of Cultivation	**38311**	**73715**
	Revenue Per Hectare	**3966**	**72680**
	Revenue Surplus over Operational Cost	-20350	26703
	Revenue Surplus over Total Cost	-34345	-1035
	Cost of Production (Rs per Quintal)		
	Operational Cost of Production	**7635**	**1065**
	Fixed Cost of Production	**4767**	**643**
	Total Cost of Production	**12402**	**1708**
	Average Price Received	**1195**	**1520**
	Price Surplus over Operational CoP	-6440	455
	Price Surplus over Total CoP	-11207	-188

Source: Primary Survey by Author

Table 1 presents the cost of cultivation (CoC), that is, expenditure per hectare and cost of production (CoP) that is, expenditure per quintal of paddy. The lower CoC in *Kuraitha* village is because most of the farmers could not work on the field after flood. The expenditure on human labour in *Kuraitha* is less than half of *Kharbhaiya*. The harvest of paddy in case of Bihar is completely done by human labour and hence, the expenditure over human labour in Katihar was less than Patna village. The use of machine also reflects the impact of

flood. However, expenditure over machinery in *Kharbhaiya* village was higher than other parts of state because of the highly fragmented land in the village. In *Kharbhaiya* village, one hectare of land is divided on an average into 13 plots at different locations. The seed used in *Kuraitha* village was mainly short grain, but, in *Kharbhaiya* village, farmers cultivate non-Basmati fine varieties of paddy, which has the higher price than the short varieties. The lower expenditure on fertilisers, irrigation, manure, and insecticides/pesticides in *Kuraitha* is also because of the flood. The rent of land in *Kuraitha* village in general is lower than that in *Kharbhaiya* village.

The depreciation and interest on fixed capital are directly taken from the Cost of Cultivation data of Directorate of Economics and Statistics. However, the figure for *Kuraitha* village was adjusted as per the machinery used by surveyed farmers. The lower expenditure under the head of depreciation and interest on fixed capital show the lesser use of capital in *Kuraitha* than *Kharbhaiya* village.

Operational cost is close to 63 percent in *Kuraitha* and 62 percent in *Kharbhaiya* village. The rental value of land is the highest portion of the fixed cost in both the villages. Because of the flood, the average revenue in *Kuraitha* village was just Rs 3966 per hectare. The average revenue was calculated based on average price received by the farmers and total output (paddy and paddy straw) produced. The revenue on one-hectare land in *Kuraitha* village was Rs 20350 less than the operational cost and Rs 34345 less than the total cost of cultivation. Since, the Government of Bihar also provided a flood-relief monetary support of Rs 10391 per hectare on an average for the surveyed household, so, the loss of farmers on one hectare of land decreased to Rs 23954. The total CoP of paddy in *Kuraitha* was Rs 12402, and average price received by farmer was Rs 1195. This makes a loss of Rs 11207 on one quintal of paddy produced by farmers. Adjusting the figure with the compensation provided by the state Government, the loss decreases to Rs 7637 on one quintal of paddy. In addition, after adjusting with the revenue on paddy straw produced, the loss is Rs 7337 per quintal.

In *Kharbhaiya* village, the revenue per hectare was Rs 72680, which was Rs 26703 more than operational cost. However, the surveyed agricultural

households in village made a loss of Rs 1035 on total cost of cultivation. The average price received for one-quintal of paddy by the farmers of *Kharbhaiya* village was Rs 1520 and the total cost of production was Rs 1708; this led to a loss of Rs 188 per quintal of paddy. Accounting for the revenue on paddy straw the loss decreased to Rs 23 per quintal, on an average.

Table 5.2: Different Scenarios for Cost of Production, Price, and Surplus (Rs per Quintal), 2017-2018

Farmer (with Own Land)	Cost of Production	1071
	Price	1520
	Surplus	**449**
Tenant Farmer (with Leased-in Land)	Cost of Production	1708
	Price	1520
	Surplus	**-188**

Source: Primary Survey by Author (2017-18)

In all conditions, farmers in *Kuraitha* village is making huge loss on the produce, precisely because of flood and inadequate compensation by the Government. According to the news reports, the Government of Bihar decided to give compensation at the rate of Rs 13,500 per hectare for irrigated land and Rs 6,000 per hectare for non-irrigated land, for a maximum of two hectares land.[2] However, for the irrigated land in *Kuraitha* village, farmers, on an average, received Rs 10391 from Government of Bihar that was not sufficient to eliminate the loss. In *Kharbhaiya* village, farmers with own land, who are not complied to pay any rent on land, could earn Rs 449 per quintal. However, the surplus here includes rental value of own land and hence as informed above, the 56 percent of the total land cultivated by the surveyed households were leased-in. On the leased-in land a farmer need to pay rent and after excluding the rent, farmers make a loss of Rs 188 and if they sell paddy straw then the loss is at least Rs 23 on one quintal of paddy.

Value Addition by Other Actors of Paddy Value Networks

The local trader interviewed in *Kuraitha* village reported that he procures paddy from five other neighbouring villages. He procured mainly from marginal and small farmers. According to him, almost 20 other local traders

[2] https://www.hindustantimes.com/patna/flood-hit-bihar-farmers-to-be-compensated-for-crop-damage-within-a-month/story-zKhmeaFHAIqmpPhGKZyrgL.html

function in the village. Out of the total number of farmers from which he procures, 40 percent are regular seller. The local traders procure from the field and make expenditure on transportation, loading/unloading, jute bags and payment to farmers. Generally, the local traders pay farmers in less than a week's period. The price paid to farmers was in the range of Rs 1100 and Rs 1400 per quintal. The local trader who was interviewed, reported the business of 250 - 300 quintal of paddy in a period November - December of 2017. The business was comparatively lower due to the flood season. Otherwise, in an annual year, the local traders, procure 500 to 600 quintal of paddy in a season. The local traders take paddy either to the wholesalers of Katihar Market Committee or Purnea Gulab Bagh Market, 12 km and 43 km from the village, respectively. The procurers from neighbouring state Jharkhand and local Rice-Flakes millers buy paddy from the Katihar Market and the wholesaler of Purnea Gulab Bagh supply paddy to the local rice mills. In the Katihar Market Committee, the traders received price between Rs 1320 and Rs 1420 per quintal. The price in the Gulab Bagh market was between Rs 1340 and Rs 1440 per quintal. The major difference between these two markets is that, the payment in Purnea Gulab Bagh market is on the spot but wholesaler of Katihar market takes 3-4 days for the payment. According to the local trader, the cost involved in transportation and loading/unloading is Rs 40 per quintal if traded to Katihar Market and Rs 60 per quintal if traded to Purnea market. The cost of jute bag to store 50 kg paddy is Rs 20 that means the bag cost per quintal is Rs 40. The rent of storage is Rs 1000 for month that stores almost 750 quintal of paddy.

The local trader in *Kharbhaiya* village reported that there are more than 20 local traders procure from the village. He procures from four other neighbour villages of *Kharbhaiya*. In the period between January and February 2018, he could trade almost 450 quintal of paddy. The local trader does not have his own vehicle so; he has to rent a vehicle, collect from the field and sell it to wholesalers either in *Hilsa* or *Beldari* or *Fatuah* market. The wholesale markets are almost at equidistance (16-17 km) from the village. The farmers in the village cultivate short as well as fine varieties; out of the total procurement by the local traders, 80 percent is fine varieties and the rest is short varieties.

Apart from the payment to farmers, local trader also spends Rs 40 per quintal on jute bag, Rs 10 per quintal on loading/unloading, Rs 4 per quintal on weighing and Rs 40 per quintal on transportation. In the 2017-18 season, they paid farmers between Rs 1450 and Rs 1590 per quintal and received price from the wholesalers between Rs 1610 and Rs 1670 per quintal.

The wholesalers at all locations in Bihar (Katihar, Purnea and Patna), follow the same mechanism to decide the price. The wholesaler checks the variety and quality of grain and accordingly bid a price, if the trader agrees then deal is considered fix, if not then traders can bargain or move to other wholesalers in the market. All the wholesalers have storing facility for food grains. In Katihar market, purchasers of rice mill come to wholesalers and buy paddy, the buyers are also from outside Bihar, mainly from Jharkhand. In Purnea Gulab Bagh market, wholesalers themselves take paddy to rice mills with whom they have regular business. In Patna, wholesalers sell paddy to rice mills through commission agents, who charge one percent of the price paid by rice mills. The wholesaler of paddy in Katihar market made an expenditure of Rs 20 per quintal, that includes mainly storing, wage of workers and managerial requirements. In Purnea, wholesalers transport paddy to the rice mills, so the cost increases to Rs 90 per quintal. In Patna, the wholesaler's expenditure on one quintal of paddy is Rs 29. The average payment received by wholesalers in Katihar market was between Rs 1400 and Rs 1500 per quintal. In Purnea, wholesalers received price of paddy between Rs 1500 and Rs 1600 per quintal. In Patna, wholesalers received price of paddy between Rs 1690 and Rs 1700 per quintal. The higher price in Patna is also because of the varieties; in most of the sale, it was non-Basmati fine varieties. The agent between rice mills and wholesalers of Patna received Rs 17.30 per quintal that includes fifty percent payment by rice mill and fifty percent by wholesalers.

The pricing system in the wholesale markets of Bihar does not have any direct impact on the farmers if a local trader is involved in trade. The pricing mechanism of farmers-local trader and local trader-wholesaler are mutually exclusive. However, the existence of public procurement does play a significant role in in bargaining power of farmers that result in pricing. In *Kuraitha* village of Katihar district, none of the surveyed household reported

sale of paddy to public procurement agencies. In *Kharbhaiya* village of Patna district, farmers sold 19 percent of the total paddy to the Primary Agriculture Credit Society (PACS). The PACS has the mandate to procure paddy from the member farmers at minimum support price (MSP) fixed by the Government of India at a rate of 20 quintals per hectare. To sell paddy, a farmer needs to register online using AADHAR Card credential and for that, purpose farmer goes to Cyber Café. The charge in Cyber Café is Rs 50 per registration. The farmers need to upload his/her photo, land paper, Bank Passbook and AADHAR card. Last year the State Government allowed the procurement of rice from tenant farmers as well, which was not allowed earlier. The maximum procurement from one tenant farmer is 75 quintals. The PACS, which covers *Kharbhiya* village has 1860 member farmers, out of which PACS only procured from 45 farmers (including 20 tenants). According to PACS chairperson, generally farmers in *Kharbhaiya* village cultivate fine varieties, which carry higher price in the open market. However, the MSP for fine variety for the year was Rs 1590 per quintal and farmers reported sale of paddy at a price below this level. The answer farmers gave for selling fine varieties of paddy to local traders is that the later procures from the field and in case of PACS farmers need to pay transportation charge.

After procuring paddy from the farmers, PACS needs to pack paddy in the jute bags provided by the State Food Cooperation (SFC) of Bihar. After that, the PACS take paddy to the rice mill, which is 14 km from the procurement centre, notified by the District Cooperative Officer and collects rice at the rate of 67 kg per quintal of paddy. The SFC does the final procurement of rice and pays commission to the PACS and milling cost to rice mills through PACS. The farmers receive money for paddy in their bank accounts directly. Apart from the milling cost, the rice mills also get revenue on the sale of rice bran, husk, and broken or remaining rice.

The rice mill in Patna produces parboiled as well as raw rice. The mill has one permanent worker/caretaker, other than that also employs 20-25 piece rated wage-workers during the milling season. The main tasks performed by the rice mills are; parboiling, drying, de-husking and packing. For raw rice, rice mill performs only de-husking and packing. The total expenditure of rice mill on

parboiled rice is Rs 35 per quintal and for raw rice Rs 25 per quintal. The total expenditure per quintal of paddy also includes the depreciation of capital employed, which has current value, according to rice mill owner, is Rs 250 million. In one season, the capital setup mills almost 25000 quintal paddy. The mill does two types of packing of rice; one 25 kg and another 50 kg. The buyers from the other states procure the 50 kg packets of rice in large quantity, and the 25 kg packets are supplied to other parts of Bihar. The intra and inter-state trade take place through agents, who charge one percent from the procurer of rice. The rice mill sells by-products, i.e. rice bran, husk and broken rice in the open market. In, in ordinary cases the recovery rate in case of parboiled rice is 68 percent and for raw rice, it is 67 percent. The recovery rates of other items are; 17 percent paddy husk, 9 percent broken rice and 7 percent rice bran. The rice mill, reported that they received on an average Rs 1965 per quintal of paddy; this includes price received for rice, rice bran and paddy husk.

Table 5.3: Cost and Margins for Different Actors of Value Chain in Bihar (Rs per Quintal of Paddy), 2017-2018

Place	Actors	Price Paid for Main Input(Paddy/Rice) Rs		Other Costs (Rs)	Price Received (Rs)		Margin (Rs)
		Range	Average		Range	Average	Average
Katihar	Local Trader (to Katihar)	1100-1400	1195	81	1320-1420	1370	94
	Wholesaler (Katihar)	1320-1420	1370	20	1400-1500	1450	60
	Local Trader (to Purnea)	1100-1400	1195	100	1340-1440	1390	95
	Wholesaler (Purnea)	1340-1440	1390	90	1500-1600	1550	70
Patna	Local Trader	1450-1587	1520	94	1610-1670	1640	26
	Wholesaler	1610-1670	1640	29	1690-1770	1730	61
	Agents for Rice Mills	--	--	--	--	--	17
	Rice Mill	1690-1770	1730	30		1965	205

Source: Primary Survey by Author (2017-18)

The trade through local traders is the largest segment of the paddy value networks at both places in Bihar. Table 3 provides the price paid, other costs incurred, and price received by different actors of the value network. Even though Katihar was flooded in 2017-18 monsoon season, which resulted in the heavy loss of farmers, the other actors in the value networks did not make any loss. The local traders could earn Rs 94 or 95 per quintal of paddy, wholesalers could earn Rs 60 per quintal in Katihar and Rs 70 per quintal of paddy in Purnea. However, according to the local traders and wholesalers, their revenue declined due to flood in 2017-18. In Patna, the margin of actors of the value networks increases while moving downstream. The local traders could earn Rs 26 per quintal and wholesalers earned Rs 61 per quintal of paddy. The earning of rice mill was Rs 205 per quintal and their agents could make Rs 17 per quintal of paddy. The margin that a rice mill receives includes revenue earned on by-products (rice bran, paddy husk, and broken rice) per quintal of paddy.

The second largest segment of paddy value system in Bihar is self-consumption by agricultural households. In that segment, farming households parboil and get paddy de-husked at local huller in the village. Farmers consume all product and by product for consumption and pays Rs 100 per quintal to huller. If the agricultural households take service of professional parboilers, then they spend another Rs 100 per quintal and one-tenth of rice. In both the cases, the scale of business of professional parboiler and local huller is very small, though their margin is high, but the aggregate income is less.

In *Kharbhaiya* village, 19 percent of paddy produced by the surveyed households was sold to public procurement agencies through PACS. In this segment of paddy value network, the farmers could get Rs 1550, the MSP. However, the average cost of production was Rs 1708 and hence, even at the MSP, farmers made deficit, on an average. However, the MSP is higher than the average price (Rs 1520) received by the farmers; so, the deficit of farmers in this segment is lower than the segment where paddy is sold to local traders. The State Food Corporation (SFC) of Government of Bihar paid Rs 31.25 per quintal to PACS for commission for procurement during 2017-18.[3] The total

[3] Data Source is Department of Food and Public Distribution, Government of India.

expenditure (including payment made to farmers) of public procurement agencies was Rs 1757 per quintal of paddy or Rs 2621 per quintal of rice. The rice mills in this segment of value system are notified by the Government, they receive Rs 10 per quintal for raw rice and Rs 20 per quintal of paddy for parboiled rice. The rice mills also get money through sale of rice brans, broken rice, and paddy husk. According to rice mill owner, the average price of paddy husk was Rs 250 per quintal, and Rs 1400 per quintal of rice bran and broken rice. Therefore, from one quintal of paddy, rice mill earns Rs 276.5 for raw rice and Rs 238 for parboiled[4] rice.

Agricultural Workers in Paddy Value Networks of Bihar

The workers in the paddy value system, particularly the agricultural workers, belong to socially deprived communities in the respective villages. All male and female workers in *Kuraitha* village of Katihar District, who participated in the focused group discussion (FGD) are from ST communities. The workers mainly work in brick kiln, construction, and agriculture. For female workers, agriculture is the main source of employment for the period between April and July. The brick kiln operates only between October and April. The construction work is available in and outside village for whole year except rainy season. For male workers, agriculture is major work between April and July and in the other months of the year they work in brick kiln, and construction. Many male workers also migrate to other parts of the country. During August and September of 2017, workers could not find any work because of flood situation in the state. The female workers are generally employed on piece rated wage for transplantation of paddy seedlings, weeding and harvesting. The farmers employ male workers for ploughing, spraying pesticides, transplantation, weeding and harvesting of paddy. There is a clear wage difference between male and female workers; female workers get remuneration Rs100 to Rs160 per day, during off-season, for the same work, they get Rs 100 per day. The

[4] Parboiled rice has higher recovery rate (68 percent) and does not produce rice bran

male workers get Rs150 to Rs250 per day (during peak season they get work for 25 days in a month, maximum).

In the *Kharbhaiya* village of Patna, the female agricultural workers belong to SC and OBC, while most of the male workers are from SC communities. Most of the male workers work in the construction sector during the agricultural off-season, while, the female workers only work in agriculture. The male workers generally employed for all operations of paddy, whereas, the female workers only work for transplantation and harvesting. For agricultural work, the female workers get 5 Kg rice per day for paddy transplant, for paddy harvest, 1/12th share of total harvest or 5 kg paddy, for wheat harvest 10 Kg wheat. In monetary terms, female get Rs150-200 per day whereas the male workers get Rs 250 per day including lunch for the same work.

At both the places in Bihar workers reported some health related issues while working in the paddy field. During sowing period of paddy, the workers work for 12 hours in a day in the field and because of the continuous work in water, their hand, and legs are swollen for three-four days. Since, paddy transplantation work is available for the very short period; they continue to work despite hand and leg swelling get worse.

Findings from the Field – II (Punjab)

Introduction

The paddy producing region of Punjab can be distinguished on the basis of varieties. A total of 20 percent of the total area under paddy cultivation in the state produces Basmati rice. The districts of Indian Punjab, sharing boarders with Pakistani Punjab, are the main producers of Basmati rice in the state. These districts are mainly western part of *Malwa* region and entire *Majha* region of Indian Punjab. Amritsar and Tarantaran are top producer of Basmati rice in Punjab. The *Majha* region contributes 40 percent in total production of Basmati rice produced in the state. In Amritsar, Basmati varieties constitutes 58 percent in the total area under paddy cultivation.

The production of non-Basmati rice is more in the eastern part of *Malwa* region of the state. The region is also at the top in terms of yield of rice; all districts of *Malwa* had yield of more than 4000 Kg per hectare between 2012-13 and 2016-17. In the last five years, Sangrur, Patiala and Ludhiana have remained top rice producing district in the state.

Considering the variation within state, two villages were selected for the field study. *Seel* village was selected from the Patiala district of Punjab, which is main the producer of non-Basmati varieties. *Mehlanwala* village was selected from Amritsar district, which is the main producer of Basmati varieties.

Seel Village, Patiala District, Punjab

Seel village is a part of *Ghanaur* block of Patiala district. According to the census of India, 2011, there are 413 households with a population of 2180 in the village. The total population of the village includes 21 percent Schedule Caste (SC). In the village, 559 persons were reported as workers, which includes 258 cultivators and 88 agricultural workers, that is, 62 percent of working population are directly dependent on agriculture (DCOP, 2011b). The total area of the village is 479 hectares that includes 436 hectares as net sown area and remaining land is under non-agricultural use. Canal water and 322 irrigate a total of 110-hectare land by wells/tube-wells in the village (DCOP, 2011a).

Figure 6.1: *Seel* village in the Map of Patiala District

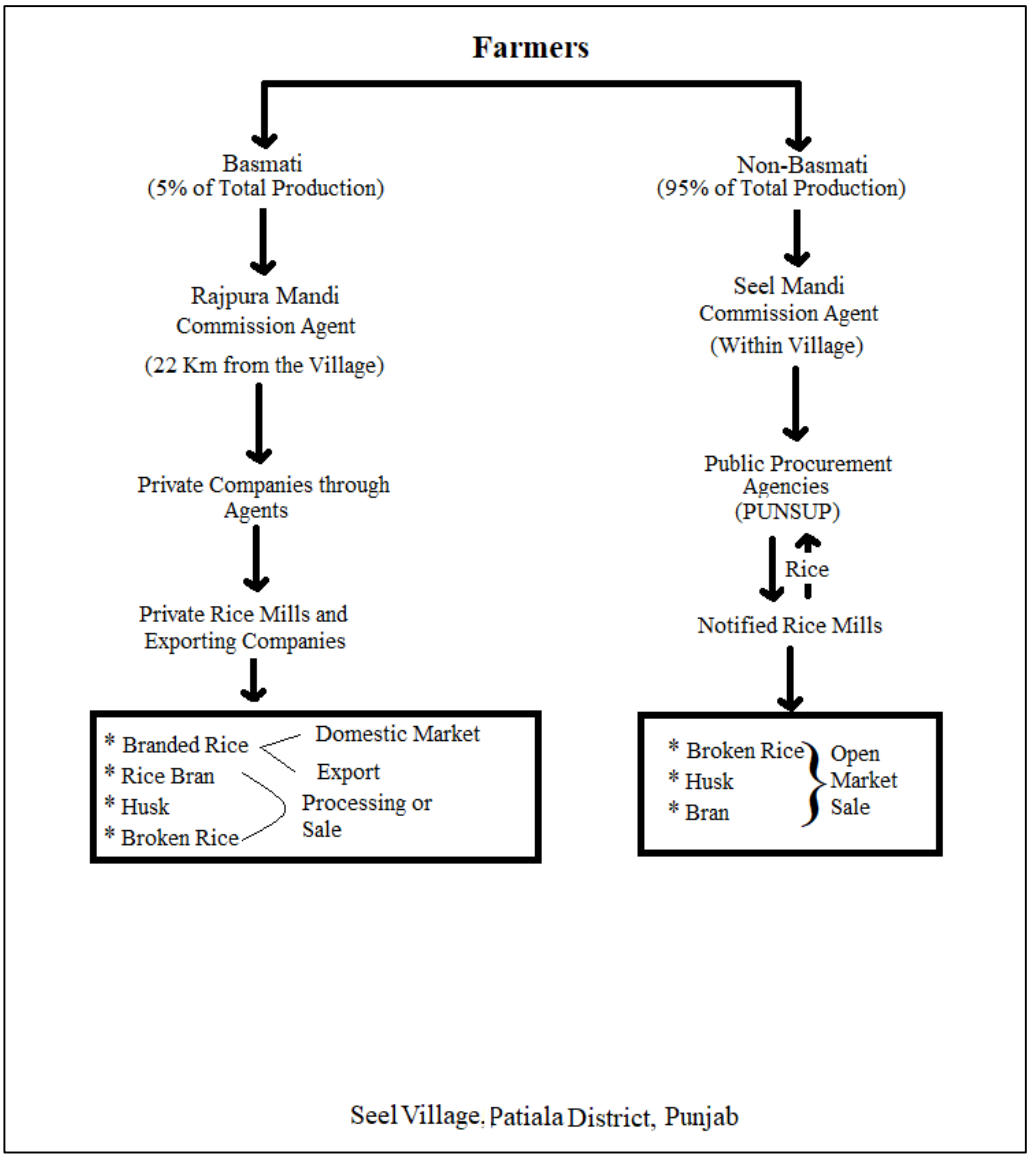
Source: Google Map,2019

In *Seel* village, 15 smallholder agricultural households were interviewed who cultivated a total area of 34.4 hectares during the 2017-18 crop season. The surveyed farmers used canal water on 30 percent of area under paddy cultivation and tube well water on the rest of the land as the main source of irrigation. The hundred percent-subsidized electricity is the source of power for irrigation for all households. All surveyed agricultural households belonged to Jatt Sikh that is a reflection of state-level scenario, where ownership of land is highly skewed towards general category Sikh households. In the village, 13

percent of the total surveyed cropped area was leased-in. The farmers reported that they had bought inputs from the open market.

It was noted from the field survey that 100 percent of the surveyed farmers were aware of subsidies provided by the government on fertilizers and agricultural machinery. 100 percent of the surveyed households were aware of Minimum Support Price (MSP) and Government procurement agencies. All of the surveyed smallholder agricultural households had accessed the public procurement agencies through commission agents.

Figure 6.2: *Paddy Value Network in Seel Village, Patiala District, Punjab*



Source: Primary Survey by the Author (2017-18)

All surveyed agricultural households were aware of the credit support system through Government Schemes and all households had borrowed money from the formal sources. 90 percent of the total surveyed households had borrowed money from Cooperative Society and the rest of them had borrowed money from Rural Bank. Other than borrowing from the formal sources, 60 percent of the farmers had also borrowed from informal money lenders. Commission agents are the main informal moneylenders in the village. The average borrowing of the surveyed households in *Seel* village was Rs 284,500 per households; this includes 79 percent from formal sources and 21 percent from informal sources. The interest rate for formal source was 4 percent per annum and for informal source, it was 24 percent per annum. However, most of the farmers who borrowed from the commission agents reported that the money given by the commission agent is advance payment. The commission agents pay a share of amount of future sale to the farmers, but this carries 2 percent monthly simple interest rate. If farmer does not sell to the same commission agents, then the interest rate turns into interest rate compounded monthly.

The surveyed smallholder farmers in *Seel* village reported having produced 1995.5 quintals of paddy, that includes five percent of Basmati and 95 percent of non-Basmati varieties. PR 1121[1] is the only Basmati variety cultivated by farmers in *Seel* village. The varieties of non-Basmati mainly include PR 121, PR 122, PR 126, PR 127 and PR 666. The average yield of non-Basmati and Basmati varieties cultivated by surveyed farmers in *Seel* village was 6090 kg per hectare and 3704 kg per hectare, respectively. Since, the harvest was done using combine-harvest machine, that extracts paddy straw in the field. All surveyed households burned paddy straw in the field itself.

The Punjab State Civil Supply Corporation Limited (PUNSUP), an undertaking of the Government of Punjab procures all non-Basmati varieties at MSP from the village through commission agents. The commission agent is entitled to check the moisture levels, foreign materials etc. Once the quality is up to the mark, the paddy is supplied to notified rice mills. PUNSUP pays all costs in loading/unloading, packing, jute bags, transportation, and 2.5 percent

[1] https://www.thehindubusinessline.com/todays-paper/Pusa-1121-proves-a-major-hit-with-farmers/article20184928.ece?ref=archive

of the MSP to the commission agent. The PUNSUP collects rice at the rate of 67 percent per quintal of paddy from the rice mills. The rice mill sells all by-products; broken rice, husk and rice bran, in the open market through agents.

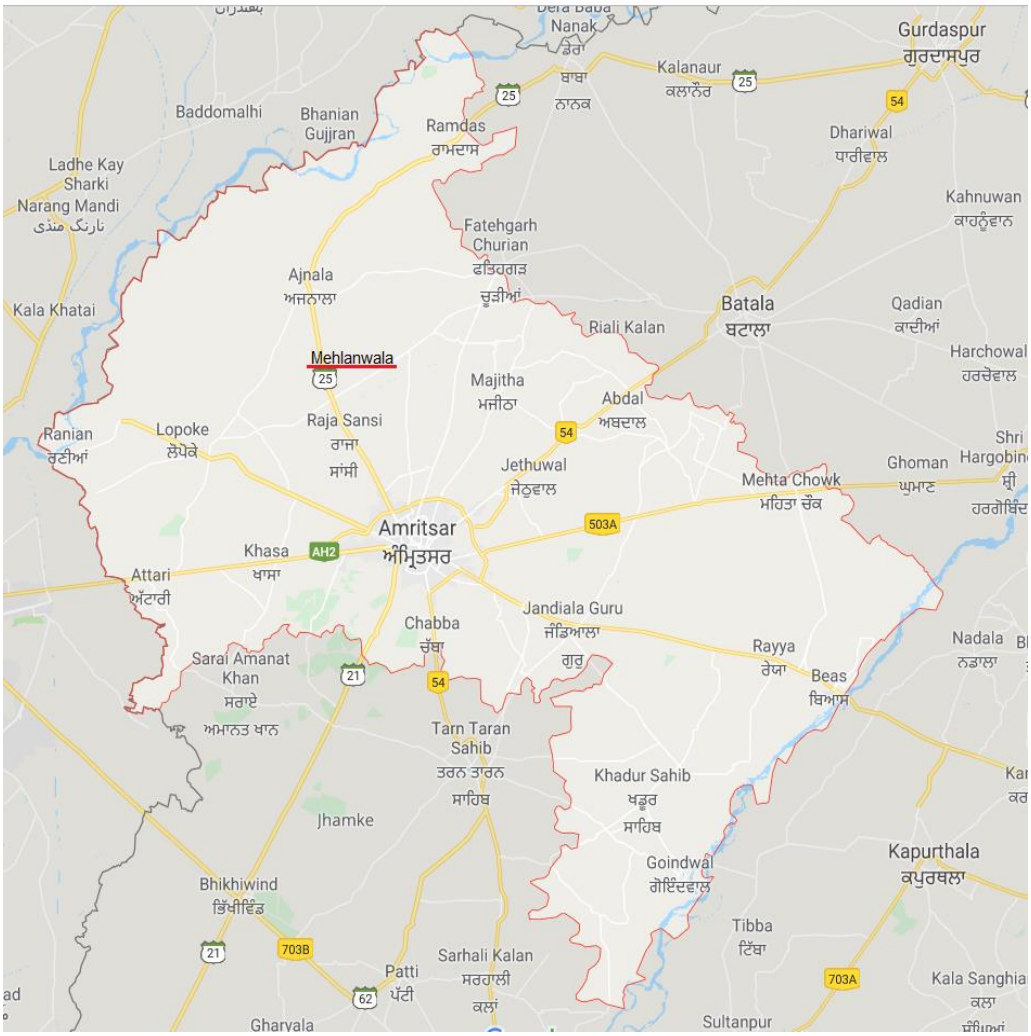
The Basmati producers of *Seel* village sell it in the *Rajapura* private market to the commission agents, that is 22 km away from the village. In the *Rajapura* market, private rice companies procure paddy either through agents or companies' procurers. The auctioneering process is used to arrive at a price of Basmati paddy. Once the deal is fixed, the commission agents receive 2.5 percent of the total value of sale as commission. The farmers pay costs on transportation between the village and the market.

Since, PUNSUP collects all non-Basmati paddy produced in *Seel* village, this provides an incentive to the farmers to produce non-Basmati varieties. For non-Basmati varieties, farmers not only get confirmed buyer but also secured price (MSP) that is opposite in the case of Basmati varieties. Price of Basmati is depending upon demand for it in the market and that is why, the risk averse behaviour leads to the higher share of non-Basmati cultivation.

Mehlanwal **Village, Patiala District, Punjab**

Mehlanwala village is a part of Harsa Chhina block of Amritsar district. According to the census of India, 2011, there are 513 households with a population of 2610 in the village. The total population of the village includes 45 percent Schedule Caste (SC). In the village, 840 persons were reported as workers, that includes 282 cultivators and 105 agricultural workers, i.e. 46 percent of working population are directly dependent on agriculture (DCOP, 2011d). The total area of the village is 817 hectares that includes 761 hectares as net sown area and the remaining land is under non-agricultural use. A total of 392-hectare land is irrigated by canal water and 369 by wells/tube-wells in the village (DCOP, 2011c).

Figure 6.3: *Mehlanwala* village in the Map of Amritsar District



Source: Google Map, 2019

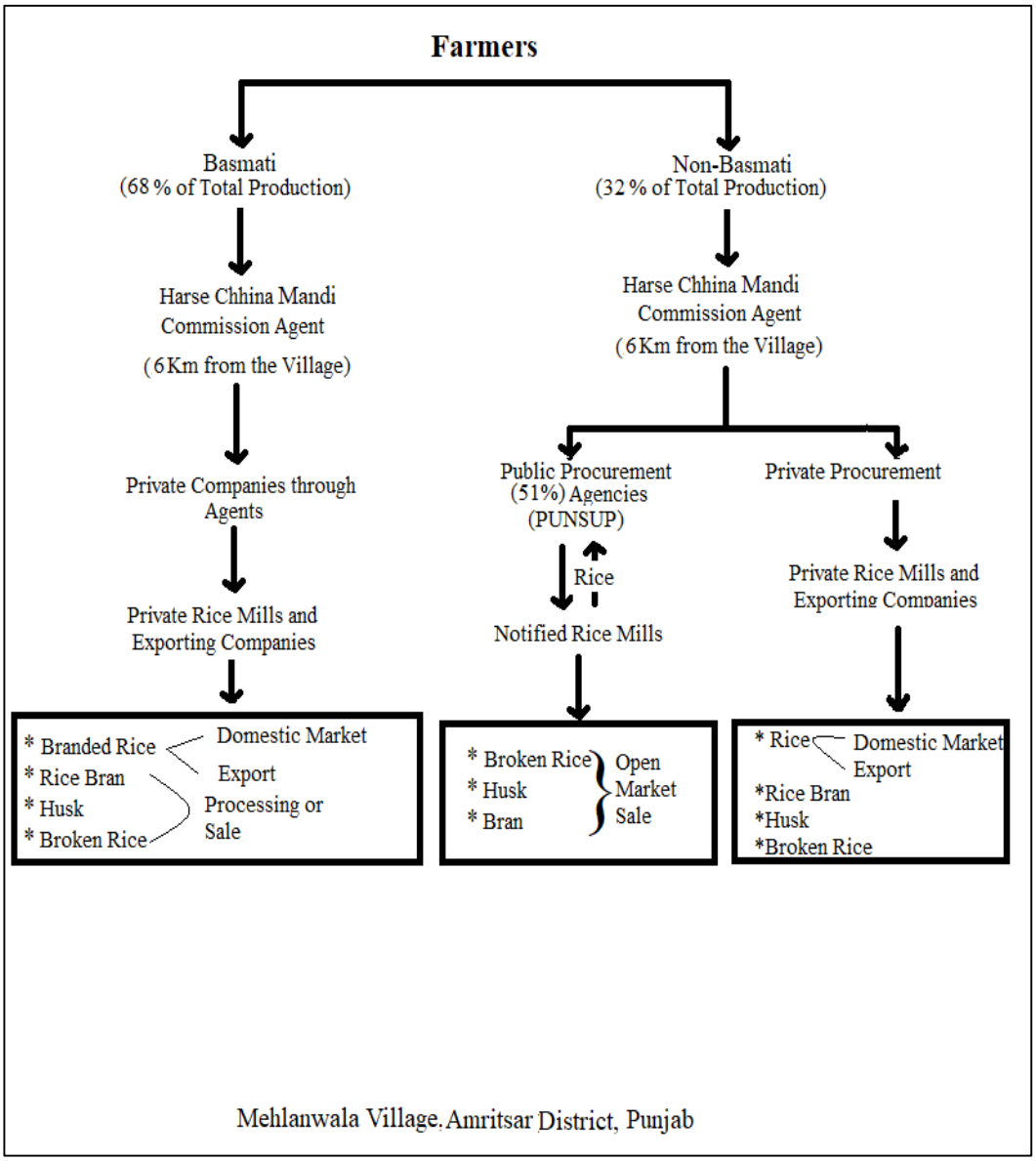
In *Mehlanwala* village, 15 smallholder agricultural households were interviewed who cultivated a total area of 49 hectares during the 2017-18 crop season. The surveyed farmers used only tube well as the main source of irrigation for paddy cultivation. The hundred percent-subsidized electricity is the source of power for irrigation for all households. All surveyed agricultural households belong to Jatt Sikh. In the village, 17 percent of the total surveyed cropped area was leased-in. The terms of a contract between farmers and landowners are generally annual (for two crops; wheat and paddy). The landowners receive rent before the cultivation begins. The farmers reported that they had bought inputs from the open market.

It was noted from the field survey that 90 percent of the surveyed farmers were aware of the subsidies provided by government on fertilizers and agricultural machinery. Almost/ all of the respondents surveyed had the knowledge of Minimum Support Price (MSP) and Government procurement agencies. However, only 28 percent of the surveyed households, who produced non-Basmati paddy could access the public procurement agencies.

All surveyed households reported that they are aware of credit support through Government schemes, however, 90 percent of them accessed institutional credit providers. 60 percent of the surveyed households got loan from cooperative society and 30 percent borrowed money from the banks. 40 percent of the surveyed households also borrowed from commission agents at the interest rate of 2 percent per month. The share of informal loan out of total borrowed money is just 6 percent. The average borrowing in *Mehlanwala* village is quite high, that is, Rs 879,000. According to the farmers, apart from cultivation, buying home appliances and expenditure during family functions are the main reason for borrowing. Since, loan amount is quite high, the rate of interest form the bank is 12 percent unlike 4 percent per annum of agricultural loan.

The surveyed smallholder farmers in Mehlanwal produced 2334 quintals of paddy, that includes 68 percent Basmati and rest is non-Basmati. The main Basmati varieties cultivated by surveyed farmers were PR 1121 and PR 1509. Some of farmers reported that they did manual harvest for Basmati and hence, they got paddy-straw for household use. The main non-Basmati varieties sown in the village by surveyed households were PR 121 and PR 126. The average yield of Basmati and non-Basmati varieties cultivated by surveyed farmers in *Mehlanwala* village was 4753 kg per hectare and 6617 kg per hectare, respectively.

Figure 6.4: *Paddy Value Network* in *Mehlanwala* Village, Amritsar District, Punjab



Source: Primary Survey by the Author (2017-18)

Unlike *Seel* village of Patiala, the procurement of non-Basmati by PUNSUP in *Mehlanwala* village of Amritsar was only 51 percent. there is a similar pattern in the case of Patiala, paddy procured by the PUNSUP through commission agents was supplied to notified rice mills and then stored in the warehouses. Private procurers procure 49 percent of non-Basmati rice. The private procurers of non-Basmati in *Harse Chhina* market bid price, that is generally less than the MSP. The commission agent mostly fix the deal and receive the commission at 2.5 percent of the total value. The process of the sale of Basmati

paddy in *Harse Chhina* market is same as in *Rajpura* Market of Patiala district. The farmers pay the cost for transportation between the village and *Harse Chhina* market, that is six km from the village.

Table 6.1: Cost per Hectare of Land and per Quintal of Paddy in Surveyed Villages, 2017-2018

	Vilaage → **Cost Heads (Rs Per Hectare) ↓**	***Seel* (Patila) Non-Basmati**	***Seel* (Patila) Basmati**	***Mehlanwala* (Amritsar) Non-**	***Mehlanwala* (Amritsar) Basmati**
1	Human Labour	14874	16625	17250	19001
2	Total Machine	7963	7167	7964	7861
3	Seed Value	2072	4000	2050	4000
4	Fertilizers	3274	2946	2983	1952
5	Mannure and Insecticides	3293	3622	3622	4500
6	Irrigation Charges	0	0	0	0
7	Rent (Imputed/Actual)	55550	55550	61730	61730
8	Depreciation	373	336	373	368
9	Interest of Fixed Capital	4175	3758	4175	4122
	Operational Cost (Sum of 1 to	**31475**	**34360**	**33869**	**37315**
	Fixed Cost (Sum of 7 to 9)	**60098**	**59644**	**66278**	**66220**
	Total Cost	**91573**	**94004**	**100147**	**103535**
	Revenue Per Hectare	**95574**	**97106**	**95082**	**133970**
	Revenue Surplus over	64098	62746	61213	96656
	Revenue Surplus over Total	4000	3102	-5065	30436
	Cost of Production (Rs per				
	Operational Cost of	**517**	**928**	**512**	**785**
	Fixed Cost of Production	**986**	**1609**	**1002**	**1393**
	Total Cost of Production	**1503**	**2537**	**1514**	**2178**
	Average Price Received	**1569**	**2622**	**1437**	**2819**
	Price Surplus over	1053	1694	925	2034
	Price Surplus over Total CoP	66	85	-77	641

Source: Primary Survey by Author (2017-18)

In the surveyed villages of Punjab, almost two-third of the total cost of cultivation is fixed cost. The share of fixed cost in the total cost for Basmati and Non-Basmati in *Seel* village were 63 percent and 66 percent, respectively. In *Mehlanwala* village, the share of fixed cost were 64 and 66 percent for respective varieties. In the fixed cost, share of the rental value of land is highest. In Punjab villages, rent is fixed per acre for one year. It was found from the field study that rent is higher in *Mehlanwala* than *Seel*, consistently with the

yield rate of respective villages. The depreciation and interest of fixed capital are proportional to the use of machine for cultivation; these are higher for non-Basmati varieties than the Basmati varieties.

The operational cost of cultivation, that is almost one-third of the total cost, is higher for Basmati varieties than the non-Basmati. The higher portion of operational cost for Basmati varieties are mainly because of the higher human labour and high cost of seed. Some of the farmers uses human labour for harvesting of Basmati. The cost of machine labour is more in non-Basmati varieties. For Basmati varieties, particularly in *Mehlanwala* village, farmers spend more on insecticides/pesticides and manure than the fertilizers. The same thing was observed in *Seel* village, but the difference between cost of fertilizers per hectare and cost of manure and insecticides per hectare in the village is less than *Mehlanwala*. Since, all farmers get free electricity from the State, so irrigation is free completely. However, farmers do spend money in maintenance of irrigation equipment and implements; the cost is included in the depreciation.

Table 6.2: Different Scenarios for Cost of Production, Price and Surplus (Rs per Quintal), 2017-2018

		Seel **(Patila) Non-Basmati**	***Seel*** **(Patila) Basmati**	***Mehlanwala*** **(Amritsar) Non-Basmati**	***Mehlanwala*** **(Amritsar) Basmati**
Farmer with Own Money (At Cost 'C2-Rent')	CoP	519	966	517	788
	Price	1569	2622	1437	2819
	Surplus	**1050**	**1656**	**919**	**2031**
Farmer with Borrowed Money (At Cost 'C2-Rent')	CoP	579	1066	549	850
	Price	1569	2622	1437	2819
	Surplus	**990**	**1556**	**888**	**1968**
Tenant Farmer with Own Money (At Cost 'C2')	CoP	1503	2537	1514	2178
	Price	1569	2622	1437	2819
	Surplus	**66**	**85**	**-77**	**641**
Tenant Farmer with Borrowed Money (At Cost 'C2')	CoP	1563	2637	1546	2240
	Price	1569	2622	1437	2819
	Surplus	**6**	**-15**	**-109**	**579**

Source: Primary Survey by Author

Table 2 presents the different scenarios for cost of production, price, and surplus accrued by the farmers. The typical scenarios of farmers' surplus emerges because of land relation and relation of credit with commission agents. As discussed above, rent is very high in Punjab, it results in siphoning of a large part of surplus generated in paddy cultivation. The second important factor that decreases the farmers' earning in Punjab is sizeable amount of informal borrowing from commission agents. While making payment for the paddy, commission agents get 2.5 percent from public procurement agency and deducts interest on advance payment made to the farmers. The rate of interest is 2 percent per month; farmers get advance before sowing and pays after harvest, this means period of borrowing is 5 to 6 months. On an average in Patiala, the interest paid to the commission agent is 3.8 percent of the price of paddy. In Amritsar, the average interest amount paid to the commission agent is 2.2 percent of paddy price.

Price in all scenario is same and it is average for the surveyed households. The Minimum Support Prices, used by public procurement agencies, were Rs 1550 per quintal for common grade and Rs 1590 per quintal for 'A' grade. Table 2 mentions that if a farmer cultivates his own and with own money, that is, he/she does not pay either rent or interest, in that case, the surplus of farmers in *Seel* village, for Basmati and non-Basmati are Rs 1656 and Rs 1050 per quintal, respectively. However, it should be noted that surplus per hectare of land was more from non-Basmati than the Basmati for *Seel* farmers; this is because of the higher yield of former variety. If farmers have to pay interest to commission agents then, on an average, the surplus from Basmati and non-Basmati were Rs 1556 per quintal and Rs 990 per quintal, respectively. Subtracting the rent leads to a sharp fall in the surplus that ism the surplus by a tenant farmer. For Basmati varieties, a tenant farmer earns surplus of Rs 85 and for non-Basmati, it is Rs 66 per quintal. If a tenant farmer has to pay interest as well, then on an average, the farmer earns a surplus of Rs 6 per quintal on non-Basmati and makes a loss of Rs 15 per quintal on Basmati.

In *Mehlanwala*, surplus of farmers per hectare as well as per quintal of paddy is higher for Basmati than non-Basmati. A farmer, who does not need to pay rent, makes a surplus of Rs 919 per quintal and Rs 2031 per quintal for non-

Basmati and Basmati, respectively. If the farmer has to pay an interest to commission agents, then surplus is Rs 888 and Rs 1968 for non-Basmati and Basmati, respectively. A tenant farmer, who pays rent, earns a surplus of Rs 641 per quintal on Basmati and makes a deficit of Rs 77 per quintal on non-Basmati cultivation. If a tenant farmer has to pay an interest to commission agent, then his loss increases to Rs 102 per quintal on non-Basmati paddy and on Basmati tenant makes a surplus of Rs 579 per quintal in this case. The analysis suggests that on per hectare basis, that is the governing principle behind farmers' choice of varieties of paddy, the cultivation of non-Basmati is profitable in *Seel* and Basmati cultivation is profitable in *Mehlanwala*.

Value Addition by Other Actors of PVN

The trading in Punjab takes place through commission agents. The procurer includes Government as well as private agencies. Commission agent has a two-way relation with farmers; one credit relation and other output relation. The credit and output relations are intertwined in a manner that provides a commission agent, confirmed supply and increases their distributional share in the value system. The advance payment made to the farmers becomes a guarantee that the farmers will sell their produce to the commission agent. Hence, the commission agent receives commission by procurement agencies and interest from farmers.

According to the commission agent in *Seel* village of Patiala district of Punjab, he procures non-Basmati paddy for PUNSUP. There are at least 150 farmers, who sell their produce to him. These farmers are from *Seel* village as well as from 7-8 neighbour village. The commission agent has a designated place in the *Seel* Mandi (Market Committee), where he buys paddy from farmers, checks quality and makes payment after adjustment of interest. In the *Seel* Mandi, six commission agents are operating. According to the commission agent, farmers pay for cleaning and procurement agencies pay for the loading/unloading/packing and transportation of paddy. The moisture content permissible in the paddy is between 18 and 19 percent. If farmers bring paddy with higher moisture content, then they have to dry it and then weighing take place. The commission agent informs that in one year, all commission agents

together in *Seel* village trade almost 1.5 lakh packets (one packet is 35 kg) or 52500 quintal of paddy. The business of paddy in *Seel* village starts in October and continues until February.

The farmers of *Mehlanwala* village sell paddy to the commission agents in Harsha Chhina Mandi. According to the commission agent interviewed in Harsha Chhina Mandi, he trades paddy for approximately 150 farmers, who come from village within 25 km radius of Harsha Chhina. The interviewed commission agent says that 70-80 percent farmers take advance payment and these farmers take 80-90 percent money in advance. Procurers of paddy include both private (50 percent) and public agencies (50 percent) in Harsha Chhina Mandi for non-Basmati varieties. Only agents of private companies come in the market for procurement of Basmati varieties. Out of the total trade, Basmati varieties constitute approximately 75 percent and non-Basmati 25 percent. According to the commission agent, the total amount of trade increases between September to November and then it decreases. He reports that the trade of paddy begins in the month of September, when the trade amount is roughly between 500 packet and 1000 packets, in October it is 1000 packets to 2000 packets, in November the sale is maximum that is, between 3000 packets to 4000 packets and in December trade falls between 1000 packets and 2000 packets and between January and March the total trade is 400-500 packets (one packet is of 35 kg). According to the commission agent, procurers pay market fees and development cess. Workers in the market get piece rated wage; for cleaning it is Rs 5.74 per packet (from farmers), Rs 5.76 per packet (from procurer), Rs 1.63 per packet (loading/unloading from procurer) and Rs 1.35 per packet for stitching (from procurer). The commission agent does not need any storing facilities as the trade happens on the same day of product arrival in the market. The commission agent spends money only for electricity bill (Rs 5000 per month), cleaning machine in a season (Rs 6000 or Rs 2000 each for three machines and for generator (Diesel) Rs 3000 per month. The total expenditure per month for a commission agent is approximately Rs 9200.

The operation of rice mills in Punjab coincides with the functioning of the Mandi. Therefore, except for big Basmati Rice companies, most of the mills, used for non-Basmati paddy, operate between September and March.

According to the rice mill operator in Punjab, from one unit of paddy, the output ratio of raw rice is between 64 percent and 80 percent, broken rice is 9 percent, husk is 17 percent, and rice bran is 12 percent. The interviewed rice mill has employed two mechanics on a salary of Rs 15000 per month for each, one cashier on a salary of Rs 25000 per month and another cashier on a salary of Rs 16000 per month. There are six workers employed by the mills, who get almost Rs 10000 per month each. For loading, unloading and packing, rice mill employs casual workers, the number is 22, each of them get Rs 600 per day for 22 hours' work, when rice mill is operational.

There is one manager of the mill, who gets Rs 25000 per month from rice mill and Rs 5000 per month from a spare parts company. Apart from these workers, there is a cook and a security guard in the rice mill, both of them get Rs 10000 per month. All workers get salary only for the period between September and March. The interviewed rice mill spends Rs 1 lack per month on electricity. Machine maintenance for a season requires Rs 1.5 lakh. Expenditure on seasonal replacement of tarpaulin is between Rs 10000 and Rs 15000, and wooden base for storage of rice is Rs 50000. There is 2-acre land with the rice mill and a storage capacity of 5700 packets at a time. In 2017-18, rice mill received 100 -115 thousand packets of paddy for milling, that includes 80-85 thousand packets from *Seel* Mandi and 20-30 thousand packets from Rajpura Mandi. The rice mill provides their own jute bags to the commission agents but the final packing of rice happens in the new jute bags provided by the government procurement agency. The transportation cost is borne by government.

According to rice mill owner, the milling for 1165 packets of paddy (35 kg. per packet) is done in one day. The output includes 570 packets of rice (50 kg. per packet), 50 packets of rice bran (55 to 60 kg per packet), 45 quintals of husk per day and 10 to 12 packets of broken rice per day (60 kg per packet) approximately.

The owner of the rice mill has 60 acres of agricultural land. He is also one of the six commission agents in the *Seel* Mandi. 1.5 lacs packets of paddy arrive in Mandi in one season, which is distributed amongst two rice mills equally.

Last year, out of the total 85000 packets brought at his rice mill, 11000 packets of paddy were produced on his own land.

Table 6.3: Cost and Margins for Different Actors of Value Chain in Punjab (Rs per Quintal of Paddy), 2017-2018

Place	Actors	Other Costs (Rs)	Price Received (Rs)	Commission	Interest on Loan	Total
Patiala	Commission Agent (Non-Basmati)			38.75 - 39.75	60	98.75 - 99.75
	Commission Agent (Basmati)			65.00 - 67.50	100	165.00 - 167.50
	Rice Mills	25.33	310.5	285.17		285.17
Amritsar	Commission Agent (Non-Basmati)			30.00 - 39.75	32	62.00 - 71.75
	Commission Agent (Basmati)			57.50 - 87.50	62	119.50 - 149.50

Source: Primary Survey by Author (2017-18)

The public procurement agencies procure paddy on two prices; for grade A, rice price for the period was Rs 1590 per quintal and for common paddy, it was Rs 1550 per quintal. So, for common and grade A varieties of non-Basmati paddy, commission agents received Rs 38.75 per quintal and Rs 39.74 per quintal, respectively. The average interest earning of commission agents on non-Basmati varieties in *Seel* village was Rs 60 per quintal. Therefore, a total earning of commission agent on non-Basmati varieties was between Rs 98.75 and Rs 99.75 per quintal. The Commission agent in Rajpura Mandi earned commission between Rs 65 and Rs 67.50 per quintal on Basmati paddy. The average interest earning of the commission agents in Patiala on Basmati is Rs 100 per quintal. Therefore, the total earning of commission agent on Basmati is between Rs 165 and Rs 167.5 per quintal.

The commission agents in Amritsar earned commission on non-Basmati paddy between Rs 30 and 39.75 per quintal. The average interest earning was Rs 32 per quintal on non-Basmati rice. A total surplus of commission agent on non-Basmati paddy is between Rs 62 and Rs 71.50 per quintal. On Basmati varieties, commission agents earn between Rs 57.5 and Rs 87.5 per quintal as commission and an average of Rs 62 per quintal as interest payment by farmers.

Therefore, the total surplus earning of commission agents in Amritsar is between Rs 119.5 and Rs 149.5 per quintal.

Taking all expenditure together, that is, variable and fixed costs (including depreciation), a rice mill spends Rs 25.33 on one quintal paddy. The mill gets Rs 10 per quintal of paddy from public procurement agency for milling. Apart from that, rice mill sells all the by-products in open market. For broken rice, the mill received Rs 1400 per quintal in 2017-18. The price received by rice mill for husk was between Rs 200 and Rs 250 per quintal. The price of rice bran in open market was between Rs 1100 and Rs 1200 per quintal. Using the revenue from by-products, the revenue of rice mill on one quintal of paddy was Rs 310.5 and surplus was Rs 285.17 per quintal.

Agricultural Workers in Paddy Value Networks of Punjab

The agricultural workers' involvement in the paddy value networks of Punjab reflects a unique social pattern. The workers, participated in focused group discussion in Patiala, were migrant OBC workers from Bihar. The migrant workers come to Punjab in February and are there till July and then again come back in October and stay till December. When they are in Bihar, they work in agriculture. The workers' participation reflects that agriculture of Punjab mostly depend upon the migrant workers. The migrant workers come to Punjab in a group of 5-6 people. They live at some place adjacent to crop field. They call that place (Motor). They farmers come to Motor and offer the work. Generally, these workers get work on a piece (of land) rated basis. Since, most of the time they get piece rated wage, they earn Rs 200 to Rs 600 per day (varying working hours) with rice or wheat. Other than agriculture, they also work in construction, for that they get Rs 300 to Rs 450 per day with a scope of bargain. In agriculture, they work for 12 to 16 hours. When they work 12 hours a day, they get Rs 500 and when they work for 16 hours a day, they get Rs 700-800.

Other than male migrant workers, female workers also participate in agricultural work. All the female workers participated in the focused group discussion were SC. As discussed in earlier chapter that the share of SC in total population of Punjab is close to 30 percent and in *Seel* village it is 21 percent.

However, their ownership over the land is less than 3 percent. Hence, the rural SC households are the major constituent in the agricultural and non-agricultural workforce. According to the participants of the discussion, most of the women also work in the construction sector. Some women reported tailoring as an occupation during the agricultural off-season. For both, agricultural as well as construction works, they work in the village only. The employers come to their home and offer the work. For agricultural works, female workers get Rs 170 per day and two-time tea and for non-agricultural work, Rs 180-200 per day. During the peak agricultural season, women workers work for 8 hours a day for 10-15 days in a month.

In the *Seel* village, most of the workers were employed for paddy transplant. As it was noted that most of the operations in paddy cultivation in Punjab are done by machine except for transplantation, so, it is also reflected in the workforce participation in agriculture. There is a clear gender wage gap reported generally, for the same work, female workers get almost half of what their male counterparts get.

In Amritsar, all the male workers belonged to SC community, that is again a reflection of asymmetric ownership over land or other means of production. The workers reported that other than Paddy transplant and harvest, they generally work in a diverse range of non-agricultural works. In 2017-18, they also worked as housekeeper, security guard etc. but, they left these jobs after a month or two, because they are continuously in search of better paid jobs. The other reason they said that they did not find this job interesting. When they were working as housekeeper or security guard, they were doing only one job at a time. However, in case of agricultural works, they reported that sometimes they worked as construction workers in villages and nearby areas. Therefore, even agricultural work is not something where they work every year.

In *Mehlanwala,* the participants of discussion were residents of the same village. They reside in a cluster in the village, where most of the households are SC. The employers either visit their home or call them for work. For agricultural work, they get Rs 300 per day. In non-agriculture, they get Rs 300 per day or Rs 9000-10000 per month in case of salaried employment. In

agriculture, they work for at least 10 to 15 days in a month for about 12 hours a day.

In both the villages of Punjab, it was reported that while working in water during paddy transplantation, the hands and legs absorbs water. The swelled hands and legs take 10-15 days to recover. However, even in that situation, they continue to work in the field. Sometimes, their works also get affected, so, in the piece rated work the daily earing decreases. They also reported that after putting Padan (a pesticide) in the paddy field, they generally fall sick; headache, nausea, fever is the immediate outcome of Padan spray on workers.

An Exploration of Power Relations in Agricultural Value Networks

Introduction

From cultivation to consumption, paddy passes through several production processes, where the arrangement of actors and production processes are non-linear. Post cultivation, paddy is traded to local private traders, public procurement agencies, in markets, input dealers, processors or other agencies. The forward linkages of farming are closely related with the land size group of the farmers. After some exchanges, paddy reaches as the raw material to rice mills or other processing units, where rice as a main product is produced by the labour using machineries and other auxiliary material. In the final stage, rice reaches to the markets for sale.

Throughout its way, from cultivation to end markets, various linkages are possible and each linkage reflects unique power relation between actors of the interlinked production processes. The power relation between actors answers the question, why particular type (size group) of actor exchanges the produce with a particular type of actor in the next segment of the interlinked production processes. From chapter 3, 4 and 5, it is evident that the farmers in the larger land size group have better forward linkages than the farmers in the smaller land size groups. The access to better forward linkage allows farmers to increase their surplus. The current chapter tries to understand, how the power relation works between the interlinked production processes and studies its impact on the surplus of the farming in view of the evidences presented in the earlier chapters of the thesis.

Exchange and Power

From one stage to another stage of the value system, the movement of commodity is possible through only exchange. After completion of each production process, the product has some use value. However, some labour process is needed from the view of exchange and hence, the value of the product does not remain equal to its use value. According to Marx,

> "*In the course of time, therefore, some portion at least of the products of labour must be produced with a special view to exchange. From that moment, the distinction becomes firmly established between the utility of an object for the purposes of consumption, and its utility for the purposes of exchange. Its use-value becomes distinguished from its exchange value*" (Marx, 1867).

After the cultivation process, paddy is taken to the market followed by the rice mills where the use value remains same. However, in the process of these movements, some labour power is needed, which increases the value of the product. So, at each stage or transaction of the value systems is in itself a labour process, where some amount of the labour is added to the product. When a local trader procures paddy from the farmers' field and take it to the market for sale, she/he also adds value to it and hence the value of the product in the market is higher than when it was in the field. In other words, the exchange value of any commodity is what it commands for exchange with other commodity, which is not necessarily equal to use value.

The pre-condition for the exchange of commodity is ownership over it. The parties in exchange must recognise each-other's ownership over respective commodities under exchange. Moreover, because of the ownership right, power becomes intrinsic to exchange. According to Marx,

> "*Commodities are things, and therefore without power of resistance against man. If they are wanting in docility he can use force; in other words, he can take possession of them. In order that these objects may enter into relation with each other as commodities, their guardians must place themselves in relation to one another, as persons whose will resides in those objects, and must behave in such a way that each does not appropriate the commodity of the other, and part with his own, except by means of an act done by mutual consent. They must therefore, mutually recognise in each other the rights of private proprietors. This juridical relation, which thus expresses itself in a contract, whether such contract be part of a developed legal system or not, is a relation between two wills, and is but the reflex of the real economic relation between the two. It is this economic relation that determines the subject-matter comprised in each such juridical act.*" (*ibid*)

Once a human acquires or owns the object then the power of resistance enters against the other human, who wishes to take possession of the object. However, the object is alienable and for that in a society of private property, the exchange is possible through formal/informal contracts. The alienation of object from the owner is not in absence of power. Hence, how much an object commands in

terms of other object, is not only dependent on the use value. The respective powers of the persons at the both ends of the exchange decides the exchange value of the commodity.

For the owner of the object, a set of powers work from behind i.e. the factors that pushes him/her to alienate the object. The other set of powers work at the forward linkages i.e. the factors that pulls object from him/her. In the agricultural value systems, smaller farmers are compelled to sell produce immediately after the harvest to raise money, to repay loan or in absence of proper storing capacity etc. (Muthiah, 1961; Thingalaya, 1965; Dev and Rao, 2005). In case of share-cropping in some places, land owner gets half of the final produce (Saxena, 2013).[1] These set of factors weakens the power position of the small farmers in exchange. The weaker power position reflects in the unit price received by the farmers for the identical produce.

As discussed in chapter 4, 96 percent of Bihar paddy farmers received price less than the MSP. The proportion of farmers in marginal, small, semi-medium and medium were 97, 97, 90 and 82 percent respectively. In Punjab (chapter 5), 26 percent of the farmers received unit price of paddy less than MSP. This reflects the weaker power position of farmers in Bihar than Punjab in exchange of paddy. The power position in exchange further weakens with the decreasing land size of the farmers. The land is central factor to decide the power position of farmers in the value systems. The ownership over land, as discussed in chapter 2 and 3, is closely related with the social position of the farmers and hence, the socio-economic-political conditions affect the power position of farmers.

Exchange in the Agricultural Value Networks:

In the Agricultural Value Networks, the exchange takes place between agriculture and non-agriculture segments of the economy. Apart from the general production processes of agriculture and non-agriculture, these

[1] http://planningcommission.nic.in/reports/articles/ncsxna/index.php?repts=leasing.htm#

segments are quite dissimilar in terms of surplus generation capacity. According to Marx,

> "*absolute surplus-value is greater in industry so long as the normal working-day is not regulated by force of law. A second reason for a smaller amount of surplus-value being created in agriculture is the long period during which the product remains in the process of production without any labour being expended on it.*" (Marx, 1968)

In agriculture, the increase in the surplus value through increase in the labour time is possible only to a limited extent. However, in industry workers can be forced to work for longer hours to increase production and hence surplus. In agriculture, there is a certain period when seed in the soil needs no labour process but natural growth, which also results in lower surplus generation in agriculture than industry.

The second factor that differentiates the agriculture from other industry is price determination. Changes in price of agricultural product is demand-determined. Whereas, changes in price of finished goods are cost-determined. The differences in the price determination is because of different conditions of supply. In words of Michel Kalecki,

> "*The production of finished goods is elastic as a result of existing reserves of productive capacity. When demand increases it is met mainly by an increase in the volume of production while prices tend to remain stable. The price changes which do occur result mainly from changes in costs of production. The situation with respect to raw materials* [agricultural products] *is different. The increase in the supply of agricultural products requires a relatively considerable time. With supply inelastic in short periods, an increase in demand causes a diminution of stocks and a consequent increase in price.*" (Kalecki, 1971).

In case of paddy, most of the produce is available for sale after harvest, once in a year or at some places twice in a year. When the paddy is harvested, a definite stock is available for sale, that cannot be increased because of increase in demand immediately. The increase in demand or price may have its impact on the following year's cultivation, however the short run changes in demand directly affects price of paddy. In case of rice mills, provided they have storage capacity for paddy, the change in demand for rice can be met by change in amount of milling. Hence, any change in demand will reflect change in supply and price though remains unchanged. However, the change in demand for rice

will have an impact on change in demand for paddy that would cause change in price of paddy. Therefore, taking points from Kalecki's argument, the changes in price of rice is through channels of cost, that is, change in the price of paddy. Even in a capitalist economy, the performance of agriculture sector and industry are quite different. The difference also affects their interlinkages and power position in exchange.

In India, as discussed in chapter 1, majority of the workforce are dependent on agriculture as either cultivators or agricultural workers. Most of agricultural dependent population is smallholder households, who do not have storage capacity. Due to lack of storage, compulsion of loan repayment, and to begin operations for next crop, most of the farmers sell produce immediately after harvest. As discussed in chapter 7 and 8, the finding from the field suggests that most of the markets for paddy function for the months when harvesting takes place. Later on, the amount of sale in the market drops. In Bihar, it was found that local traders procure paddy from the field itself. In Punjab, most of the farmers take the paddy to the markets loading them on tractors directly from the field and do not store it anywhere. Whereas, rice mills, local traders and wholesalers of paddy, as surveyed in both the states have good storage facilities.

The limitation to surplus generation in agriculture and demand-determined price places agriculture in a weaker power position in the exchange vis-à-vis forward linkages. The lower surplus generation pushes capital outside the sector in a capitalist economy, until rate of profit in all sectors equalises (Yaffe, 1974). The lower surplus also causes lower re-investment in agriculture and in the end until situation reverses, it remains economically weaker. In India, there is a substantial amount of land under tenancy, where the tiller of the soil is not the master of the land. As discussed in chapters 3, 4 and 5, there is a significant share of leased-out land out of total owned land. A significant portion of the surplus value in agriculture goes to owner of land as rent (Marx,1968). The siphoning of surplus is barrier to investment and hence hinders the growth of agriculture (Patnaik U, 1999).

Since, farmers cannot respond to change in demand by changing supply amount, so, the power remains at the demand side of the exchange. However, in the long run farmers can decide to cultivate more (provided last year's cultivation is below the potential level), but, in the short run farmers can respond to change in demand only if they have storing facility or capacity to respond to change the supply according to demand, which most of the Indian farmers do not have. Because of such nature of agriculture, external protective measures are required for farmers. In India, in 1965, Agricultural Price Commission (APC) was formed to advise the Government on the prices of agricultural products. Along with a general protection to farmers, the APC was mandated to provide an incentive to the producer to maximise production using new technologies, to ensure that land and productive resources are used rationally and to take into account the impact of price policy on overall economy (Bharadwaj, 1997).

Extraction of Agricultural Surplus by Output Linkages:

Agricultural value chain is a series of interconnected production processes or 'labour processes' or 'circuit of capital'. Using Marx's theory, this can be represented as M_1-C_1-M_1'-------M_2-C_2-M_2'-------M_3-C_3-M_3'-------M_4-C_4-M_4'----- and so on. Let us assume that circuit of capital for paddy cultivation (sector 1) is M_1-C_1-M_1' and circuit of capital for processing industry (sector 2) is M_2-C_2-M_2'. Paddy is main raw material for the processing industry. The processing industry buys one unit of paddy at M'$_1$ price, spends money over wage, auxiliary materials, and depreciation in the process of milling. Combining all expenditures on the milling of one unit of paddy, owner of processing industry spends M_2 money. Hence,

M_2 = M_1'+Price of auxiliary materials +Depreciation of machinery +Payment to workers … (1)

The extended form of circuit of capital is M_1-C_1- C_1'-M_1' for sector 1 and M_2-C_2- C'$_2$-M_2'for sector 2 i.e. using the labour processes at each stage of the production process, the value of product is increased from C_i to C_i' ($i = 1,2$).

In sector 1, M_1 money is spent to procure C_1 capital, assuming the value of money is constant in the short run, the value of M_1 will be equal to the value of C_1, i.e.

$M_1 = C_1 = c_1+v_1$;

……. (2)

where 'c_1' is constant capital and 'v_1' is variable capital in production.

$C_1' = c_1+v_1+s_1$;

……. (3)

Hence, the surplus generated in the sector 1 = $C_1' - C_1 = (c_1+v_1+s_1) - (c_1+v_1) = s_1$. …… (4)

It should be noted that the surplus is generated in the production process but it is realised in the money form in the market (i.e. $M_1' - M_1$ is the realised surplus) and the money value of commodity or the price is not necessarily equal to the value of product (Sweezy, 1946; Yaffe,1974; Amin, 1978). Due to these reasons mentioned in the previous section of the chapter; the lower surplus generation capacity of agriculture and demand determined the price of agricultural product, and that the power position (bargaining strength) of the farmers is weaker than the industry owner. Hence, the M_1' is not necessarily equal to C_1' and because of the weaker power position of the farmers in the exchange of paddy, it is most likely that M_1' is less than C_1'.

Alternatively,

Since, $M_1 = C_1$ [Using …. (2)] and $M_1' < C_1'$

So, $M_1' - M_1 < C_1' - C_1$ [Since, $M_1' < C_1'$]

Or, Realised surplus in sector 1 < Generated surplus in sector 1.

In the sector 2, the surplus realised = $M_2' - M_2$

$= M_2' - (M_1'$+Price of auxiliary materials +Depreciation of machinery +Payment to workers) [Using …. (1)]

Here, M_2' is cost determined price, because rice is industrial output and paddy is agricultural product. The cost-determined price implies that there is a mark-up, below which the price cannot fall. The price of auxiliary materials is also determined in the same way and therefore, it cannot be controlled by the owner of sector 2. The depreciation of machine is inevitable. There are only two things in the above formulation, which can be the source of surplus; one, workers and two, M_1'. The workers are the source of surplus as discussed by Marx at length. Here, the sector 2, not only accumulates the surplus generated by the workers of sector 2 but also pulls a significant amount of surplus generated in sector 1, using stronger power position in the exchange. The stronger power position of industry allows it to suppress the value of C_1', i.e. the payment made to farmers for one unit of paddy. Therefore, a significant portion of surplus realised in the sector 2 is actually generated in the sector 1.

The transfer of surplus generated in agriculture to industry is dependent on relative power positions. As stated above, the first reason for weaker power position of farmers than industry, in exchange, is lower surplus generation capacity of agriculture in comparison to industry. The lower surplus generation capacity results in lower reinvestment possibility for agriculture. For a given geographical and policy conditions, the surplus generation capacity is more or less same per unit of land. However, the rate of surplus may be same across all land size groups, but the aggregate surplus from agriculture is directly proportional to the land size. This provides better opportunities for reinvestment in agriculture to larger land size farmers than the smaller land size farmers. The second reason for the weaker power position of the farmers in exchange is, demand-determined price system for the agriculture. The demand-determined pricing mechanism allows the farmers to get control of the price until they have capacity to respond to the change in supply with respect to demand. Because of the more capital investment and more (total) production,

the larger farmers are better equipped to respond to change in demand than the smaller farmers. This results in the conclusion that the relative power position of the farmer in exchange is directly proportional to the land ownership. The conclusion indicates that the M_1' for large land size farmers is more than the same for small land size farmers. However, this does not negate the possibility of squeeze of surplus from agriculture. Hence, the different value chains in value networks exhibits unique link of relative power positions and distribution.

As discussed in chapter 6 and 7, farmers' earning from one unit of paddy is smaller than the other actors of the value systems of paddy. For the period of survey (2017), the rate or return (the percentage of return on the investment made) for the farmers in Seel village of Punjab from one unit of non-Basmati paddy was 1.5 percent, and 2.8 percent from one unit of Basmati. In Mehlanwala village, the rate of return from non-Basmati and Basmati for farmers were -6 percent and 28 percent respectively. In Kharbhaiya village of Bihar, the rate of return was -11 percent for farmers. Farmers of Kuraitha village made complete loss because of flood. It should be noted here that the rate of return (taking cost of production as base), for a farmer is for the period of three-four months. However, for other actors, period for rate of return is quite smaller than that.

The surplus earned by farmers in Seel village of Punjab is one percent of ex-mill price of non-Basmati rice. In Mehlanwala village of Punjab, famers' surplus from non-Basmati rice was negative for the surveyed period. The surplus earned by commission agents in Punjab was 2 percent and by rice mill it was 18 percent of the ex-mill price of non-Basmati rice. In both villages of Bihar, the surplus earing of farmers, on an average, was negative. At the same time, in the surveyed villages of Bihar, the surplus earning of local traders was between 1 and 2 percent, for wholesalers it was between 3 and 4 percent, and for rice mill it was 10 percent of the ex-mill price of the non-Basmati rice. The deficit for farmers and the surplus for other actors reflects the weaker power position of the farmers in the paddy value system. Hence, the figure presented here is not possible without significant shift of the surplus from agriculture to non-agriculture segment of the value network of paddy.

In chapter 4, it is discussed that how in a given regional conditions, the price and hence margin received by the farmers of Bihar is dependent on the size of operational land. The larger landholder paddy farmers of Bihar get better price through better market opportunities than the small holders. The public procurement agencies are considered as better market for the farmers in Bihar, accessibility to which increases with the increasing land size of the farmers. The situation in Punjab is different from Bihar; most of the farmers in Punjab receive price higher than the Minimum Support Price (MSP), primarily because of the public procurement at MSP. However, the situation of Punjab farmers does not contradict the result stated in the above paragraph. In Bihar and Punjab, the economic cost of rice (calculated by the public procurement agencies) is more than the wholesale price for most of the years as discussed in chapter 4 and 5. The lower wholesale price of rice can only be explained through the possibility of squeeze from the farmers. Therefore, as a whole, farmers have weaker power position in the value system, but, within the farming community, the power position improves with the increasing size of the land holding.

Role of the State:

The affirmative actions by the policy makers or Governments have the potential to strengthen the power position of farmers in the agricultural value system and hence, to affect the flow of surplus. From the perspective of surplus generation in agriculture and retention of the same, the State has twofold role i.e. (1) intervention in the backward linkages and (2) intervention in the forward linkages. The state's intervention in the backward linkages helps farmer to generate more surplus in either the short run or long run. The intervention of the state in the forward linkages helps to retain the surplus generated in agriculture to a significant extent. Some of the well know intervention of the Government in the backward linkages are; subsidy on fertilisers, electricity subsidy, irrigation infrastructure, credit facility, research and development, etc. The intervention in the forward linkages mainly includes

building market infrastructure and other infrastructure for the market connectivity, public procurements etc.

Table 7.1: Fertilizer Subsidy Given by Government of India (Rs Million), 2007-2017

Year	Fertilizer Subsidy (Nominal)	Fertilizer Subsidy (Real)	Annual GR (%)	AAGR (%)
2007-08	224510	305078		
2008-09	309864	388359	27	
2009-10	499803	590825	52	40
2010-11	499807	542309	-8	
2011-12	499979	499979	-8	
2012-13	609741	566986	13	
2013-14	659713	578698	2	0
2014-15	729703	620946	7	
2015-16	729686	618865	0	
2016-17	663129	546808	-12	-2

Source: Nominal Value from Various Years Union Budget, Note; the Real Value is adjusted using GVA Deflator, the Source of GVA is Reserve Bank of India.

The fertilisers' subsidy constitutes more than 85 percent of the total agricultural subsidy in India and subsidy on irrigation is negligible (Kaur and Sharma, 2012). The Government of India provides subsidy for fertilizers. The average annual growth rate (AAGR) of real fertilizer subsidy given by the Government of India is 8 percent. The annual growth in the real fertilizer subsidy can be divided into three phases; (1) until 2009-10, the AAGR was 40 percent, (2) between 2009-10 and 2013-14 the growth declined and AAGR was 0 percent and (3) in the last three years AAGR was -2 percent with an absolute decline of 12 percent in 2016-17.

Some of the State Governments in India subsidises electricity for agriculture. The Government of Punjab, Karnataka and Tamil Nadu provided electricity subsidy for agriculture. Punjab, Karnataka, and Tamil Nadu Governments have allocated Rs 129500 million, Rs 88410 million and Rs 75378 million respectively as for the electricity subsidy; most of it is used for agriculture.[2] As per the latest available data, in India 20 percent of the total electricity consumption (863364GWh) is used in agriculture. In Punjab, the share of

[2] 2018-19 Budget of Punjab, Government of Punjab, 2018-19 Budget of Karnataka, Government of Karnataka and 2018-19 Budget of Tamil Nadu, Government of Tamil Nadu

electricity consumption for agriculture is 28 percent (11514GWh) and in Bihar the share is 2 percent (344GWh) of the total consumption of electricity.

According to the agricultural census of India, 2010-11, the ground water (tube-well) is the biggest source of irrigation in India. In Bihar out of total irrigated land, tube-well is used in 65 percent area, in Punjab the share is 79 percent. However, the total irrigated land in Bihar is 48 percent and in Punjab it is more than 99 percent. The surface water irrigation (canal) is 14 percent in Bihar and 20 percent in Punjab of the total agricultural land. Because of the lack of subsidised electricity, in Bihar, for the ground water irrigation, farmers have to rely mainly on the diesel operated power generators. However, the Punjab farmers benefit from the free electricity.

The subsidy on fertilisers and electricity, directly act upon the cost of cultivation and through that direction helps to increase the surplus from agriculture for farmers. On the other hand, the Government's support in accessing the institutional credit to farmers helps in minimising the leakage of surplus as interest on borrowed money. The institutional credit disbursed in Bihar and Punjab, as per latest available data (2016-17), are Rs 261845 million and Rs 743015 million respectively (DoES, 2018). The access to institutional credit in Punjab is almost three times higher than farmers in Bihar. Taking the per hectare credit accessibility, the ratio further decreases for Bihar. However, in case of Punjab, various studies show that despite a very high amount of institutional credit disbursed in the state, farmers' dependence on the informal lending is not less. In fact, in Punjab, the informal sources have the highest share out of the total borrowing by agricultural households in Punjab, (Gill, 2004).

Research and development (R&D) is another area where state intervention helps farmers to increase productivity and therefore, in the long run to increase surplus. This is the area where farmers in individual capacity cannot do much (except big capitalist). The green revolution in India, during the mid-1960s, helped the farmers to access high yielding varieties of seeds, modern technologies, upgraded fertilisers etc. These factors in the long run helped to increase the productivity and made the country self-reliant in food grain

production. However, as discussed in chapter 5, the impact of green revolution was not alike across different states of India. Punjab benefited more than Bihar from the Union Government sponsored green revolution. The budgetary provision for agricultural research and education by the Union Government in 2015-16 was Rs 29886 million, which increased by 10 million in 2016-17 but declined to Rs 16248 million in 2017-18.

The affirmative intervention of the state in the backward linkages helps the farmers to garner more return than in a situation of absent state intervention. The agricultural policy of the state is one of the reasons behind higher surplus of paddy farmers in Punjab than Bihar. However, the intervention of state is not enough to stop the leakage of surplus completely. In Punjab, as mentioned above, farmers in Punjab are still more reliant on informal moneylenders. The borrowing of money from commission agent (discussed chapter 7) reflects the debt trap of the farmers on the one hand and leakage of surplus through high interest payment on the other. The rate of interest paid on the loan from commission agents in Punjab is as high as 24 percent per annum. As discussed in chapter 7, the payment made to commission agents as interest on borrowed money is even higher than the commission. Another leakage of surplus takes place through the rent of land. In Punjab, the rental value of land is close to 60 percent of the total cost of cultivation and in Bihar, it is 35 percent.

Due to the lack of adequate surplus generation capacity, in Bihar, many agricultural households are not dependent on agriculture alone. For agricultural households in the state, income from non-agricultural sources is quite large (Thakur et. al. 2001). Contrary to this, surplus generation in Punjab agriculture is higher than Bihar, however the leakages through high interest on informal lending and rent of leased in land diminish the benefit of the policies for farmers. The size of land and its ownership also affect the credit market, not only in Punjab but also across the country, the access to institutional credit is more for large land holder farmers (NSSO, 2014).

The state's intervention in the forward linkages mainly consists market, connectivity to the market and public procurement. The accessibility to the agricultural markets reduces the transaction cost for the farmers, as in most of

the cases the cost of the transportation is paid by the seller/farmers. Therefore, increasing the market density or smoothing the connectivity with the markets (through road infrastructure etc.) helps the farmers to realise higher rate of return than otherwise. As discussed in chapter 4 and 5, the agricultural market density in Punjab is higher than that in Bihar. This is also one of the reasons behind sale of paddy to local traders by farmers in general and by small landholders in particular. Benefitting from the economies of scale, large landholders take their produce directly to the markets. In Punjab, according to the primary survey, all small landholder farmers take their produce to market but in most of the cases in Bihar, it is sold to local traders. Therefore, easier access to agricultural market strengthens the power position of the farmers in general and smallholder farmers in particular.

Public procurement is considered as one of the major intervention of the state that directly and immediately benefits the farmers. The public procurement agencies procure at a price (MSP), which, in an ideal case, takes care of the cost of production, and hence keeps farmers away from the fluctuating market price. Therefore, the matter of power position does not enter in the transaction between farmers and public procurement agencies. In the normal circumstance, the price of agricultural commodities is entirely dependent of the demand side behaviour (Kalecki, 1971). The public procurement, through the demand side approach also strengthens the power position of the farmers in other markets.

The normal demand for agricultural product can be represented as $\mathbf{Q}_d = A - \alpha\mathbf{P}$. Here, '$Q_d$' is quantity demanded in the market and 'P' is the price. The demand equation for public procurement agencies cannot be represented by the same demand curve. The quantity of public procurement does not depend on the price and hence, there is no inverse relation between price and quantity demanded. The quantity of public procurement is completely a policy instrument. As per the primary survey results in Bihar, the time when public agencies start procurement of paddy is more crucial and there is a deciding factor of total amount of public procurement. Hence, the demand equation given above is just a representative of the normal market demand that is inversely related to the price of the commodity. The quantity supplied by the farmers in a particular crop season is constant. If the farmers have storing

capacity, then only farmers can respond to the change in price in a manner that quantity supplied is directly proportional to the price change. However, in normal circumstances, most of the farmers in India do not have the storing capacity and due to the need of liquid money, they sell paddy immediately after the harvest. Therefore, the quantity supplied by farmers of a particular region can be represented as '$\mathbf{Q}_s$ = B'.

Here, two cases have been analysed; 1. Situation without public procurement and 2. With public procurement.

Case1: It is assumed that in a normal circumstance both the actors in exchange of commodity exercise their power position in a manner that market gets clear

i.e. $\mathbf{Q}_d = \mathbf{Q}_s$

or, $A - \alpha\mathbf{P}_1 = B$, where, A, α and B are constant numbers.

or, $\mathbf{P}_1 = (A - B) / \alpha$

Case2: Let us assume that public procurement agencies procure 'C' amount from the farmers at MSP. From the empirical evidence, it is clear that the price paid by public procurement agencies for paddy is greater than the average market price of the same. Hence, in all circumstances, public procurement is preferred destination for sale by farmers. It is also assumed that C <= B, i.e. public procurement is either smaller or equal the total amount of paddy for sale. If C < B, farmers sell the remaining paddy in open markets. So, in this case Q_s = B – C. Again, as per equilibrium condition

i.e. $\mathbf{Q}_d = \mathbf{Q}_s$

or, $A - \alpha\mathbf{P}_2 = B - C$,

or, $\mathbf{P}_2 = (A - B + C) / \alpha$

So, $\mathbf{P}_2 > \mathbf{P}_1$

i.e. average market price in absence of public procurement is lower than the price in presence of public procurement. Even if there is a need to increase the average price in the agricultural market, in a demand-determined price regime,

it is possible only through the demand side intervention of public procurement agencies. The $\mathbf{P}_2$ price is directly proportional to the C, i.e. higher the public procurement, higher will bet the price in agricultural market.

Graphically,

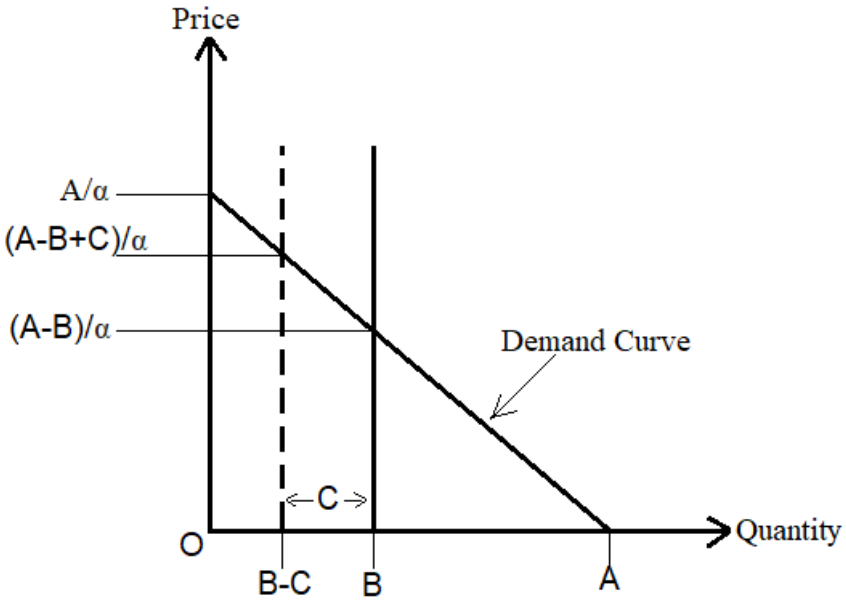


Figure 7.1.

Here in the figure 1, it is shown that a normal demand and supply curves provides a market clearing price, (A – B)/α. In presence of public procurement agency that procures C amount, the supply curve shifts backward, i.e. quantity available for sale in the open market reduces by C and hence a new market clearing price appears, (A – B + C)/α that is higher than the initial price.

The effect of price rise, mentioned above, is based on a condition that from the supply side, public procurement and open market sale are perfectly integrated, that is, farmers can decide where to sell based on price in these two segments. In other words, the price effect to take place, farmers have to be aware of the MSP and public procurement. However, the level of awareness regarding MSP and public procurement is not uniform across different states of India. It was found that only in Punjab, Haryana, and Chhattisgarh most of the farmers were aware about MSP of rice (Aditya et. al., 2017). The limited awareness is also

because of lower level of public procurement. As discussed in chapter 4 and 5, in the year between 2012-13 and 2016-17, the public procurement of paddy in Bihar was on average 17 percent, whereas, in Punjab the ratio was 78 percent. The empirical evidences support the theory outlined, as the average price received by the farmers for paddy is also higher in Punjab than Bihar; 96 percent of Bihar and 26 percent of the Punjab paddy farmers receive price less than MSP.

Since the purpose behind the public procurement is to increase the surplus of farmers, so, it is possible only at a MSP, that takes care of the entire cost of cultivation and provides additional incentives to the farmers for reinvestment. In 2004, Government of India formed National Commission for Farmers under the chair of Prof M S Swaminathan. Regarding MSP, the Swaminathan Commission recommended that the procurement price should be 50 percent over C2 cost of production. However, so far, the MSP is below Sawminatan level and that remains one of the main demands of farmers in India.

There are some criticisms of this approach; it is said that price intervention by the Government distorts the market conditions (Chand, 2009). However, it is clear from the depiction above and empirical findings that agricultural market, by nature, is demand dominated and without any demand side intervention of the Government at an adequate MSP, the power position of the farmers is weaker than other actors in transaction. The weaker power position of the farming community makes small farmers more vulnerable. As in case of Bihar, because of lower public procurement, the situation of small landholders is more vulnerable than the large landholders. Therefore, undoubtedly, price intervention by the Government results in an alteration of the normal market condition but this change is in favour of the farming community, who otherwise would end up at a price that is not an incentive for the reinvestment in agriculture.

The other criticism of price intervention of the Government argues that the policy to emphasise more on the non-price intervention to increase yield etc. can help farmers to earn more from the given size of land (Dev and Rao, 2010). There is no contradiction that increasing yield helps farmers to generate more

income, but, in absence of public procurement, the realisation of higher income may not take place because of the very nature of demand determined agricultural price.

Like Government's intervention in the backward linkages that helps to generate more surplus, the Government's role in forward linkages are not same for all land size groups. In case of lower share of public procurement out of total production, the benefit of MSP mostly reaches to large landholder farmers. In Punjab, though the share of public procurement is high, but because of interlinked credit market, only a significant portion of surplus reaches commission agents as discussed in the chapter 7.

Although, the affirmative role of the state is more visible in case of Punjab than Bihar in both, backward and forward linkages, but, leakages do take place in Punjab as well. Because of high rent, a significant surplus goes out from the farmers. Similarly, because of informal lending, farmers pay a significant amount as interest on loan. The lending in Punjab exhibits a peculiar scenario, the system of commission agent also plays as informal money lender, that charges at least 24 percent interest per annum. In case of some of the state interventions, for example, electricity, the benefit is not similar across different land size group. The large farmers benefit more from the free electricity because they have updated technologies and reinvestment capacity (Sarkar, 2011).

Conclusion and Implications of the Study

The study of agricultural value networks provides an opportunity to analyse the farmers' situation in the larger context of the value system in India. The first problem that the current study noted is the lack of unanimity with regard to concepts used for combining the whole system of value addition from production to consumption. Most of the concepts are linear considered that, the value adding processes/actors are linearly connected to each other. The linear concepts have very less room for the explanation of the question that is why different types of actors have different type of forward linkages. In most of the cases, linearity just covers movement of commodity and earning of different actors. The weakness of the linear concept does not lie in the visualisation of the power asymmetry in the value system.

The existence of power asymmetry is responsible behind the different forward linkages for different land-size-class of farmers as well as disproportionality between value addition and distribution. It is noted in literature that big farmers can dominate in the markets, whereas, the small, and marginal farmers face 'compulsive involvement'. The small farmers' power position in the system of market is not sufficient to exploit the conditions in their favour, so, the forward linkages of small and marginal farmers are forced commerce. In fact, the development of agriculture on a capitalist line, by nature, favours big landholders and eliminates small peasantry. It is also noted from literature that agriculture by its very nature, is different from non-agriculture. Therefore, the interaction of agriculture and non-agriculture, in absence of external forces, puts former actors in a vulnerable position. The vulnerability results in disproportional distribution of surplus generated in the value system.

The existence of power asymmetry is the central part of the concept of Agricultural Value Networks (AVN), presented in the study. The concept based on power asymmetry enables to know the reason behind chains for different farmers. The concept also helps to identify the source of power and method of its realisation. The AVN concept allows us to analyse the power relation between different actors/activities and different chains.

AVN depends on numerous factors, also responsible for its structure. The first set of factors are input for cultivation and production of agricultural output. The land, agro-ecology, variety of seed, month for sowing, fertilisers, irrigation sources, pesticides, and insecticides, tools used for cultivation and harvest and the natural conditions are deciding factors for the first part of AVN. The regional variation of agro-ecology is among the first set of factors that decides the selection of crop, and hence the AVN. There are 21 agro-ecological zones in India, based on climate in the region, soil type, quality and geographical location. The AVN has social dimension from the beginning of the land relations; most of the deprived castes are concentrated in smaller land size groups and privileged castes are in the large-land size groups. The policies related to inputs, trade etc. are other set of factors deciding the structure of the AVN.

In India, more than half of the agricultural households cultivate paddy. In terms of area under cultivation, quantity of produce, value of produce, the cost of cultivation, and largest use of human labour per hectare of land, paddy/rice is ranked first in India. The paddy has long range of varieties. Among the agricultural products in India, the Marketed Surplus Ratio (MSR) is the second highest for paddy, that is, 85 percent, implies that production for the commercial purpose. rice is ranked first in terms of quantity of food grain procured by public agencies and export of agricultural product. It is due to some of these reasons and the significance of rice, we select paddy for the AVN study in India.

The top six states (West Bengal, Uttar Pradesh, Punjab, Tamil Nadu, Andhra Pradesh and Bihar) produce almost 60 percent of the total rice produced in the country. The states of paddy cultivation are spread across nearly all parts of India, however, with varying yield rates. Among the top paddy producing states Punjab has the highest yield rate followed by Tamil Nadu, whereas, Bihar has the lowest yield rate. Out of total cost of cultivation, Punjab is the only state where the fixed cost is higher than the operational cost and lowest share of human labour cost. Punjab is second highest producer of Basmati rice in India. The yield of Basmati is highest in Punjab among the Basmati producing states of India. The MSR of rice in Punjab is highest (close to 99 percent) and lowest in West Bengal (69 percent).

Most of the paddy farmers in India, sold paddy to informal procurers, such as local traders, input dealers, unregulated markets etc. Mandi, which includes regulated as well as unregulated markets, also carry a significant share in the farmers' forward linkages. Approximately 4 percent of the total paddy growers reported the sale of paddy to public sector agencies. The highest number of paddy growers (27 percent) sold paddy to local private agencies. Almost 9 percent of paddy farmers sold their produce in the Mandi, 4 percent paddy farmers sold paddy to input dealers, 1 percent to processors and 3 percent to other agencies. The proportion of sale out of total number of paddy farmers in a particular land size group, decreases with decreasing land size. The proportional relation between land size group and sale of paddy reflects that smaller farmers consumes most of the produce, whereas, larger farmers produces mostly for sale. The same trend is reflected in terms of quantity of paddy sale across different land size groups. The average price received by the farmers reflects that, larger landholders have access to better price, this is precisely as they are relatively in a better power position than the smaller landholder farmers to utilise the market conditions in their favour.

The secondary data is not sufficient to cover the domestic trade of paddy/rice, except public procurement, which is close to 32 percent of the total rice produced in the country. Out of total production of rice in India, 12 percent are exported and taking MSR of rice in to consideration, that is, 85 percent for India, the domestic sale of rice/paddy through private traders is 41 percent. All these trade passes, in most of the case, through marketing system. According to an estimate of 2012, there are 28,994 unregulated Mandis in India, which includes 22,505 rural primary Mandis and 6489 Wholesale Mandis. The number of regulated Mandis is 7190, which includes 2456 regulated Principal Mandis and 4734 Sub-market Yards. The secondary data is insufficient to make any claim regarding value addition by the marketing system for paddy. The secondary data is also not enough to provide information on the milling of paddy by different kind of rice mills in India. The annual survey of industry collects some sample of rice mills for the study, however, the sample is too small to generalise. The collected samples of annual survey of industry suggests that the highest density of rice mills is in Punjab, and among the major paddy producing states, Bihar

has the lowest rice mill density. The public procurement is the only segment where the study of value addition by different actors is possible using secondary data. The secondary data is abundantly available for the national average wholesale, retail and export price of rice.

The export price of Basmati shows a high amount of fluctuations in the last two decades, whereas, the export price of non-Basmati rice has seen lesser number of fluctuations. The quantity of Basmati sale has increased in the mentioned period, whereas, the trade of non-Basmati rice was regulated by the Government of India, periodically. In the last two decades, the Basmati export price has experienced huge variation, and since 2013-14, it is continuously declining. The demand for Basmati in the international market is also not constant, it faces policy level interferences (examples; Europe, Iran etc.). The variation in the demand and price of Basmati raises risk and uncertainty.

The comparison of economic cost of public procurement for non-Basmati rice, wholesale price and export price reflects that, (1) export price is less than the economic cost of rice, (2) in some years, wholesale price is also less than the economic cost, (3) in most of the years, the wholesale price is more than the export price. Since, an exporter or wholesalers of any country cannot alone change the world price, so to make export or wholesale profitable, even with a lower margin, the squeeze is possible only in the backward linkages in general and from farmers in particular.

Followed by discussion on Indian PVN using secondary data, the study discusses PVN in Bihar and Punjab. The overall value system of agriculture in Bihar is affected by natural calamity. The north of river Ganga is frequently flood affected and south has better irrigation system but in recent past this part of the state has experienced some drought years. In Punjab, the regional difference within the state is because of variety of paddy cultivation. The farmers in western part of the state cultivates more Basmati rice that has lower yield but higher market value. The farmers in the eastern part of Punjab cultivate relatively more non-Basmati rice.

The operational holding of land, the first part of AVN, reflects the social dynamics of the value system in the states. In Bihar, 76 percent of the

operational area in the state belongs to small and marginal farmers. In Punjab, 90 percent of the operational land belong to semi-medium, medium, and large farmers. According to National Sample Survey (NSS), 70th round, out of the total 4.2-million-hectare land possessed by the agricultural households of Bihar, Schedule Castes (SC) have 9 percent share, Schedule Tribes (ST) have 1 percent share, Other Backward Classes (OBC) have 67 percent share and privileged castes have 23 percent. The survey also reveals that out of the total 2.2-million-hectare land possessed by the agricultural households of Punjab, SC have 5 percent share, OBC have 8 percent share and privileged castes have 87 percent. The proportion of the SC, ST, OBC and privileged castes in the total agricultural households of Bihar are 13.5 percent, 1.2 percent, 68.3 percent and 17 percent respectively. In Punjab, SC, OBC and privileged castes in the total agricultural households are 26 percent, 10 percent, and 63 percent respectively. In both the states, operational land is skewed towards privileged castes, though; the skewness is more in Punjab than Bihar.

In Bihar, 85 percent of the total agricultural households cultivated paddy, the share in Punjab, is 97 percent according to NSS. In the last five years (2012-13 to 2016-17), farmers in Bihar produced 7 million tonnes of rice annually on an average. In the same period Punjab farmers produced almost 11 million tonnes of rice. Among the major factors of lower production in Bihar than Punjab, natural calamities are very crucial; almost 72 percent of the agricultural area in Bihar are flood prone and 68 percent are vulnerable to drought.

The operational cost of cultivation is higher than fixed cost of cultivation in Bihar; however, situation is reversed in case of Punjab. The ratio of operational cost and fixed cost in Bihar and Punjab are 70:30 and 47:53 respectively in the period between 2011-12 and 2015-16. The Average Annual Growth Rate (AAGR) in both the state is higher for fixed cost than operational cost in the mentioned period. However, the AAGR of cost of cultivation of paddy is more in Bihar than Punjab. The cost of cultivation in Bihar is less than 60 percent of the same in Punjab. Under the operational cost, human labour is the major component, whereas, under the fixed cost, rental value of land is the largest component in both states. The higher AAGR for fixed cost in both states is because of rapid rise in the rental value of land. In Punjab, free electricity by

state is significant contributor in the lower irrigation cost. However, the cost of machine labour and fertilisers result in higher operational cost in Punjab than Bihar. The secondary data is not sufficient to provide a comparable picture of Basmati cost of cultivation in Punjab. The data provided in Basmati study reports of Agricultural Product Export Development Authority (APEDA), does not provide methodology of cost calculation, hence, cannot be used for the comparison of Basmati cost of cultivation with that of non-Basmati.

The share of farmers in total, who reported sale of paddy in Bihar is less than Punjab, reflects that they consume a significant portion of paddy produced by agricultural households. In Bihar, only one percent of the agricultural households sold paddy to public procurement agencies, the share in Punjab is 26 percent. In Punjab, 56 percent of the farmers reported access to Mandi for sale of paddy. Because the Government regulates Mandi in Punjab, so, the access to Mandi as well as public agencies can be regarded as formal linkages. The farmers' linkages with formal set up increase with an increase in operational land with the farmers in the state. In Bihar, the Government does not regulate Mandis, hence public procurement agency is the only formal set up with the farmers. The access to public procurement agencies in Bihar for paddy sale is directly proportional to the land size with the farmers. In Bihar, close to 8 percent of the total paddy produced by the farmers is sold to input dealers, whereas, the practice is negligible in Punjab. In terms of quantity of sale and procurement agencies, the relation represents the same story as mentioned above. In Punjab, around 26 percent of the paddy cultivating agricultural households received price of paddy less than Minimum Support Price (MSP), however, the share of such farmers in Bihar is 96 percent.

The price received by the paddy farmers can be seen in light of various end markets. According to data provided APEDA and Department of Food and Public Distribution, in the period between 2012-13 and 2016-17, public procurement agencies procured 17 percent of the total rice produced in Bihar. The public procurement in Punjab was 78 percent of the total production. The share of export in Bihar and Punjab were three and 12 percent respectively. This implies that only ten percent of the total rice produced in Punjab and 80 percent in Bihar are linked with private domestic markets or consumed by agricultural

households. In Bihar and Punjab, for the year between 2013-14 and 2017-18, the economic cost of rice is higher than the wholesale price of rice in state. In Punjab, the public procurement agencies procured nearly the entire amount of non-Basmati rice produced in the state. Therefore, the negative difference between wholesale price and the economic cost reflects that the expenditure made by the public procurement agencies on all process involved, is more than the market price. However, in case of Bihar, public procurement is very less, in such situation if the wholesale price is less than the economic cost then it is possible if only if farmers get a price that is less than the cost of production, this complements the finding that 96 percent of Bihar paddy farmers receives price less than MSP.

The value addition by the other actors, like local traders, wholesalers, rice millers etc. could not be assessed using secondary data. Therefore, the primary data was collected from two villages in each states. *Kuraitha* village of Katihar district and *Kharbhaiya* village of Patna district were selected for field survey in Bihar. *Seel* village of Patiala district and *Mehlanwala* village of Amritsar district were selected in Punjab. The primary data reflects that even in the same state, each village has PVN of local unique pattern. In the *Kuraitha* village, flood causes a significant loss of the value system of paddy, in the 2017-18 crop season, 76 percent of the area surveyed under paddy cultivation was damaged due to flood. Of the remaining paddy, produced 60 percent is traded to local traders and the surveyed agricultural households keep 40 percent for household consumption. The paddy kept for household consumption goes through an outdated technology of hulling, but with innovative style. All households consume parboiled rice; there are a few women professional parboiler in the village. There are a few hullers in the village for de-husking paddy that includes some mobile hullers. The value addition by the professional parboiler and mobile huller in *Kuraitha* village supports the thesis of specialisation in the value system and highlights the need for development in the value system. The local traders sell paddy to wholesalers in Purnea or Katihar, from where it is exported to other states or sold to rice mills. Followed by the processing of paddy, rice mill sell rice as well as all of the by-products in the open market.

There are three forward linkages observed for paddy farmers in *Kharbhaiya* village. 22 percent of total paddy production was consumed, 59 percent was sold to local traders and 19 percent was procured by public agencies through Primary Agricultural Credit Society (PACS). Agricultural households do the maximum value addition on the paddy for household consumption, parboiling is done as household level and de-husking is done by the hullers in village. Local traders sell paddy in the various block level wholesale markets, from where paddy reaches rice mill through commission agents. The rice and its by-product are sold within the state by rice mills in Patna. PACS procures paddy for the State Food Corporation (SFC). The task performed by PACS includes procurement and transportation of paddy to notified rice mills. The SFC procures rice from rice mills. The by-products, produced during milling, are sold by rice mills in the open markets.

In *Seel* village of Patiala district, out of total paddy produced by the surveyed households, 95 percent was non-Basmati and 5 percent was Basmati. The sequence of value addition for these varieties are mutually exclusive, post-harvest. The entire amount of non-Basmati was procured by the public agencies. Whereas, the Basmati variety was procured by private rice companies. Farmers sold Basmati varieties in the Block level market, and non-Basmati was sold in the village market through commission agents. The notified rice mills receive paddy from the commission agents and after milling, rice is transported to warehouses of public procurement agencies and by-products are sold in the open market.

In *Mehlanwala* village of Amritsar district, 68 percent of the total paddy produced by the surveyed agriculture households was Basmati and rest was non-Basmati. The agricultural households sold Basmati to private companies through commission agents, which after processing sell paddy in the domestic markets as well as export. Unlike *Seel* village, public procurement agencies did not procure the entire amount of non-Basmati varieties, but only 51 percent of the total non-Basmati produced by the surveyed households. Private companies through commission agents procured the rest of the non-Basmati varieties.

Out of total cost of cultivation, the expenditure on family labour is more in villages of Bihar than Punjab. The lower expenditure on human labour in case of *Kuraitha* village of Bihar is because most of the farmers could not harvest because of the flood. Unlike Punjab, farmers in Bihar do not use the machine for harvesting, which is one of the major human labour-absorbing operations in Paddy farming. However, farmers in Punjab and Bihar use human labour for transplantation of seedlings. The expenditure over machine is recorded higher in case of *Kharbhaiya* village of Bihar than any other surveyed villages; which may be because of fragmented land in the village. In *Kharbhaiya* village, one hectare of land is divided on an average into 13 plots at different locations. Otherwise, expenditure over machine labour is lower in Bihar than Punjab. The other reason for the lower machine cost in Punjab is that in most of the cases farmers own machines.

In the case of Punjab, the value of non-Basmati seeds is lower than that for Basmati varieties. In *Kharbhaiya* village, farmers cultivate non-Basmati fine varieties of paddy, which has the higher price than the short varieties. The use of fertilisers for non-Basmati varieties is comparatively higher than the Basmati varieties. However, the use of insecticides/pesticides is higher for Basmati. The farmers in Patiala reported that the Basmati requires lots of care as the crop very prone to diseases.

Irrigation cost in villages of Punjab is zero because the electricity is free for farmers. The cost of irrigation is one of the main reason behind the higher operational cost of cultivation in Bihar than Punjab. The difference between the operational cost of production in villages of Bihar and Punjab is even higher than the operational cost of cultivation in these villages because of the lower yield of paddy in Bihar than Punjab. The fixed cost of cultivation in Punjab is between 66 and 68 percent of the total cost, in case of both villages of Bihar the share is 38 percent. The rent of land alone is around 60 percent of the total cost of cultivation. Rent of land is higher in Amritsar than Patiala. The sum of depreciation and interest on capital are higher in case of Punjab than Bihar, which is because most of the farmers in Punjab own pump sets, tractors, and other machines. Because of the higher fixed cost, the total cost in the villages of Punjab is more than that of Bihar.

Farmers in *Kuraitha* village made a loss of Rs 23954 over the total cost of cultivation. The Government of Bihar provided compensation for the flood loss, which was almost half of the loss over operational cost. In *Kharbhaiya*, farmers made a loss of Rs 1035 over total cost of cultivation. The loss per quintal for farmers of *Kharbhaiya* village was Rs 188 over total cost of cultivation. The average price received by the farmers in Bihar villages for non-Basmati varieties was less than that in Punjab.

In *Seel* village, farmers earned more surplus per hectare on the cultivation of non-Basmati paddy than the Basmati. The yield and average price of Basmati are more in Amritsar than Patiala, which results in higher surplus on Basmati. Since, the area under cultivation of Basmati paddy is more in Amritsar, which attracts more number of exporting companies. The farmers of *Mehlanwala* village of Amritsar made the loss on the non-Basmati varieties because they received an average price less than MSP. However, Patiala farmers largely benefitted from the procurement by public agencies. In Patiala, farmers do not rely completely on Basmati because the market is not available in the proximity and the price is not secured, which is reflected in the higher earning per hectare in case of non-Basmati than Basmati in the village. In Amritsar, the larger portion of the land is used for Basmati cultivation, but for the security purpose, farmers do cultivate non-Basmati varieties. The behaviour of farmers poses a question on the sustainability of the Basmati cultivation in the light of not having secured price market for the same. There is a possibility that farmers can increase the share of land under Basmati cultivation from the current 68 percent, if there is a mechanism for fixing a price before cultivation begins.

The surplus received by the farmers is not only a function of revenue and cost of cultivation but, because of the peculiar relation between farmers and commission agents in Punjab, the actual surplus earned by farmers is different from what is mentioned in the table above. At both places in Punjab, the farmers receive some advance money from commission agents before the plantation begins. On advance payment, commission agent charges 2 percent simple interest per month (24 percent per annum). The advance payment becomes a base for the contract between farmer and commission agent for the sale of paddy. According to the farmers, the breaking of the contract is considered

socially devaluing of the status, and as a penalty, the commission agents charge compound interest of 2 percent monthly on the advance payment. According to the commission agents in Patiala and Amritsar, around 80-90 percent of the farmers, who sell paddy through them, receive advance payments. The advance payment is close to 70 percent of the total value of the produce. As per the primary data collected from the field, 70 percent farmers in *Seel* and 40 percent farmers in *Mehlanwala* received advance payment from the commission agents. The borrowed money from commission agents in *Seel* and *Mehlanwala* villages were 38 percent and 22 percent of the total value of the final produce respectively. Most of the farmers received the advance in June and repaid in November (five months), so, the commission agent received 10 percent on the amount or additional 3.8 percent and 2.2 percent of the value of the produce in respective villages.

If a farmer owns the operated land, then the actual surplus that he/she receives is positive in all surveyed villages; this surplus also includes the rent on own land and interest on own money used for cultivation. The highest surplus per quintal is in case of Basmati of Amritsar followed by Basmati of Patiala. If a farmer borrows money from a commission agent for cultivation (as discussed above), then the interest paid will be deducted from the surplus. In case of tenancy farming, the rent will be deducted from the surplus and as result of that tenant farmer of Patna and non-Basmati farmers of Amritsar would make a loss. If a tenant farmer borrows money in the same proportion then except Basmati cultivation in Amritsar, in all other cases, farmers will make the loss.

The margins received by all actors other than farmers in the value system are positive. The commission agents earn more on the Basmati varieties than the non-Basmati varieties. The margin of rice mill is the highest because of the revenue earned on the sale of by-products. The rice mill in Punjab made a larger profit than the Bihar because rice mills in Bihar also pay for transportation to bring paddy to the mill. Unlike Bihar, the share received by the commission agent in case of Punjab is proportional to the price received by the farmers, which means higher the price received by the farmers, higher would be the commission.

According to the methodology of Commission for Agricultural Cost and Prices, the cost of production includes imputed rent of the own land, so, with this consideration farmers earing per quintal of paddy is lowest in the PVN for all surveyed villages. The rice mills have the highest earning per quintal of paddy in the PVN at all places. The earning per quintal of non-Basmati paddy for value system actors of Punjab is higher than their counterparts in Bihar. There are twofold reasons for the same; one, the public procurement system is better in Punjab, which enables farmers to get a secured price, two, irrigation cost, a critical input, which is close to 14 percent of the total operational cost in Patna, is completely free for the farmers in Punjab. Therefore, the support of the Government in Punjab at both ends of the PVN assists actors to accrue the large earning per quintal of paddy.

The workers in the PVN, particularly the agricultural workers, belong to socially deprived communities in the respective villages. All male and female workers in *Kuraitha* village of Katihar District are from ST communities. In the *Kharbhaiya* village of Patna, the agricultural workers belong to SC and OBC. The female workers are generally employed on piece rated wage for transplantation of paddy seedlings, weeding and harvesting. The farmers employ male workers for ploughing, spraying pesticides, transplantation, weeding and harvesting of paddy. There is a clear wage difference between male and female workers.

The female agricultural workers in *Seel* village of Patiala are from SC communities. The male workers, who work in agriculture are mainly migrant from Bihar and belong to OBC. Since harvesting is done using the machine, the main labour-absorbing operation in paddy is transplantation. The male workers visit Bihar for four months in a year at two points in time, after paddy plantation is over in Punjab and after wheat harvest. The migrant workers work in their native village for paddy and wheat once they complete the operations in Punjab. The male workers in *Mehlanwala* village of Amritsar belong to SC. The workers live in a separate cluster in the same village. Apart from local male workers, the main source of human labour for paddy cultivation in Amritsar is migrant male and female workers. The workers in all villages reported that because of the continuous work in water during transplantation, their hands and legs are

swollen. The speed of the work becomes slow because of the swelling of the hands, and since the transplantation is a piece (of land) rated job at all places, the earing of the workers per day declines.

All actors in the PVN are linked through processes of value addition or exchange/transaction. The AVN presents the interaction of agriculture and non-agriculture segments of the value system, a system in which product reaches from farm to plate. The interaction of different actors/production-processes/exchanges also involve respective power position. There are two factors that distinguishes agriculture with non-agriculture manufacturing industries; (1) lower surplus generation capacity of agriculture in comparison to manufacturing industry and (2) demand-determined pricing mechanism for agricultural products. According to Marx, there is a period in agriculture when farmers leave seed in the soil to grow naturally, since no labour is employed for that particular period, surplus cannot be generated. According to Kalecki, when demand for agricultural products changes then the producers (farmers) cannot respond in change in supply immediately as production of agricultural products require certain period in a year, hence, the demand side has sole authority over determination of price.

The two factors stated above put actors in agriculture at a weaker power position and are responsible behind the power asymmetry in the AVN. The weaker power position results in transfer of surplus from agriculture to non-agriculture segment of the AVN. Therefore, the surplus realised in the non-agricultural segment of value system (example; trading, milling etc.) is not only generated in that particular level of production but also includes a significant amount of surplus generated in agriculture. The power asymmetry of AVN works against farmers in general, small, and marginal farmers in particular. As discussed in case of PVN, the surplus realisation in agriculture is directly proportional to the area of operational holding.

The power asymmetry in the PVN leads to outflow of surplus at both the end of agriculture. In the backward linkages, the owner of the land takes a significant amount of surplus away as rent. In the forward linkages, the weaker power position of farmers results in suppression of price agricultural products and

leads to surplus squeeze. To assist the farming in a situation of existing power asymmetry, the Government has an important role to play. However, there are many existing provisions at the policy level that intentionally help the farmers to realise higher return from agriculture. However, such policies are not same across different states of India. The subsidy on fertiliser is provided by the Union Government, which helps at the cost side of cultivation. In Punjab, the state Government provides free electricity for irrigation that is why the cost of irrigation in the state is less than Bihar. Such approaches help the farmers in increasing the surplus from the farming. The Government intervention in the forward linkages helps to reduce the leakages of surplus from farming. The public procurement of rice is very high in Punjab, which is a contributing factor in higher price received by the farmers. The public procurement is the main factor behind the selection of paddy variety in the state. In Patiala, the Government agencies procure entire non-Basmati rice and according to farmers that is the main reason, they cultivate non-Basmati. The pricing system of Basmati is very vulnerable and fluctuates as per demand that discourages farmers. In Amritsar, public procurement is not adequate for non-Basmati, the pricing mechanism of both varieties of paddy is almost same in the district. Hence, the vulnerable price is one of the reasons behind lower area under non-Basmati cultivation.

Regarding the Government intervention in PVN in Bihar, first of all, the betterment for the farmers, primarily, lie in saving the northern part of Bihar from the frequent flood. One of the reasons behind sale of paddy to local traders by farmers in Bihar at very low price is lack of markets/mandi in the proximity of the village. The Government has a role to help farmers by providing markets in the proximity of the village and through minimising the role of the middle persons. In the villages of Bihar, an outdated technology is used for a significant portion of paddy produced in the village. In this case, there are scope and requirement for the functional improvement to mill paddy properly so that farmers can maximise the return from by-products as well. Since the average price received by the paddy farmers in Bihar is quite low, so taking example of Punjab, through increasing the share of public procurement, farmers can get higher price.

In Punjab, the cultivation of Basmati by farmers may yield good return but price is vulnerable because of demand fluctuation in the market. Therefore, to encourage farmers to cultivate high value product requires a system of secure price. However, in case of Punjab, the environmental degradation because of higher area under paddy cultivation, that requires huge amount of water, cannot be ignored. There is an urgent need to shift farmers from paddy cultivation to other crops that can yield good return.

In both the states, there is a need for regulating rent of land. In case of Punjab, the fixed cost is higher than the operational cost mainly because of rent. In Bihar, rent is the largest portion of fixed cost. Since the land ownership is highly unequal in India, so, to provide respite to the tenants or agricultural dependent sections, a formal instrument is needed to minimise the rent on land. In Punjab, another leakage of surplus is happening through informal lending; regulation is required in this manner to curb the exorbitant rate of interest. There is a need for higher amount of agricultural credits from formal sources in both the states. Finally, all existing Government schemes are more accessible for the large landholders, hence in a country of skewed land ownership, the priority should always be given to the smallholders in the policy framework.

Annexure 0.1 State wise production, area under cultivation and yield of rice (1/3)

	2007-08			2008-09			2009-10		
States	*Production*	*Area*	*Yield*	*Production*	*Area*	*Yield*	*Production*	*Area*	*Yield*
Andhra Pradesh	13324	3984	3344	14241	4387	3246	10538	3441	3062
Arunachal Pradesh	158	124	1275	164	127	1293	216	122	1777
Assam	3319	2324	1428	4009	2484	1614	4336	2496	1737
Bihar	4418	3573	1237	5590	3496	1599	3599	3214	1120
Chhattisgarh	5427	3752	1446	4392	3734	1176	4110	3671	1120
NCT of Delhi	31	7	4243	31	7	4243	19	7	4252
Goa	122	52	2330	123	50	2466	101	47	2138
Gujarat	1474	759	1942	1303	747	1744	1292	679	1903
Haryana	3613	1075	3361	3298	1210	2726	3625	1205	3008
Himachal Pradesh	122	79	1546	118	78	1523	106	77	1381
Jammu and Kashmir	561	263	2133	563	258	2186	497	260	1914
Jharkhand	3336	1654	2018	3420	1684	2031	1538	995	1546
Karnataka	3717	1416	2625	3802	1514	2511	3691	1487	2482
Kerala	529	229	2310	590	234	2519	598	234	2557
Madhya Pradesh	1462	1559	938	1560	1682	927	1261	1446	872
Maharashtra	2996	1574	1903	2284	1522	1501	2183	1470	1485
Manipur	406	166	2446	397	168	2357	320	169	1889
Meghalaya	200	106	1880	204	108	1886	207	108	1910
Mizoram	16	55	288	46	52	885	44	47	939
Nagaland	291	173	1685	345	173	1994	240	169	1426
Odisha	7541	4452	1694	6813	4455	1529	6918	4365	1585
Puducherry	53	20	2618	51	21	2442	52	21	2504
Punjab	10489	2610	4019	11000	2735	4022	11236	2802	4010
Rajasthan	260	128	2031	241	133	1807	228	151	1515
Sikkim	23	14	1636	22	15	1476	24	13	1869
Tamil Nadu	5040	1789	2817	5183	1932	2683	5665	1846	3070
Telangana	.	.	.	.	.	.	.	.	.
Tripura	625	237	2633	627	243	2586	640	246	2606
Uttar Pradesh	11780	5709	2063	13097	6034	2171	10807	5187	2084
Uttarakhand	593	289	2052	582	296	1966	608	294	2068
West Bengal	14720	5720	2573	15037	5936	2533	14341	5630	2547
ALL INDIA	**96693**	**43914**	**2202**	**99183**	**45537**	**2178**	**89093**	**41918**	**2125**

Source: Handbook of Statistics on Indian States, RBI, Note: Production in thousand tonnes, Area in thousand hectares and Yield in Kg per hectare

Annexure 0.1 State wise production, area under cultivation and yield of rice (2/3)

States	2010-11			2011-12			2012-13		
	Production	*Area*	*Yield*	*Production*	*Area*	*Yield*	*Production*	*Area*	*Yield*
Andhra Pradesh	14418	4751	3035	7746	2346	3302	6862	2210	3106
Arunachal Pradesh	234	122	1925	255	124	-	263	126	-
Assam	4737	2570	1843	4516	2537	1780	5129	2488	2061
Bihar	3102	2833	1095	7163	3324	2155	7529	3299	2282
Chhattisgarh	6159	3703	1663	6028	3774	1597	6609	3785	1746
NCT of Delhi	20	7	2787	20	7	2885	30	7	4403
Goa	115	47	2467	122	47	2577	123	46	2679
Gujarat	1497	808	1852	1790	836	2141	1541	701	2198
Haryana	3472	1245	2789	3759	1235	3044	3976	1215	3272
Himachal Pradesh	129	77	1673	132	77	1705	125	77	1629
Jammu and Kashmir	508	261	1942	545	262	2078	818	262	3126
Jharkhand	1110	720	1541	3131	1469	2131	3165	1414	2238
Karnataka	4188	1540	2719	3955	1416	5795	3364	1278	2632
Kerala	523	213	2452	569	208	2733	508	197	2577
Madhya Pradesh	1772	1603	1106	2227	1662	1340	2775	1883	1474
Maharashtra	2696	1518	1776	2841	1543	1841	3057	1557	1963
Manipur	522	213	2453	591	224	2642	258	123	2099
Meghalaya	207	108	1912	216	109	1988	232	109	2125
Mizoram	47	41	1160	54	38	1411	30	15	2088
Nagaland	381	181	2102	382	182	2106	405	183	2210
Odisha	6828	4226	1616	5807	4005	1450	7295	4023	1814
Puducherry	52	20	2596	42	17	2538	47	16	2857
Punjab	10837	2831	3828	10542	2818	3741	11374	2845	3998
Rajasthan	266	131	2025	253	134	1886	223	126	1771
Sikkim	21	12	1727	21	12	1730	21	12	1790
Tamil Nadu	5792	1906	3040	7459	1904	3918	4050	1493	2712
Telangana	.	.	.	5149	1750	2942	4648	1418	3277
Tripura	703	265	2655	718	266	2700	713	255	2800
Uttar Pradesh	11992	5657	2120	14022	5947	2358	14416	5861	2460
Uttarakhand	550	290	1901	594	280	2121	580	263	2206
West Bengal	13046	4944	2639	14606	5434	2688	15024	5444	2760
ALL INDIA	**95980**	**42862**	**2239**	**105301**	**44006**	**2393**	**105241**	**42754**	**2462**

Source: Handbook of Statistics on Indian States, RBI, Note: Production in thousand tonnes, Area in thousand hectares and Yield in Kg per hectare

Annexure 0.1 State wise production, area under cultivation and yield of rice (3/3)

States	2013-14			2014-15			2015-16		
	Production	*Area*	*Yield*	*Production*	*Area*	*Yield*	*Production*	*Area*	*Yield*
Andhra Pradesh	6970	2444	2852	7234	2394	3022	7489	2161	3465
Arunachal Pradesh	276	132	-	285	127	-	204	129	1584
Assam	4927	2449	2012	5223	2495	2093	5125	2485	2062
Bihar	5506	3131	1759	6357	3263	1948	6802	3232	2104
Chhattisgarh	6716	3802	1766	6322	3809	1660	5789	3816	1517
NCT of Delhi	30	6	4906	26	6	4288	17	6	2862
Goa	127	43	2954	121	42	2871	115	41	2783
Gujarat	1636	788	2076	1831	786	2329	1702	772	2205
Haryana	3998	1228	3256	4006	1287	3113	4145	1354	3061
Himachal Pradesh	121	74	1625	125	72	1728	130	74	1763
Jammu and Kashmir	611	271	2250	517	276	1871	646	305	2123
Jharkhand	2811	1256	2238	3362	1502	2238	2882	1589	1814
Karnataka	3573	1340	2666	3541	1326	2670	3021	1110	2722
Kerala	509	200	2551	562	198	2836	549	197	2790
Madhya Pradesh	2845	1930	1474	3625	2153	1684	3547	2024	1752
Maharashtra	3120	1613	1934	2946	1551	1899	2593	1503	1725
Manipur	398	223	1788	334	225	1488	339	237	1429
Meghalaya	274	110	2493	298	110	2703	301	110	2726
Mizoram	59	39	1522	61	37	1643	62	37	1671
Nagaland	430	189	2267	454	195	2326	319	201	1586
Odisha	7613	4180	1821	8298	4166	1992	5875	3942	1491
Puducherry	50	16	3147	53	17	3164	44	16	2698
Punjab	11267	2851	3952	11107	2894	3838	11823	2975	3974
Rajasthan	313	146	2147	367	168	2186	370	183	2022
Sikkim	20	11	1815	20	11	1818	13	11	1230
Tamil Nadu	5350	1726	3100	5728	1795	3191	7517	2000	3758
Telangana	5755	1912	3009	4441	1415	3138	3047	1046	2913
Tripura	712	254	2800	747	257	2903	795	270	2946
Uttar Pradesh	14636	5982	2447	12168	5872	2072	12501	5862	2133
Uttarakhand	579	253	2289	604	262	2307	639	264	2420
West Bengal	15371	5514	2788	14677	5376	2730	15954	5524	2888
ALL INDIA	**106646**	**44136**	**2416**	**105482**	**44111**	**2391**	**104408**	**43499**	**2400**

Source: Handbook of Statistics on Indian States, RBI, Note: Production in thousand tonnes, Area in thousand hectares and Yield in Kg per hectare

Annexure 0.2 Procurement of rice for the central pool (Million Tonnes)

States	2013-14	2014-15	2015-16	2016-17	2017-18
Andhra Pradesh	3.74	3.60	4.34	3.72	3.67
Assam	0.00	0.02	0.04	0.05	0.02
Bihar	0.94	1.61	1.22	1.23	0.79
Chandigarh	0.01	0.01	0.02	0.01	0.01
Chhattisgarh	4.29	3.42	3.44	4.02	3.21
Delhi	0.00	0.00	0.00	0.00	0.00
Gujarat	0.00	0.00	0.00	0.00	0.00
Haryana	2.41	2.02	2.86	3.58	3.99
Himachal Pradesh	0.00	0.00	0.00	0.00	0.00
J&K	0.00	0.01	0.01	0.01	0.01
Jharkhand	0.00	0.00	0.21	0.14	0.14
Karnataka	0.00	0.09	0.06	0.00	0.00
Kerala	0.36	0.37	0.38	0.31	0.33
Madhya Pradesh	1.05	0.81	0.85	1.31	1.10
Maharashtra	0.16	0.20	0.23	0.31	0.17
Nagaland	0.00	0.00	0.00	0.00	0.00
Odisha	2.80	3.36	3.37	3.63	2.82
Puducherry	0.00	0.00	0.00	0.00	0.00
Punjab	8.11	7.79	9.35	11.05	11.83
Tamil Nadu	0.68	1.05	1.19	0.14	0.78
Telangana	4.35	3.50	1.58	3.60	3.47
Uttar Pradesh	1.13	1.70	2.91	2.35	2.88
Uttarakhand	0.46	0.47	0.60	0.71	0.04
West Bengal	1.36	2.03	1.57	1.92	0.05
All India Total	31.85	32.04	34.22	38.11	35.31

Source: Department of Food and Public Distribution, Government of India

Annexure 0.3 Marketed Surplus Ratio of Paddy (%)

States	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Andhra Pradesh	91.99	81.63	88.4	91.06	83.07	87.86	89.11	91.73
Assam	25.96	28.81	45.14	38.54	40.16	50.91	50.78	70.09
Bihar	80.03	76.27	83.57	77.5	78.9	82.49	81.79	86.16
Haryana	95.18	99.91	94.63	97.09	98.57	93.47	93.87	98.61
Karnataka	85.47	86.32	91.45	94.56	84.02	84.15	87.48	94.4
Kerala	72.98	57.13	86.97	87.8	77.3	86.15	93.52	84.7
Madhya Pradesh	78.98	74.9	73.12	73.77	83.99	87.91	90.77	93.09
Orissa	66.18	61.9	65.33	67.43	59.34	73.96	70.37	77.35
Punjab	98.06	99.24	99.57	99.7	99.36	99.48	97.02	99.37
Tamil Nadu	83.8	84.86	88.76	90.7	92.45	91.08	91.58	91.51
Uttar Pradesh	76.85	78.69	75.62	76.2	80.18	83.11	85.37	78.43
West Bengal	64.45	57.61	67.33	67.72	54.73	67.48	68.02	68.98
All India	78.61	75.55	79.74	80.65	77.2	81.51	82	84.35

Source: Agricultural Statistics at a Glance, different years, Directorate of Economics and Statistics.

Annexure 0.4 Rice Mills in Different States of India

S. No	States	Rice Mills Density	Total Number of Rice Mills
1	Punjab	36.7	1848
2	Telangana	19.2	2157
3	Andhra Pradesh	14.0	2288
4	Tamil Nadu	11.1	1445
5	Haryana	10.0	443
6	West Bengal	8.4	748
7	Bihar	6.2	579
8	Chhattisgarh	5.7	764
9	Orissa	5.2	810
10	Karnataka	2.4	466
11	Assam	2.4	189
12	Uttaranchal	2.4	126
13	Uttar Pradesh	1.8	448
14	Jharkhand	1.2	96
15	Kerala	1.0	38
16	Gujarat	0.6	112
17	Maharashtra	0.4	111
18	Rajasthan	0.1	41
19	Madhya Pradesh	0.1	33

Source: Annual Survey of Industries, 2014-15, Note: The unit of density is per 1000 km^2

Annexure 0.5: Distribution of Holdings and Area under Different Size Group in Punjab and Bihar

	Bihar		Punjab	
Size Group	Total Number of Holdings	Total Area	Total Number of Holdings	Total Area
Below 0.5	12052983 [74.44]	1944423 [30.44]	60822 [5.78]	21118 [0.53]
0.5-1.0	2691115 [16.62]	1724304 [26.99]	103609 [9.84]	79887 [2.01]
1.0-2.0	948016 [5.86]	1185695 [18.56]	195439 [18.57]	269082 [6.78]
2.0-3.0	290518 [1.79]	661627 [10.36]	221268 [21.02]	511823 [12.9]
3.0-4.0	124146 [0.77]	411341 [6.44]	103247 [9.81]	343288 [8.65]
4.0-5.0	50651 [0.31]	219561 [3.44]	127340 [12.1]	547887 [13.81]
5.0-7.5	23108 [0.14]	132035 [2.07]	117643 [11.18]	720669 [18.17]
7.5-10.0	7725 [0.05]	63344 [0.99]	53468 [5.08]	444301 [11.2]
10.0-20.0	2647 [0.02]	31991 [0.5]	59085 [5.61]	748819 [18.88]
20.0 & ABOVE	482 [0]	13236 [0.21]	10633 [1.01]	279755 [7.05]
ALL CLASSES	16191391 [100]	6387560 [100]	1052554 [100]	3966633 [100]

Source: Agricultural Census, 2010-11, Note: Number of Holding is absolute number, Area is in Hectare, and value in parentheses is column wise percentage

Annexure 1.1: Agro-ecological zones of India, climate, soil types, location of the zone and major crops.

Serial No	Agro-Ecological Zones	Climate	Soils	Location and Extent	Major Crops
1	Western Himalayas	Cold Arid	Shallow Skeletal	Western Part of J&K	Buckwheat, Kuth and Winter Vegetables
2	Western Plain	Hot Arid	Desert and Saline	Western Part of Rajasthan, Southern Part of Punjab and Haryana and North-West of Gujarat	Pearlmillet, fodder, pulses
3	Deccan Plateau	Hot Arid	Red and Black	Raichur and Bellary of Karnataka and Anantapur of Andhra Pradesh	Sorghum, Cotton Oilseeds
4	Northern Plain and Central Highlands	Hot Semiarid	Alluvium-Derived	Punjab, Haryana, Uttar Pradesh, Eastern Rajasthan and North-east Gujarat	Rice, Millets, Maize, Pulses, Berseem, Wheat, Musteard and Sugarcane
5	Central Highlands and Kathiawar Penninsula	Hot Semiarid	Medium and Deep Black	Western Part of Madhya Pradesh, Eastern Part of Rajasthan and Gujarat	Sorghum, Safflower, Sunflower and Gram
6	Deccan Plateau	Hot Semiarid	Shallow and Medium Black	Maharashtra, Northern Parts of Karnataka and Telangana	Sorghum, Pigeonpea and Pearlmillet
7	Deccan Plateau and Eastern Ghat	Hot Semiarid	Red and Black	Telangana and Andhra Pradesh	Sorghum, Cotton, Pigeonpea and Groundnut, Sunflower, Oilseeds and Rice
8	Eastern Ghats and Deccan Plateau	Hot Semiarid	Red Loamy	Southern Parts of Deccan Plateau, Tamil Nadu Uplands and Western Parts of Karnataka	Millets, Pulses, Oilseeds, Rice

9	Northern Plain	Hot Subhumid	Alluvium-Derived	Northern Indo-Gangetic Plain and Piedmont Plain of Western Himalaya	Rice, Maize, Pigeonpea, Jute and Wheat
10	Central Highlands (Malwa and Bundelkhand)	Hot Subhumid	Medium and Deep Black	Central Madhya Pradesh	Sorghum, Pigeonpea, Wheat and Gram
11	Deccan Plateau and Central Highlands	Hot Subhumid	Red and Black	Bundelkhand and Vidharbha	Sorghum, Cotton, Soybean, Pigeonpea, Wheat, Gram and Vegetables
12	Eastern Plateau	Hot Subhumid	Red and Yellow	Chhatisgarh and Western Part of Jharkhand	Rice, Millets, Pulses and Wheat
13	Chhota Nagpur Plateau and Eastern Ghats	Hot Subhumid	Red Loamy	Eastern Part of Jharkhand, West Bengal, Eastern Ghats of Odisha and Bastar	Rice, Millets, Pulses and Wheat
14	Eastern Plain	Hot Subhumid	Alluvium-Derived	North-eastern Part of Uttar Pradesh and Bihar	Rice, Maize, Wheat and Sugarcane
15	Western Himalayas	Warm Subhumid	Podzolic	J & K, Himachal Pradesh and Uttarakhand	Wheat, Millet, Maize and Rice
16	Assam and Bengal Plains	Hot Humid	Alluvium-Derived	Assam and West Bengal	Rice and Jute
17	Eastern Himalaya	Warm Perhumid	Brown Hill	Arunachal Pradesh and Sikkim	Rice and Millets
18	North-Eastern Hills	Warm Perhumid	Red and Lateritic	Nagaland, Meghalaya, Manipur, Mizoram and South Tripura	Rice
19	Eastern Coastal Plains	Hot Subhumid	Alluvium-Derived	Kaveri Delta to Gangetic Delta	Rice and Coconut
20	Western Ghats and Coastal Plains	Hot Humid, Perhumid	Red, Lateritic and Alluvium-Derived	Coastal Plains of Maharashtra, Karnataka and Kerala	Rice, Tapioca, Coconut and Spices
21	Islands of Andaman-Nicobar and Lakshadweep	Hot Perhumid	Red Loamy and Sandy	Andaman and Nicobar and Lakshadweep	Rice, Tapioca, Coconut and Spices

Source: Compiled on the basis of information in (Sehgal et al. 1990)

Annexure 1.2A

State wise operational holding distribution among different social categories

State/UT	All Groups	SC	SC %	ST	ST %	OTH	OTH %	INST	INST %
A & N Islands	21	0	0	0	0	20	95	1	5
Andhra Pradesh	14293	1100	8	1248	9	11893	83	52	0
Arunachal Pradesh	384	0	0	380	99	0	0	4	1
Assam	2998	151	5	516	17	2072	69	259	9
Bihar	6386	593	9	105	2	5661	89	27	0
Chandigarh	1	0	0	0	0	1	100	0	0
Chattisgarh	5083	396	8	2158	42	2524	50	5	0
D & N Haveli	19	0	0	16	84	3	16	0	0
Daman & Diu	3	0	0	0	0	3	100	0	0
Delhi	29	0	0	0	0	28	97	1	3
Goa	89	0	0	24	27	63	71	2	2
Gujarat	9898	294	3	968	10	8557	86	79	1
Haryana	3645	43	1	0	0	3444	94	158	4
Himachal Pradesh	954	131	14	50	5	767	80	6	1
Jammu & Kashmir	894	73	8	129	14	684	77	8	1
Jharkhand	3164	321	10	1430	45	1400	44	13	0
Karnataka	12161	1074	9	705	6	10309	85	73	1
Kerala	1510	35	2	34	2	1327	88	114	8
Lakshadweep	2	0	0	2	100	0	0	0	0
Madhya Pradesh	15835	1340	8	3170	20	11302	71	23	0
Maharashtra	19765	1303	7	1557	8	16806	85	99	1
Manipur	171	4	2	78	46	89	52	0	0
Meghalaya	287	0	0	286	100	0	0	1	0
Mizoram	104	0	0	104	100	0	0	0	0
Nagaland	1074	0	0	1071	100	0	0	3	0
Odisha	4850	565	12	1614	33	2618	54	53	1
Puducherry	21	0	0	0	0	20	95	1	5
Punjab	3966	126	3	0	0	3828	97	12	0
Rajasthan	21135	2467	12	1784	8	16774	79	110	1
Sikkim	105	4	4	56	53	41	39	4	4
Tamil Nadu	6488	492	8	74	1	5789	89	133	2
Tripura	284	41	14	123	43	119	42	1	0
Uttar Pradesh	17621	1969	11	79	0	15513	88	60	0
Uttarakhand	815	67	8	47	6	688	84	13	2
West Bengal	5509	1119	20	396	7	3766	68	228	4
All India	159591	13721	9	18220	11	126108	79	1542	1

Source: Source: Agricultural Census 2010-11, Note: Area in ‘000 hectares

Annexure 1.2B

State/UT	Marginal	Marginal %	Small	Small %	Semi-Medium	Semi-Medium %	Medium	Medium %	Large	Large %	All Classes
A & N Islands	2	10	3	14	8	38	7	33	1	5	21
All India	35908	23	35244	22	37705	24	33828	21	16907	11	159591
Andhra Pradesh	3727	26	4120	29	3685	26	2209	15	552	4	14293
Arunachal Pradesh	12	3	26	7	94	24	155	40	97	25	384
Assam	775	26	687	23	818	27	437	15	282	9	2999
Bihar	3669	57	1186	19	1073	17	415	6	45	1	6388
Chandigarh	0	0	0	0	0	0	0	0	0	0	0
Chattisgarh	953	19	1179	23	1348	27	1153	23	451	9	5084
D & N Haveli	4	20	5	25	5	25	4	20	2	10	20
Daman & Diu	2	67	1	33	0	0	0	0	0	0	3
Delhi	5	17	6	20	8	27	9	30	2	7	30
Goa	28	31	18	20	17	19	12	13	14	16	89
Gujarat	885	9	2075	21	2989	30	2930	30	1020	10	9899
Haryana	360	10	463	13	814	22	1185	33	823	23	3645
Himachal Pradesh	273	29	244	26	230	24	156	16	51	5	954
Jammu & Kashmir	416	46	235	26	171	19	62	7	12	1	896
Jharkhand	764	24	591	19	775	24	725	23	311	10	3166
Karnataka	1851	15	3020	25	3393	28	2904	24	994	8	12162
Kerala	886	59	282	19	159	11	64	4	120	8	1511
Lakshadweep	2	100	0	0	0	0	0	0	0	0	2
Madhya Pradesh	1915	12	3466	22	4510	28	4545	29	1400	9	15836
Maharashtra	3186	16	5739	29	5765	29	3993	20	1084	5	19767
Manipur	40	23	63	37	55	32	13	8	0	0	171
Meghalaya	46	16	77	27	113	39	47	16	4	1	287
Mizoram	30	29	38	36	24	23	9	9	4	4	105
Nagaland	3	0	23	2	125	12	481	45	442	41	1074
Odisha	1922	40	1498	31	919	19	381	8	132	3	4852
Puducherry	10	45	4	18	4	18	3	14	1	5	22
Punjab	101	3	269	7	855	22	1713	43	1029	26	3967
Rajasthan	1238	6	2162	10	3774	18	6918	33	7044	33	21136
Sikkim	15	14	20	19	27	25	32	30	12	11	106
Tamil Nadu	2292	35	1644	25	1356	21	848	13	350	5	6490
Tripura	140	49	76	27	54	19	14	5	1	0	285
Uttar Pradesh	7171	41	4243	24	3629	21	2199	12	380	2	17622
Uttarakhand	296	36	225	28	175	21	94	12	25	3	815
West Bengal	2891	52	1557	28	731	13	110	2	222	4	5511

Source: Source: Agricultural Census 2010-11, Note: Area in '000 hectares

Annexure 1.3: NIC Code 106: Manufacture of Grain Mill product, starch, starch products

State	No of Factories	Factories in Operation	Geographical Area (Km^2)	Density of Factories (no/Km^2)	Density of Operational Factories (no/Km^2)
Punjab	2297	1859	50362	4.6	3.7
Telangana	2936	2843	112077	2.6	2.5
Andhra Pradesh	3446	2607	162968	2.1	1.6
Tamil Nadu	2555	2092	130058	2.0	1.6
Haryana	601	467	44212	1.4	1.1
West Bengal	839	786	88752	0.9	0.9
Chhattisgarh	1050	852	135191	0.8	0.6
Bihar	638	553	94163	0.7	0.6
Odisha	706	618	155707	0.5	0.4
Kerala	158	154	38863	0.4	0.4
Assam	311	310	78438	0.4	0.4
Uttar Pradesh	938	761	243290	0.4	0.3
Gujarat	513	388	196024	0.3	0.2
Maharashtra	754	653	307713	0.2	0.2
Jharkhand	149	119	79714	0.2	0.1
Madhya Pradesh	300	281	308350	0.1	0.1
Karnataka	90	80	191791	0.05	0.04
All India	19652	16565	3287263	0.6	0.5

Source: Annual Survey of Industries Report, 2014-15

Annexure 1.4

STATEMENT SHOWING THE STATE-WISE MONTHLY AVERAGE STORAGE CAPACITY WITH FCI FOR THE MONTH OF DECEMBER, 2016.

(FIG.IN LAC TONNES)

ZONE	SL. NO.	REGION/U.T.	COVERED: FCI OWNED	COVERED: HIRED: STATE GOVT.	COVERED: HIRED: CWC	COVERED: HIRED: SWC	COVERED: HIRED: PEG	COVERED: HIRED: PWS 2010	COVERED: HIRED: PRIVATE PARTIES	COVERED: HIRED: TOTAL HIRED	TOTAL COVERED	CAP: OWNED	CAP: HIRED	CAP: TOTAL	GRAND TOTAL	STOCKS HELD	UTILIZATION (%AGE)	TOTAL EFFECTIVE STORAGE CAPACITY AS PER REGION	UTILIZATION (%AGE) ON EFFECTIVE CAPACITY	Effective covered storage capacity	Utilization effecrive covered capacity
EAST	1	BIHAR	3.66	0.03	0.73	1.48	0.47	0.05	0.28	3.04	6.70	1.00	0.00	1.00	7.70	2.10	27	5.98	35	5.98	35
	2	JHARKHAND	0.67	0.00	0.07	0.43	1.23	0.00	0.15	1.88	2.55	0.05	0.00	0.05	2.60	1.01	39	2.55	40	2.55	40
	3	ORISSA	3.12	0.00	0.78	1.51	0.00	0.00	0.00	2.29	5.41	0.00	0.00	0.00	5.41	1.76	33	5.20	34	5.20	34
	4	WEST BENGAL	8.40	0.00	0.41	0.00	0.00	0.00	0.80	1.21	9.61	0.51	0.00	0.51	10.12	4.23	42	7.84	55	7.84	55
	5	SIKKIM	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.11	0.00	0.00	0.00	0.11	0.09	82				
		TOTAL(E.ZONE)	15.95	0.04	1.99	3.42	1.70	0.05	1.23	8.43	24.38	1.56	0.00	1.56	25.94	9.19	35	21.79	42	21.57	43
N.E.	6	ASSAM	3.00	0.00	0.35	0.20	0.00	0.00	0.39	0.94	3.94	0.00	0.00	0.00	3.94	1.85	47	3.91	47	3.91	47
	7	ARUNACHAL PD	0.20	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.23	0.00	0.00	0.00	0.23	0.13	57	0.23	57	0.23	57
	8	MEGHALAYA	0.14	0.00	0.00	0.09	0.00	0.00	0.00	0.09	0.23	0.00	0.00	0.00	0.23	0.16	70	0.23	70	0.23	70
	9	MIZORAM	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.25	0.12	48	0.26	46	0.26	46
	10	TRIPURA	0.35	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.43	0.00	0.00	0.00	0.43	0.27	63	0.37	73	0.37	73
.	11	MANIPUR	0.28	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.32	0.00	0.00	0.00	0.32	0.16	50	0.32	50	0.32	50
	12	NAGALAND	0.29	0.00	0.08	0.00	0.00	0.00	0.00	0.08	0.37	0.00	0.00	0.00	0.37	0.24	65	0.37	65	0.37	65
		TOTAL(N.E.Z)	4.51	0.12	0.43	0.29	0.00	0.00	0.42	1.26	5.77	0.00	0.00	0.00	5.77	2.93	51	5.69	51	5.69	51
NORTH	13	DELHI	3.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.36	0.31	0.00	0.31	3.67	1.50	41	2.64	57	2.64	57
	14	HARYANA	7.68	2.31	2.90	3.79	33.49	0.00	2.00	44.49	52.17	3.33	0.00	3.33	55.50	31.27	56	55.39	56	52.07	60
	15	HIMACHAL PD.	0.19	0.00	0.04	0.00	0.13	0.00	0.00	0.17	0.36	0.00	0.00	0.00	0.36	0.26	72	0.34	76	0.34	76
	16	J & K	1.03	0.10	0.00	0.00	1.35	0.00	0.00	1.45	2.48	0.10	0.00	0.10	2.58	1.45	56	2.44	59	2.44	59
	17	PUNJAB	22.24	0.00	5.67	28.93	42.42	0.00	3.00	80.02	102.26	7.31	0.00	7.31	109.57	69.21	63	109.44	63	102.24	68
	18	CHANDIGARH	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.06	0.06	100				
	19	RAJASTHAN	7.06	0.00	2.55	5.68	1.14	0.00	0.80	10.17	17.23	1.85	0.00	1.85	19.08	14.82	78	17.65	84	17.21	86
	20	UTTAR PRADESH	14.95	0.15	3.51	11.71	11.00	0.00	0.00	26.37	41.32	5.19	0.00	5.19	46.51	19.83	43	43.39	46	39.74	50
	21	UTTARAKHAND	0.66	0.16	0.39	0.47	0.00	0.00	0.00	1.02	1.68	0.21	0.00	0.21	1.89	0.84	44	1.79	47	1.62	52
		TOTAL(N.Z.)	57.17	2.72	15.12	50.58	89.53	0.00	5.80	163.75	220.92	18.30	0.00	18.30	239.22	139.24	58	233.08	60	218.30	64
SOUTH	22	ANDHRA PRADESH	7.29	0.00	0.05	0.15	0.30	0.30	0.00	0.80	8.09	1.60	0.00	1.60	9.69	1.81	19	9.71	19	8.11	23
	23	ANDAMAN NIKOBAR	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.07	0.05	71				
	24	TELANGANA	5.37	0.00	0.17	0.00	0.85	0.00	0.00	1.02	6.39	1.02	0.00	1.02	7.41	1.15	16	7.40	16	6.38	18
	25	KERALA	5.29	0.00	0.00	0.00	0.05	0.00	0.00	0.05	5.34	0.21	0.00	0.21	5.55	3.68	66	5.18	71	5.18	71
	26	KARNATAKA	3.81	0.00	0.15	1.10	0.86	0.00	1.33	3.44	7.25	1.36	0.00	1.36	8.61	5.31	62	7.25	73	7.25	73
	27	TAMIL NADU	5.80	0.00	1.81	0.90	1.05	0.00	0.50	4.26	10.06	0.25	0.00	0.25	10.31	6.26	61	10.54	66	10.54	66
	28	PONDICHERRY	0.44	0.00	0.00	0.19	0.39	0.00	0.00	0.58	1.02	0.06	0.00	0.06	1.08	0.74	69				
		TOTAL(S.Z.)	28.07	0.00	2.18	2.34	3.50	0.30	1.83	10.15	38.22	4.50	0.00	4.50	42.72	19.00	44	40.08	47	37.46	51
WEST	29	GUJARAT	5.00	0.14	1.09	0.00	0.00	0.00	0.00	1.23	6.23	0.27	0.00	0.27	6.50	4.24	65	5.49	77	5.22	81
	30	MAHARASHTRA	8.85	0.00	1.38	2.66	5.45	0.15	0.70	10.34	19.19	1.02	0.00	1.02	20.21	13.97	69	19.76	72	18.87	75
	31	GOA	0.15	0.00	0.05	0.00	0.00	0.00	0.00	0.05	0.20	0.00	0.00	0.00	0.20	0.17	85				
	32	MADHYA PRADESH	3.37	0.00	0.03	0.00	0.00	0.00	0.00	0.03	3.40	0.36	0.00	0.36	3.76	1.24	33	3.54	35	2.83	44
	33	CHHATTISGARH	5.12	0.00	0.30	1.33	0.76	0.00	0.05	2.44	7.56	0.01	0.00	0.01	7.57	2.06	27	7.56	27	7.56	27
		TOTAL(W.Z.)	22.49	0.14	2.85	3.99	6.21	0.15	0.75	14.09	36.58	1.66	0.00	1.66	38.24	21.68	57	36.35	60	34.48	63
		GRAND TOTAL	128.19	3.02	22.57	60.62	100.94	0.50	10.03	197.68	325.87	26.02	0.00	26.02	351.89	192.04	55	336.99	57	317.50	60

Effective Capacity - Capacity available with FCI for storage of foodgrains, as reported by the Regions.

Source: http://fci.gov.in/app/webroot/upload/Storage/Stg.Cap.31.12.2016%20xls.._1.pdf

Annexure 1.5

	Rice (KMS)		Wheat (RMS)		No of Agricultural HH		
States/UTs	**2015-2016**	**2016-2017***	**2016-2017**	**2017-2018**	2013NSS	**15-16 benefited Rice**	**16-17 benefited Wheat**
Andhra Pradesh	276699	544124	-	-	3596800	7.7	
Telangana	535007	1086196	-	-	2538900	21.1	
Assam	7288	6482	-	-	3423000	0.2	
Bihar	275484	287830	-	-	7094300	3.9	
Chandigarh	3468	2235	1025	935			
Chhattisgarh	1110163	1327944	-	-	2560800	43.4	
Delhi	0	0	-	-			
Gujarat	335	1316	14	1700	3930500	0.0	0.0
Haryana	212351	556654	472313	690448	1569300	13.5	30.1
Himachal Pradesh	0	0	127	167			
Jharkhand	53945	39480	-	-	2233600	2.4	
Jammu and Kashmir	2812	2693	-	-			
Karnataka	14587	0	-	-	4242100	0.3	
Kerala	162737	125530	-	-	1404300	11.6	
Madhya Pradesh	199984	287759	532907	738895	5995000	3.3	8.9
Maharashtra	111503	148073	-	-	7097000	1.6	
Odisha	1078596	1087446	-	-	4493500	24.0	
Puducherry	0	0	-	-			
Punjab	1206216	940560	834655	843446	1408300	85.7	59.3
Rajasthan	0	0	38942	110338	6483500	0.0	0.6
Tamil Nadu	850640	73367	-	-	3244300	26.2	
Uttar Pradesh	433556	435320	166073	800646	18048600	2.4	0.9
Uttrankhand	51772	79470	710	654			
West Bengal	1244256	373299	-	-	6362400	19.6	
India	**7831399**	**7405778**	**2046766**	**3187229**	90201100	8.7	2.3
	8.7	8.2	2.3	3.5			

Note : * : KMS 2016-17 is under progress. Data reported as on 26.07.2017.
Source : Lok Sabha Unstarred Question No. 2570, dated on 01.08.2017.

Annexure 1.6

Export Revenue on Account of Agricultural Product in US$ (2016-17)

Country	US$	Share
Vietnam Soc Rep	2248479400	13.8
U Arab Emts	1387436069	8.5
Saudi Arab	1148727114	7.1
U S A	914211619	5.6
Nepal	657069779	4.0
Iran	646456405	4.0
Iraq	636160617	3.9
Malaysia	622820733	3.8
Indonesia	518736563	3.2
Bangladesh Pr	395437736	2.4
Rest	7070519387	43.5

Source: Directorate General of Commercial Intelligence and Statistics

Annexure 2.1

Indian Rice Export

Year	Non-Basmati Rice (Kg)	Basmati Rice (Kg)
1987-88	33519000	355277000
1988-89	35473900	314088000
1990-91	21024000	217695000
1991-92	525790000	235590000
1992-93	276734550	286170000
1993-94	240454000	527233000
1994-95	448446000	442167000
1995-96	4540699000	373314000
1996-97	1988847213	523126822
1997-98	1796279554	592678258
1998-99	4365841578	597756430
1999-00	1257747512	638379777
2000-01	682746621	851717701
2001-02	1541485140	666713639
2002-03	4337062990	710156206
2003-04	2640438932	771475368
2004-05	3615109547	1162989156
2005-06	2921601914	1166562794
2006-07	3702191989	1045714947
2007-08	5285916327	1183355732
2008-09	931879803	1556411056
2009-10	139540759	2016774999
2010-11	100685777	2370658389
2011-12	3997719573	3178174433
2012-13	6687990847	3459898933
2013-14	7133183374	3757271423
2014-15	8274046018	3702260073
2015-16	6464569768	4045822286
2016-17	6770804279	3985195600

Source: APEDA, Ministry of Commerce and Industry, Government of India

Annexure 2.2

Unit Price (Nominal) of Exported Rice

Year	Non-Basmati Rice (Rs/Kg)	Basmati Rice (Rs/Kg)
1987-88	6.4	8.9
1988-89	5.5	9.9
1990-91	6.9	12.7
1991-92	6.1	18.5
1992-93	7.2	24.5
1993-94	9.4	20.1
1994-95	7.6	19.6
1995-96	8.2	22.8
1996-97	9.7	23.8
1997-98	9.4	28.4
1998-99	10.1	31.4
1999-00	10.7	27.9
2000-01	11.4	25.4
2001-02	8.6	27.6
2002-03	8.8	29.0
2003-04	8.2	25.8
2004-05	10.9	24.3
2005-06	10.9	26.1
2006-07	11.5	26.7
2007-08	14.0	36.7
2008-09	18.1	60.9
2009-10	26.2	54.0
2010-11	23.0	47.9
2011-12	21.7	48.6
2012-13	21.6	56.1
2013-14	24.9	78.0
2014-15	24.7	74.5
2015-16	24.0	56.2
2016-17	25.0	54.0
STDEV	**7.0**	**18.5**
AVERAGE	**13.5**	**34.5**
CV	**0.52**	**0.54**

Source: APEDA, Ministry of Commerce and Industry, Government of India

Annexure 2.3

Unit Price (Real) of Exported Rice

Year	Real Non-Basmati Rice (Rs/Kg)	Real Basmati Rice (Rs/Kg)
1987-88	5.9	8.2
1988-89	5.1	9.2
1990-91	6.2	11.5
1991-92	5.4	16.2
1992-93	6.6	22.4
1993-94	8.5	18.3
1994-95	6.9	17.8
1995-96	7.5	20.9
1996-97	9.0	22.2
1997-98	8.8	26.7
1998-99	9.3	29.1
1999-00	10.4	27.1
2000-01	11.0	24.5
2001-02	8.4	26.8
2002-03	8.5	28.0
2003-04	7.9	24.9
2004-05	10.3	23.0
2005-06	10.4	25.0
2006-07	10.8	25.1
2007-08	13.3	34.7
2008-09	16.7	56.0
2009-10	24.7	50.9
2010-11	21.1	43.9
2011-12	20.0	44.8
2012-13	20.0	52.0
2013-14	23.4	73.4
2014-15	24.0	72.3
2015-16	23.5	55.2
2016-17	24.1	52.1
STDEV	6.7	17.7
AVERAGE	12.7	32.5
CV	0.53	0.54

Source: APEDA, Ministry of Commerce and Industry, Government of India; and Deflated with GDP Deflator (Source: World Bank)

Annexure 2.4

Unit Price of Exported Rice

Year	Non-Basmati Rice (US$/Qtl)	Basmati Rice (US$/Qtl)
1987-88	49.2	68.9
1988-89	38.0	68.6
1990-91	38.3	70.8
1991-92	24.9	75.5
1992-93	23.4	79.8
1993-94	29.9	64.2
1994-95	24.2	62.3
1995-96	24.5	68.1
1996-97	27.3	67.2
1997-98	25.3	76.5
1998-99	24.0	74.6
1999-00	24.7	64.4
2000-01	24.9	55.7
2001-02	18.4	58.8
2002-03	18.2	59.9
2003-04	18.3	57.4
2004-05	24.3	54.1
2005-06	24.6	58.9
2006-07	25.4	59.2
2007-08	34.6	90.7
2008-09	39.4	132.4
2009-10	55.2	113.9
2010-11	50.4	105.1
2011-12	45.2	101.4
2012-13	39.7	103.0
2013-14	40.9	129.5
2014-15	40.3	122.0
2015-16	36.6	86.0
2016-17	37.4	80.7

Source: Ratio of Value and Quantity mentioned in Data (annexure 4) from APEDA, Ministry of Commerce and Industry, Government of India

Annexure 2.5 Economic Cost of Rice and Export Price of Rice in Major Paddy Producing States

	2013-14				
	Raw Rice	Raw Rice	Para Boiled	Para Boiled	Export Price
State	Common	Grade A	Common	Grade A	
Andhra Pradesh	26.3	26.9	25.8	26.5	23.7
Assam	22.7	23.3	0.0	0.0	17.1
Bihar	24.8	25.4	24.4	25.0	16.2
Chhattisgarh	26.2	26.8	25.8	26.4	21.9
Haryana	23.1	23.7	22.7	23.3	37.9
Odisha	25.2	25.8	24.8	25.4	23.9
Punjab	24.0	24.6	23.6	24.2	32.8
Tamil Nadu	24.2	24.7	23.8	24.4	33.2
Uttar Pradesh	22.6	23.2	22.3	22.8	26.1
West Bengal	24.2	24.8	23.9	24.4	23.8
	2014-15				
	Raw Rice	Raw Rice	Para Boiled	Para Boiled	Export Price
State	Common	Grade A	Common	Grade A	
Andhra Pradesh	NA	NA	NA	NA	23.9
Assam	23.6	24.2	23.2	23.8	24.1
Bihar	25.8	26.4	25.4	26.0	17.4
Chhattisgarh	27.4	28.1	27.0	27.7	21.5
Haryana	23.9	24.6	23.5	24.2	34.5
Odisha	26.2	26.9	25.8	26.4	28.0
Punjab	24.8	25.5	24.4	25.1	30.2
Tamil Nadu	25.0	25.7	24.6	25.3	29.8
Uttar Pradesh	23.5	24.1	23.1	23.7	26.2
West Bengal	25.3	25.9	24.9	25.5	22.2
	2015-16				
	Raw Rice	Raw Rice	Para Boiled	Para Boiled	Export Price
State	Common	Grade A	Common	Grade A	
Andhra Pradesh	28.2	29.0	27.8	28.5	22.3
Assam	24.3	25.0	0.0	0.0	33.0
Bihar	26.7	27.4	26.3	27.0	19.5
Chhattisgarh	28.0	28.7	27.6	28.3	20.1
Haryana	24.7	25.3	24.3	24.9	34.1
Odisha	25.4	26.1	25.0	25.7	16.2
Punjab	25.9	26.6	25.5	26.2	31.5
Tamil Nadu	25.9	26.6	25.5	26.2	33.5
Uttar Pradesh	23.8	24.5	0.0	0.0	25.1
West Bengal	26.2	26.9	25.8	26.5	21.3
	2016-17				
	Raw Rice	Raw Rice	Para Boiled	Para Boiled	Export Price
State	Common	Grade A	Common	Grade A	
Andhra Pradesh	29.4	30.1	28.9	29.6	23.6
Assam	25.6	26.2	25.1	25.8	19.3
Bihar	27.9	28.6	27.4	28.1	18.4
Chhattisgarh	29.3	30.1	28.9	29.6	21.7
Haryana	26.1	26.7	25.6	26.3	35.6
Odisha	27.7	28.4	27.3	28.0	25.7
Punjab	27.4	28.1	26.9	27.6	31.8
Tamil Nadu	26.9	27.6	26.5	27.1	34.7
Uttar Pradesh	25.5	26.1	25.1	25.7	23.9
West Bengal	27.4	28.0	26.9	27.6	23.0

Source: Economic Costs: Department of Food and Public Distribution, Government of India, Export Price: Ratio of Value and Quantity of non-Basmati rice export from APEDA, Ministry of Commerce and Industry, Government of India. Note: All figures are in Rs per Kg.

Annexure 2.6

Cost Concept

Cost Concepts

1. Costs are generated following certain cost concepts. These cost concepts and the items of costs included under each concept are given below:

Cost A1:
i. Value of hired human labour.
ii. Value of hired bullock labour.
iii. Value of owned bullock labour.
iv. Value of owned machinery labour.
v. Hired machinery charges.
vi. Value of seed (both farm produced and purchased).
vii. Value of insecticides and pesticides.
viii. Value of manure (owned and purchased).
ix. Value of fertilizer.
x. Depreciation on implements and farm buildings.
xi. Irrigation charges.
xii. Land revenue, cesses and other taxes.
xiii. Interest on working capital.
xiv. Miscellaneous expenses (Artisans etc.).

Cost A2: Cost A1 + rent paid for leased in land.

Cost B1: Cost A1 + interest on value of owned fixed capital assets (excluding land).

Cost B2: Cost B1+ rental value of owned land (net of land revenue) and rent paid for leased-in land.

Cost C1: Cost B1 + imputed value of family labour.

Cost C2: Cost B2 + imputed value of family labour.

Cost C2*: Cost C2 adjusted to take into account valuation of human labour at market rate or statutory minimum wage rate whichever is higher.

Cost C3: Cost C2* + value of management input at 10 percent of total cost (C2*).

Source: Directorate of Economics and Statistics, Government of India, (https://eands.dacnet.nic.in/Cost_Concept/Cost_Con.pdf)

Annexure 3.1

Area and Number of Land Holding by Size Group and Social Groups in Bihar, 2010-11

BIHAR	Total Holdings (SC)		Total Holdings (ST)		Total Holdings (Others)		Institutional Holdings		Total Holdings	
Size of holding(in ha.)	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Marginal	1866519 (13) [95]	443154 (12) [75]	184955 (1) [87]	55752 (2) [53]	12673033 (86) [91]	3162656 (86) [56]	19591 (0) [76]	7166 (0) [27]	14744098 (100) [91]	3668728 (100) [57]
Small	69850 (7) [4]	87817 (7) [15]	17848 (2) [8]	22757 (2) [22]	857015 (90) [6]	1070435 (90) [19]	3303 (0) [13]	4685 (0) [17]	948016 (100) [6]	1185695 (100) [19]
Semi-medium	18744 (5) [1]	47994 (4) [8]	8071 (2) [4]	20579 (2) [19]	385831 (93) [3]	999013 (93) [18]	2018 (0) [8]	5383 (1) [20]	414664 (100) [3]	1072969 (100) [17]
Medium	2367 (3) [0]	12810 (3) [2]	1201 (1) [1]	5875 (1) [6]	77159 (95) [1]	391905 (94) [7]	757 (1) [3]	4351 (1) [16]	81484 (100) [1]	414941 (100) [6]
Large	131 (4) [0]	2081 (5) [0]	42 (1) [0]	574 (1) [1]	2777 (89) [0]	37382 (83) [1]	179 (6) [1]	5190 (11) [19]	3129 (100) [0]	45228 (100) [1]
All Classes	1957611 (12) [100]	593856 (9) [100]	212117 (1) [100]	105537 (2) [100]	13995815 (86) [100]	56613911 (89) [100]	25848 (0) [100]	26776 (0) [100]	16191391 (100) [100]	6387561 (100) [100]

Source: Agricultural Census of India, 2010-11, Note: All figures are in hectare, figure in small brackets are horizontal proportion of total and figures in big brackets are vertical share in total.

Annexure 3.2

	2016-17			2015-16		
Name of Districts	**Area (ha.)**	**Production (Tonnes)**	**Yield (kg/ha)**	**Area (ha.)**	**Production (Tonnes)**	**Yield (kg/ha)**
Patna	61367	184640	3009	63675	192854	3029
Nalanda	115088	358383	3114	106501	308508	2897
Bhojpur	98902	257289	2601	88040	305027	3465
Buxer	87780	284336	3239	83817	258642	3086
Rohtash	193375	640722	3313	196657	759630	3863
Bhabhua	118095	316282	2678	109155	282272	2586
Gaya	98653	327850	3323	99927	239915	2401
Jahanabad	35879	108641	3028	35877	96104	2679
Arwal	41710	145706	3493	23954	74837	3124
Nawada	68655	237331	3457	68354	173466	2538
Aurangabad	175198	619151	3534	160233	553347	3453
Saran	76452	151594	1983	68744	74250	1080
Siwan	90484	177471	1961	90957	143477	1577
Gopalgunj	83020	134155	1616	84252	70275	834
Muzaffarpur	124092	169908	1369	113985	108343	951
E.Champaran	185066	346111	1870	193282	139591	722
W.Champaran	148488	290900	1959	144586	266719	1845
Sitamarhi	96292	204628	2125	96745	93519	967
Sheohar	22119	35776	1617	22661	12464	550
Vaishali	39616	85896	2168	43719	44578	1020
Darbhanga	78608	144400	1837	78960	110696	1402
Madhubani	206622	363130	1757	204779	211884	1035
Samastipur	88666	222666	2511	99448	167440	1684
Begusarai	18149	61047	3364	18528	29354	1584
Mungher	27181	84517	3109	27393	71847	2623
Shekhpura	22079	63266	2865	24719	95713	3872
Lakhisarai	24453	91741	3752	15866	67771	4271
Jamui	71386	220013	3082	70381	132219	1879
Khagaria	22251	42684	1918	20920	38786	1854
Bhagalpur	32004	74221	2319	32908	77527	2356
Banka	95537	323630	3387	94567	316978	3352
Saharsa	78692	135789	1726	79246	157255	1984
Supaul	104630	203084	1941	99193	188006	1895
Madhepura	84094	217783	2590	79639	162096	2035
Purnia	120954	276753	2288	86061	167109	1942
Kisangunj	78412	167185	2132	78340	138925	1773
Araria	115826	227560	1965	122011	252080	2066
Katihar	109902	242534	2207	104234	218712	2098
Total	**3339777**	**8238773**	**2467**	**3232314**	**6802216**	**2104**

Source: Department of Agriculture, Government of Bihar

	2014-15			2013-14		
Name of Districts	**Area (ha.)**	**Production (Tonnes)**	**Yield (kg/ha)**	**Area (ha.)**	**Production (Tonnes)**	**Yield (kg/ha)**
Patna	63660	163121	2562	56734	137470	2423
Nalanda	83947	217104	2586	49395	112398	2275
Bhojpur	99762	287837	2885	99843	283386	2838
Buxer	82233	228893	2783	81392	250244	3075
Rohtash	196508	820981	4178	197145	776198	3937
Bhabhua	102380	281879	2753	115422	380460	3296
Gaya	105356	338346	3211	61116	121224	1984
Jahanabad	35877	118140	3293	42526	118972	2798
Arwal	26045	114539	4398	26580	77450	2914
Nawada	77229	237015	3069	63276	132156	2089
Aurangabad	164023	619195	3775	139722	514563	3683
Saran	72545	164722	2271	74724	130551	1747
Siwan	92628	190884	2061	94115	158255	1682
Gopalgunj	84778	165823	1956	84881	132972	1567
Muzaffarpur	140365	285337	2033	131107	100068	763
E.Champaran	199560	347767	1743	189484	235785	1244
W.Champaran	152975	368148	2407	162619	333458	2051
Sitamarhi	96589	182001	1884	99394	94107	947
Sheohar	22889	42015	1836	23663	23075	975
Vaishali	46184	98248	2127	40213	58660	1459
Darbhanga	78981	134777	1706	79663	124989	1569
Madhubani	208386	324571	1558	176074	161588	918
Samastipur	88869	186443	2098	94191	112999	1200
Begusarai	22332	37450	1677	29575	32742	1107
Mungher	22256	61789	2776	25641	66210	2582
Shekhpura	26738	101864	3810	14782	36825	2491
Lakhisarai	15866	58519	3688	15654	33472	2138
Jamui	42837	87453	2042	50344	91627	1820
Khagaria	23778	39478	1660	21756	23138	1064
Bhagalpur	32351	95831	2962	29519	56697	1921
Banka	91863	323625	3523	95524	284394	2977
Saharsa	90320	166372	1842	97448	148742	1526
Supaul	112077	200960	1793	98432	167849	1705
Madhepura	70854	153772	2170	74764	111051	1485
Purnia	85477	229113	2680	94583	177280	1874
Kisangunj	77617	221120	2849	84127	207253	2464
Araria	121285	266915	2201	134378	359164	2673
Katihar	105954	279577	2639	101008	282117	2793
Total	**3263374**	**8241624**	**2525**	**3150814**	**6649589**	**2110**

Source: Department of Agriculture, Government of Bihar

	2012-13		
Name of Districts	**Area (ha.)**	**Production (Tonnes)**	**Yield (kg/ha)**
Patna	59836	191978	3208
Nalanda	112084	281071	2508
Bhojpur	105334	359978	3417
Buxer	72105	253840	3520
Rohtash	179197	719137	4013
Bhabhua	102114	393863	3857
Gaya	124805	408126	3270
Jahanabad	54368	207869	3823
Arwal	26278	80445	3061
Nawada	64792	187882	2900
Aurangabad	179922	615087	3419
Saran	70881	166595	2350
Siwan	103130	222649	2159
Gopalgunj	87682	210081	2396
Muzaffarpur	117509	256129	2180
E.Champaran	188808	353941	1875
W.Champaran	163910	360662	2200
Sitamarhi	106337	229343	2157
Sheohar	24730	52879	2138
Vaishali	46352	111901	2414
Darbhanga	64327	104458	1624
Madhubani	173674	189796	1093
Samastipur	92560	165751	1791
Begusarai	27913	55859	2001
Mungher	26779	75287	2811
Shekhpura	22773	70540	3098
Lakhisarai	13525	47383	3503
Jamui	49963	73315	1467
Khagaria	20529	38125	1857
Bhagalpur	35142	67303	1915
Banka	96359	291074	3021
Saharsa	100132	191867	1916
Supaul	97963	153357	1565
Madhepura	69266	169572	2448
Purnia	95364	187951	1971
Kisangunj	82896	114485	1381
Araria	138828	339409	2445
Katihar	100720	323023	3207
Total	**3298887**	**8322013**	**2523**

Source: Department of Agriculture, Government of Bihar

Annexure 3.3: Number of Rice Mills in Different Districts of Bihar, 11/12/2014

S.N.	Name of District	Number of Millers	S.N.	Name of District	Number of Millers	S.N.	Name of District	Number of Millers
1	Patna	100	14	Gopalganj	23	27	Purnea	59
2	Nalanda	75	15	Muzaffarpur	15	28	Araria	16
3	Bhojpur	75	16	Vaishali	5	29	Kishanganj	4
4	Buxar	64	17	Sitamarhi	19	30	Katihar	10
5	Rohtas	276	18	Sheohar	1	31	Munger	27
6	Kaimur	273	19	Bettiah	84	32	Jamui	21
7	Gaya	69	20	Motihari	71	33	Lakhisarai	73
8	Aurangabad	198	21	Darbhanga	11	34	Sheikhpura	14
9	Jehanabad	5	22	Madhubani	14	35	Begusarai	19
10	Arwal	22	23	Samastipur	28	36	Khagaria	11
11	Nawada	29	24	Saharsa	30	37	Bhagalpur	57
12	Saran	28	25	Supaul	16	38	Banka	38
13	Siwan	20	26	Madhepura	29	39	Uttari*	19

Source: Bihar State Food and Civil Supplies Corporation Limited, Accessed through the Joint Director, Agricultural Department, Government of Bihar. *: Name is unknown, it is as mentioned in the original document.

Annexure 4.1

Area and Number of Land Holding by Size Group and Social Groups in Punjab, 2010-11

Punjab	Total Holdings (SC)		Total Holdings (ST)		Total Holdings (Others)		Institutional Holdings		Total Holdings	
Size of holding(in ha.)	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
MARGINAL	26045 (16) [41]	13363 (13) [11]	0 (0) [0]	0 (0) [0]	138315 (84) [14]	87603 (87) [2]	71 (0) [8]	40 (0) [0]	164431 (100) [16]	101006 (100) [3]
SMALL	14240 (7) [22]	19113 (7) [15]	0 (0) [0]	0 (0) [0]	181119 (93) [18]	249845 (93) [7]	80 (0) [9]	124 (0) [1]	195439 (100) [19]	269082 (100) [7]
SEMIMEDIUM	14017 (4) [22]	35176 (4) [28]	0 (0) [0]	0 (0) [0]	310349 (96) [31]	819548 (96) [21]	149 (0) [16]	388 (0) [3]	324515 (100) [31]	855112 (100) [22]
MEDIUM	8139 (3) [13]	45324 (3) [36]	0 (0) [0]	0 (0) [0]	289978 (97) [29]	1665434 (97) [44]	334 (0) [35]	2101 (0) [18]	298451 (100) [28]	1712859 (100) [43]
LARGE	1039 (1) [2]	13990 (1) [11]	0 (0) [0]	0 (0) [0]	68379 (98) [7]	1005607 (98) [26]	300 (0) [32]	8979 (1) [77]	69718 (100) [7]	1028575 (100) [26]
ALL CLASSES	63480 (6) [100]	126966 (3) [100]	0 (0) [0]	0 (0) [0]	988140 (94) [100]	3828037 (97) [100]	934 (0) [100]	11631 (0) [100]	1052554 (100) [100]	3966634 (100) [100]

Source: Agricultural Census of India, 2010-11, Note: All figures are in hectare, figure in small brackets are horizontal proportion of total and figures in big brackets are vertical share in total.

Annexure 4.2

District	2012-13			2013-14		
	Area	Production	Yield	Area	Production	Yield
Gurdaspur	201	617	3071	173	507	2931
Pathankot	NA	NA	NA	29	78	2709
Amritsar	183	538	2941	182	518	2846
Tarn Taran	178	595	3345	177	594	3354
Kapurthala	117	445	3802	117	451	3853
Jalandhar	165	625	3790	167	596	3571
S.B.S. Nagar	56	231	4132	56	202	3601
Hoshiarpur	70	252	3604	70	252	3600
Rupnagar	38	145	3816	37	128	3451
S.A.S. Nagar	31	117	3760	27	95	3497
Ludhiana	257	1169	4548	183	766	4186
Firozpur	267	1057	3960	104	443	4256
Fazilka	NA	NA	NA	176	815	4630
Faridkot	102	444	4357	81	334	4123
Shri Muktsar Sahib	118	417	4392	107	500	4677
Moga	176	794	4511	257	1137	4424
Bathinda	107	458	4282	92	293	3187
Mansa	78	321	4118	115	457	3974
Sangrur	276	1299	4705	111	501	4513
Barnala	106	490	4626	273	1290	4724
Patiala	233	922	3956	231	959	4153
Fatehgarh Sahib	86	384	4462	86	351	4080

District	2014-15			2015-16		
	Area	Production	Yield	Area	Production	Yield
Gurdaspur	173	452	2613	175	501	2860
Pathankot	182	505	2776	28	88	3133
Amritsar	29	72	2477	181	513	2834
Tarn Taran	176	540	3066	178	504	2830
Kapurthala	117	439	3752	117	470	4017
Jalandhar	167	616	3690	167	649	3888
S.B.S. Nagar	57	226	3963	59	252	4271
Hoshiarpur	71	244	3434	69	244	3539
Rupnagar	36	129	3605	37	165	4467
S.A.S. Nagar	29	94	3262	31	116	3739
Ludhiana	257	1119	4354	257	1181	4594
Firozpur	189	733	3880	187	729	3898
Fazilka	97	297	3061	104	298	2870
Faridkot	106	421	3972	109	435	3995
Shri Muktsar Sahib	135	514	3812	158	667	4223
Moga	177	815	4603	183	871	4757
Bathinda	119	529	4444	137	621	4530
Mansa	82	296	3610	93	363	3904
Sangrur	271	1281	4726	274	1334	4870

Barnala	230	904	3930	110	511	4646
Patiala	108	507	4695	230	910	3956
Fatehgarh Sahib	86	374	4349	86	384	4463

District	2016-17		
	Area	Production	Yield
Gurdaspur	175	557	3185
Pathankot	28	77	2759
Amritsar	180	574	3191
Tarn Taran	186	614	3301
Kapurthala	118	483	4089
Jalandhar	170	699	4109
S.B.S. Nagar	60	260	4326
Hoshiarpur	74	287	3885
Rupnagar	38	172	4528
S.A.S. Nagar	31	112	3613
Ludhiana	259	1247	4815
Firozpur	187	791	4229
Fazilka	111	391	3521
Faridkot	115	468	4070
Shri Muktsar Sahib	173	699	4039
Moga	178	816	4585
Bathinda	152	689	4530
Mansa	103	442	4292
Sangrur	278	1355	4873
Barnala	112	516	4606
Patiala	232	984	4243
Fatehgarh Sahib	86	405	4704

Source: Statistical Abstract of Punjab, Various Years.

Annexure 4.3

S.N.	Name of District	Number of Millers
1	Amritsar	28
2	Barnala	261
3	Bathinda	226
4	Faridkot	113
5	Fatehgarh Sahib	125
6	Ferozepur	140
7	Gurdaspur	44
8	Hosiarour	36
9	Jalandhar	68
10	Kapurthala	70
11	Ludhiana	357
12	Mansa	161
13	Moga	236
14	Muktsar	140
15	Nawanshahar	37
16	Patiala	515
17	Ropar	30
18	Sangrur	571
19	SAS Nagar	21
20	Tarantaran	20

Source: Department of Food Civil Supplies and Consumer Affairs, Government of Punjab, http://foodsuppb.gov.in/sites/default/files/Mill%20Allocation%20KMS%202012-13_0.pdf

Annexure Chapter 5: Demographic Profile of the Interviewee

	Katihar					
Mode of Information Collection	Respondent	Number of Respondent	Gender	Age	Religion	Social Category
Survey of Small Holder Households	Farmers	15	Male 15	25-50:10 >50:5	Hindu 15	ST 5 OBC 10
FGD (Male)	Workers	10	Male 10	25-50:6 >50:4	Hindu 10	ST 10
FGD (Female)	Workers	10	Female 10	<25:2 25-50:7 >50:1	Hindu 10	ST 10
Expert Interview	Local Trader	1	Male 1	25-50: 1	Hindu 1	OBC 1
Expert Interview	Wholesaler	2	Male 2	25-50:2	Hindu 1	OBC 1 Gen 1
	Patna					
Survey of Small Holder Households	Farmers	15	Male 15	25-50:6 >50:9	Hindu 15	SC 5 OBC 10
FGD (Male)	Workers	10	Male 10	<25:1 25-50:6 >50:3	Hindu 10	SC 6 OBC 4
FGD (Female)	Workers	9	Female 10	25-50:9	Hindu 9	SC 2 OBC 7
Expert Interview	Local Trader	1	Male 1	25-50: 1	Hindu 1	OBC 1
Expert Interview	Wholesaler	1	Male 1	25-50: 1	Hindu 1	OBC 1
Expert Interview	PACS Chairperson	1	Male 1	25-50: 1	Hindu 1	OBC 1
Expert Interview	Rice Mill Owner	1	Male 1	25-50: 1	Hindu 1	Upper Caste 1

Source: Author's Field Study

Annexure Chapter 6: Demographic Profile of the Interviewee

	Patiala					
Survey of Small Holder Households	Farmers	15	Male 15	25-50:5 >50:10	Sikh 15	Upper Caste 15
FGD (Male)	Workers	10	Male 10	25-50:10	Hindu 10	OBC 10
FGD (Female)	Workers	10	Female 10	25-50:6 >50:4	Sikh 10	SC 10
Expert Interview	Commission Agent	1	Male 1	25-50: 1	Hindu 1	Upper Caste 1
Expert Interview	Rice Mill Owner	1	Male 1	25-50: 1	Sikh 1	Upper Caste 1
	Amritsar					
Survey of Small Holder Households	Farmers	15	Male 15	25-50:6 >50:9	Sikh 15	Upper Caste 15
FGD (Male)	Workers	8	Male 8	<25:4 25-50:4	Sikh 7 Christian 1	SC 8
Expert Interview	Commission Agent	1	Male 1	25-50:1	Hindu 1	Upper Caste 1

Source: Author's Field Study

References

Aditya, K.S., Subash, S. P., Praveen, K. V., Nithyashree, M. L., Bhuvana, N. and Sharma, A. (2017). Awareness about Minimum Support Price and Its Impact on Diversification Decision of Farmers in India. *Asia & the Pacific Policy Studies*, 4 (3), 514–526.

AFCA, (2004). *Value Chain Guidebook: A Process for Value Chain Development*. Second Edition, Canada: Agriculture and Food Council of Alberta, Value Chain Initiative.

Amin, S. (1978). *The Law of Worldwide Value*. New York: Monthly Review Press.

APEDA, (2017 a). Basmati Survey Report Volume 1. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

APEDA, (2017 b). Basmati Survey Report Volume 2. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

APEDA, (2017 c). Basmati Survey Report Volume 3. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

APEDA, (2017 d). Basmati Survey Report Volume 4. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

APEDA, (2017 e). Basmati Survey Report Volume 5. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

APEDA, (2017 f). Basmati Survey Report Volume 6. Ministry of Commerce and Industry, Government of India, New Delhi: Agricultural & Processed Food Products Export Development Authority (APEDA).

Baldwin, D. A. (1978). Power and Social Exchange. *The American Political Science Review*, 72 (4), 1229-1242.

Bandyopadhyay, D. (2009). Lost Opportunity in Bihar. *Economic and Political Weekly*, 44 (47), 12–14.

Bhaduri, A. (1973). A Study in Agricultural Backwardness Under Semi-Feudalism. *The Economic Journal*, 83 (329), 120–137.

Bhaduri, A. (1983). *The Economic Structure of Backward Agriculture*. Delhi: Macmillan India Limited.

Bhaduri, A. (1986). Forced Commerce and Agrarian Growth. *World Development*, 14 (2), 267–272.

Bhalla, G.S. and Chadha, G. K. (1982). Green Revolution and the Small Peasant: A Study of Income Distribution in Punjab Agriculture: I. *Economic and Political Weekly*, 17 (20), 826–833.

Bhalla, G.S. and Chadha, G. K. (1982). Green Revolution and the Small Peasant: A Study of Income Distribution in Punjab Agriculture: II. *Economic and Political Weekly*, 17 (21), 870–877.

Bharadwaj, K. (1974a). Notes on Farm Size and Productivity. *Economic and Political Weekly*, 9 (13), A11–A24.

Bharadwaj, K. (1974b). *Production Condition in Indian Agriculture*, Cambridge: Cambridge University Press.

Bharadwaj, K. (1997). Agricultural Price Policy for Growth: The Emerging Contradictions in *The State, Development Planning and Liberalisation in India* by Byres (Ed.). New Delhi: Oxford University Press.

Bhullar, A. S. and Sidhu, R. S. (2007). Integrated Land and Water Use: A Case Study of Punjab. *Economic and Political Weekly*, 41 (52), 5353–5357.

Birthal, P. S., Jha, A. K. and Singh, H. (2007). Linking Farmers to Markets for High-Value Agricultural Commodities. *Agricultural Economics Research Review*, 20 (Conference Issue), 425–439.

Birthal, P.S., Joshi, P. K. and Gulati, A. (2005). Vertical Coordination in High-Value Food Commodities: Implications for Smallholders. MTID Discussion Paper No. 85, *International Food Policy Research Institute*, Markets, Trade and Institution Division.

Blau, Peter M. (1964). *Exchange and Power in Social Life*. New York: Wiley.

Bottomore, T. (2001). *A Dictionary of Marxist Thought*. New Delhi: Maya Blackwell.

Chakravarty, S. (1984). Power Structure and Agricultural Productivity in Desai, M., Rudolph, S. H., & Rudra, A (Ed.). *Agrarian Power and Agricultural Productivity in South Asia*, 345-374.

Chand, R. (2003). Minimum Support Price in Agriculture: Changing Requirements. *Economic and Political Weekly*, 38 (29), 3027–3028.

Chand, R. (2009). The Wheat Market: Distortions Caused by Government Interventions. *Economic and Political Weekly*, 44 (12), 41–46.

Chand, R. (2012). Development Policies and Agricultural Markets. *Economic and Political Weekly*, 47 (52), 53–63.

Chandrashekhar, C. P. (2013b). Not a Benign Market: An Analysis of Food Price Inflation and Volatility. *Agrarian South: Journal of Political Economy*, 2 (2), 121-159.

Chandrashekhar, C. P. and Ghosh, J. (2006). The Export Growth Story. *Macroscan*,
http://www.macroscan.org/fet/feb06/print/prnt070206Export_Growth.htm

Chandrashekhar, C.P. (2013a). Locked into Business. *Frontline*, July 26.

Choudhary, D. Kunwar, M. S. and Rasul, G. (2015). From Farmers to Entrepreneurs—Strengthening Malta Orange Value Chains Through Institutional Development in Uttarakhand, India. *Mountain Research and Development*, 35 (1), 4–15.

CIAT, (2007). *Participatory Market Chain Analysis for Smallholder Producers*. Colombia: Centro Internacional de Agricultura Tropical.

CII (2013). *Strengthening the Agri-Value Chain: Enhancing the Role of Private Sector*. Available at https://www.mycii.in/KmResourceApplication/39330.ProceedingsFinal.pdf.

CIP, (2006). *Participatory Market Chain Approach (PMCA)*. Peru: International Potato Center.

Coe, N. M., Dicken, P., & Hess, M. (2008). Global Production Networks: Realizing The Potential. *Journal of Economic Geography,* 8 (2008), 271–295

Dahl, R. A. (1968). *Power*. In International Encyclopedia of the Social Sciences, Vol. 12. New York: Free Press, 405-415.

Datta, S. K. (2000). Problems and Prospects of India's rice Trade in A WTO Regime. *Journal of Indian School of Political Economy,* 12 (2), 155–190.

DCOB. (2011a). *District Census Handbook, Katihar-Part A*. Bihar: Directorate of Census Operations, Bihar (DCOB).

DCOB. (2011b). *District Census Handbook, Katihar-Part B*. Bihar: Directorate of Census Operations, Bihar (DCOB).

DCOB. (2011c). *District Census Handbook, Patna-Part A*. Bihar: Directorate of Census Operations, Bihar (DCOB).

DCOB. (2011d). *District Census Handbook, Patna-Part B*. Bihar: Directorate of Census Operations, Bihar (DCOB).

DCOP. (2011a). *District Census Handbook, Patiala-Part A*. Punjab: Directorate of Census Operations, Punjab (DCOP).

DCOP. (2011b). *District Census Handbook, Patiala-Part B*. Punjab: Directorate of Census Operations, Punjab (DCOP).

DCOP. (2011c). *District Census Handbook, Amritsar-Part A*. Punjab: Directorate of Census Operations, Punjab (DCOP).

DCOP. (2011d). *District Census Handbook, Amritsar-Part B*. Punjab: Directorate of Census Operations, Punjab (DCOP).

Dev, S. M. (2012). Small Farmers in India: Challenges and Opportunities. *Indira Gandhi Institute of Development Research*, Mumbai, Working Paper 014.

Dev, S. M. and Rao, N. C. (2005). Food Processing and Contract Farming in Andhra Pradesh: A Small Farmer Perspective. *Economic and Political Weekly*, 40 (26), 2705-2713.

Dev, S. M. and Rao, N. C. (2010). Agricultural Price Policy, Farm Profitability and Food Security. *Economic and Political Weekly*, 45 (26/27), 174–182.

DFID, (2008). *Making Value Chain Work Better for the Poor: A Tool Book for Practitioners of Value Chain Analysis*. London: Department for International Development.

Dhawan, B. D. (1993). Ground Water Depletion in Punjab. *Economic and Political Weekly*, 28 (44), 2397–2401.

DoES. (2018). *Agricultural Statistics at a Glance-2017*. New Delhi: Directorate of Economics and Statistics (DoES)

Donovan, J., Cunha, M., Franzel, S., Gyau, A., & Mithöfer, D. (2015). *Guides for Value Chain Development: A Comparative Review*. Netherlands: Technical Centre for Agricultural and Rural Cooperation.

FAO RMM, (2017). Rice Market Monitor. *Food and Agricultural Organisation of the United Nations*, 20 (2), July.

FAO, (2007). *Guidelines for Rapid Appraisals of Agri-Food Chain Performance in Developing Countries*. Agricultural Management, Marketing and Finance Occasional Paper, Rome: Food and Agriculture Organization of the United Nations.

FAO, (2010). *Agricultural Value Chain Finance: Tools and Lessons*. Warwickshire: Food and Agriculture Organization of the United Nations.

Gaiha, R. and Kulkarni, V. S. (2005). Foodgrain Surpluses, Yields, and Prices in India, Centre for Population and Development, Harvard University. *Working Paper*. Retrieved from http://www.oecd.org/tad/agricultural-policies/35752830.pdf.

Gereffi, G. and Korzeniewicz, M. (1994). *Commodity Chains and Global Capitalism (Ed.)*. London: Praeger Publishers.

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12 (1), 78–104.

Ghosh, J. (2012). Accumulation Strategies and Human Development in India. *Agrarian South: Journal of Political Economy*, 1 (1), 43– 64.

Ghosh, T. and Mukhopadhyay, A. (2014). Chapter 2: Drought Hazard in Bihar in *Natural Hazard Zonation of Bihar (India)*. New York: Springer.

Gill, A. (2004). Interlinked Agrarian Credit Markets: Case Study of Punjab. *Economic and Political Weekly*, 39 (33), 3741–3751.

Gill, S. S. (2016). Water Crisis in Punjab and Haryana Politics of Sutlej–Yamuna Link Canal. *Economic and Political Weekly*, 51 (50), 37–41.

GoI, (2016). *All India Report on Input Survey: 2011-12*. (Agriculture Census Division) Department of Agriculture, Cooperation & Farmers Welfare Ministry of Agriculture and Farmers Welfare, New Delhi: Government of India.

GoI, (2017). *Preliminary Draft for Model Act, The ----------State /UT Agricultural Produce and Livestock Contract Farming (Promotion & Facilitation) Act, 2018*. Department of Agriculture, Cooperation and Farmers'

Welfare, Ministry of Agriculture and Farmers' Welfare, Government of India. http://agricoop.nic.in/sites/default/files/Model%20Contract%20Farming%20Act%202018.pdf

GTZ, (2008). *Value Links Manual: The Methodology of Value Chain Promotion*. Bonn: German Agency for Technical (now International) Cooperation.

Gulati, A. (2010). The Changing Landscape of Indian Agriculture. *The Journal of International Association of Agricultural Economics*, 41 (s1), November.

Gulati, A. and Narayanan, S. (2003). Rice Trade Liberalisation and Poverty. *Economic and Political Weekly*, 38 (1), 45–51.

Harriss, J. (2006). *Power Matters: Essays on Institutions, Politics and Society in India*, New Delhi: Oxford University Press

Henderson, J., Dicken, P., Hess, M., Coe, N., &Yeung, H. W. (2002). Global Production Networks and The Analysis of Economic Development. *Review of International Political Economy*, 9 (3), 436–464.

Homans, G. C. (1961). *Social Behavior: Its Elementary Forms*, rev. ed. New York: Harcourt, Brace & World Inc.

ILO, (2009): *Value Chain Development for Decent Work*. Geneva: International Labour Organization.

Intodia, V. (2012). *Investment in Agricultural Marketing and Market Infrastructure – A Case Study of Bihar*. Jaipur: National Institute of Agricultural Marketing (NIAM)

Jadhav, N. L. (1994). History of the co-operative movement in India. in Thesis A study of selected urban co-operative banks in Sangli with special reference to customer service. *Shivaji University*. http://shodhganga.inflibnet.ac.in/handle/10603/145526

Jha P. and Acharya, N. (2011). Expenditure on the Rural Economy in India's Budgets since the 1950s: An Assessment. *Review of Agrarian Studies*, 1 (2).

Jha, P. (1988). Review: Agrarian Power and Agricultural Productivity. *Social Scientist*, 16 (11), 51–72.

Jha, P. (1997). Changing Conditions of Agricultural Labourers in Post-independent India: A Case Study from Bihar. Thesis Submitted at Jawaharlal Nehru University, New Delhi.

Jha, P. and Chakarwarty, A. (2016). Global Production Networks and Labour Process: A Study of the Gurgaon-Manesar Automobile Cluster, India in Nathan, D., Tewari, M., &Sarkar, S. (Eds), *Labour in Global Value Chains in Asia*, (409 – 433), Cambridge University Press.

Jha, P. and Chakarwarty, A. (2014). Post-Fordism, Global Production Networks and Implications for Labour: Some Case Studies from National Capital Region, India. *Working Paper- 172*, New Delhi, Institute for Studies in Industrial Development.

Kalecki, M. (1971). *Selected Essays on the Dynamics of the Capitalist Economy, 1933–1970*. Cambridge: Cambridge University Press.

Kaur, R. and Sharma, M. (2012). Agricultural Subsidies in India Boon or Curse. *IOSR Journal of Humanities and Social Science*. 2 (4), 40–46.

Kishore, A. (2004). Understanding Agrarian Impasse in Bihar. *Economic and Political Weekly*, 39 (31), 3484–3491.

Kumar, A. (2015). India's Irrigation Infrastructure Since the Early 1970s: An All India Analysis. *MPhil Dissertation Submitted to Jawaharlal Nehru University*, New Delhi, India.

Kumar, S., Sahdeo, A. and Guleria, S. (2013). *Bihar Floods: 2007 (A Field Report)*. Ministry of Home Affairs, Government of India, New Delhi: National Institute of Disaster Management (NIDM)

Ladejinsky, W. (1969). The Green Revolution in Punjab: A Field Trip. *Economic and Political Weekly*, 4 (26), A73–A82

Lenin, V. I. (1946): *Capitalism and Agriculture*. New York: International Publishers.

MacKinnon, D. (2012). Beyond Strategic Coupling: Reassessing The Firm-Region Nexus in Global Production Networks. *Journal of Economic Geography*, 12, 227–245.

Marx, K. (1867). *Capital: A Critique of Political Economy, Volume–I*. https://www.marxists.org/archive/marx/works/download/pdf/Capital-Volume-I.pdf

Marx, K. (1968). *Theories of the Surplus Value, Volume–II*. Moscow: Progress Publishers

Moyo, S., Jha, P. and Yeros, P. (2013). The Classical Agrarian Question: Myth, Reality and Relevance Today. *Agrarian South: Journal of Political Economy*, 2(1), 93–119.

Muthiah, C. (1961). Marketable Surplus of Foodgrains: Policy for Third Plan. *Economic and Political Weekly*, 13 (3), 87–89.

Nandy, P. (2002). Agro-Based Industries of Burdwan City and Adjoining Areas a Study with Special Reference to Rice Milling. Thesis Submitted at the Department of Geography, University of Burdwan.

NBARD, (2015). *Farmer Producer Organisations, Frequently Asked Questions*. Mumbai: National Bank for Agriculture and Rural Development.

NCERT (2006). Indian Economy: 1950-1990 in *Indian Economic Development*. New Delhi: National Council of Educational Research and Training (NCERT)

NSSO. (2014). *Key Indicators of Situation of Agricultural Households in India-70th Round*. New Delhi: National Sample Survey Office.

Pant, N. (1998). *Indigenous Irrigation in South Bihar, India: A Case of Congruence of Boundaries*. Lucknow: Centre for Development Studies.

Parikh, K. S., Narayana, N. S. S., Panda, M. and Kumar, A. G. (1995). Strategies for Agricultural Liberalisation: Consequences for Growth, Welfare and Distribution. *Economic and Political Weekly*, 30 (39), A90–A92.

Patnaik, P. (2012). The Peasant Question and Contemporary Capitalism: Some Reflections with Reference to India. *Agrarian South: Journal of Political Economy*, 1 (1), 27–42.

Patnaik, P. (2016). Imperialism and the Agrarian Question. *Agrarian South: Journal of Political Economy*, 3 (1), 1–15.

Patnaik, U. (1975). Contribution to the Output and Marketable Surplus of Agricultural Products by Cultivating Groups in India, 1960-61. *Economic and Political Weekly*, 10 (52), A90–A100.

Patnaik, U. (1986). The Agrarian Question and Development of Capitalism in India. *Economic and Political Weekly*, 21 (18), 781–793.

Patnaik, U. (1996). Export-Oriented Agriculture and Food Security in Developing Countries and India. *Economic and Political Weekly*, Special Number, 2429–2449.

Patnaik, U. (1999). EMS on the Agrarian Question: Ground Rent and Its Implications. *Social Scientist*, 27 (9/10), 51–64.

Patnaik, U. (2012). Some Aspects of the Contemporary Agrarian Question. *Agrarian South: Journal of Political Economy*, 1 (3), 233–254.

Patnaik, U. (2015). The Origins and Continuation of First World Import Dependence on Developing Countries for Agricultural Products. *Agrarian South: Journal of Political Economy*, 4 (1), 1–21.

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: The Free Press.

Prasad, A. (2016). Adivasi Women, Agrarian Change and Forms of Labour in Neo-liberal India. *Agrarian South: Journal of Political Economy*, 5 (1), 20 – 49.

Raghwan, M. (2004). Politics of Procurement and Price Support. *Economic and Political Weekly*, 39 (5), 506–508.

RBI. (2018). *Handbook of Statistics on Indian States 2017-18*. Mumbai: Reserve Bank of India

Reardon, T & Barrett, C.B. (2000). Agro-industrialization, Globalization and International Development: An Overview of Issues, Patterns and Determinants. *Agricultural Economics*, 23 (3), 195-205.

Ricardo, D. (1817). On the Principles of Political Economy and Taxation. New Delhi: Global Vision Pub. House, 2008

Sachdev, S. (1993). International Competitiveness and Agricultural Export of India. *Indian Economic Review*, New Series, 28 (2), 203–217.

Sarkar, A. (2011). Socio-economic Implications of Depleting Groundwater Resource in Punjab: A Comparative Analysis of Different Irrigation Systems. *Economic and Political Weekly*, 46 (7), 59–66.

Sarkar, B., Ramachandran, V. K. and Swaminathan, M. (2014). Aspects of the Political Economy of Crop Incomes in India. *World Review of Political Economy*, 5 (3), 392–413.

Saxena, N. C. (2013). *Tenancy Reforms Vs Open Market Leasing – What Would Serve the Poor Better? - Discussion Paper*. New Delhi: Planning Commission, Government of India.

SDC, (2008). The Operational Guide for The Making Markets Work for The Poor (M4P) Approach. Bern, Swiss Agency for Development and Cooperation.

Sekhar, S. C. S. (2003). Agricultural Trade Liberalisation- Likely Implications for Rice Sector in India. *Indian Journal of Agricultural Economics*, 58 (1), 42–63.

Sen, A. (2000). Social Exclusion: Concept, Application and Scrutiny. *Social Development Papers No. 1*, Office of Environment and Social Development, Asian development Bank.

Shah, M. (2016). Eliminating Poverty in Bihar Paradoxes, Bottlenecks and Solutions. *Economic and Political Weekly*, 51 (6), 56–65.

Sharma, A. N. and Rodgers, G. (2015). Structural Change in Bihar's Rural Economy Findings from a Longitudinal Study. *Economic and Political Weekly*, 50 (52), 45–53.

Shiva, V. (1991). *The Violence of the Green Revolution: Third World Agriculture, Ecology and Politics*. Penang: Third World Network.

Sidhu, H. S. (2002). Crisis in Agrarian Economy in Punjab: Some Urgent Steps. *Economic and Political Weekly*, 37 (30), 3132–3138.

Singh, K. (2011). Groundwater Depletion in Punjab: Measurement and Countering Strategies. *Indian Journal of Agricultural Economics*, 66 (4), 573–589.

Singh, N. and Kohli, D. S. (1998). The Green Revolution in Punjab, India: The Economics of Technological Change. *Journal of Punjab Studies*, 12 (2), 285–306.

Singh, S. (2000). Crisis in Punjab Agriculture. *Economic and Political Weekly*, 35 (23), 1889–1892.

Singh, S. (2004). Crisis and Diversification in Punjab Agriculture: Role of State and Agribusiness. *Economic and Political Weekly*, 39 (52), 5583–5590.

Singh, S. (2005). Contract Farming for Agricultural Development and Diversification in Punjab: Problems and Prospects. *Journal of Punjab Studies*, 12, 251–270.

Singh, S. (2006). Credit, Indebtedness and Farmer Suicides in Punjab: Some Missing Links. *Economic and Political Weekly*, 41 (30), 3330–3331.

Singh, S. (2007). Organic Cotton Supply Chans and Small Producers: Governance, Participation and Strategies. *Economic and Political Weekly*, 41 (52), 5359–5366.

Singh, S. (2012a). Institutional and Policy Aspects of Punjab Agriculture: A Smallholder Perspective. *Economic and Political Weekly*, 47 (4), 51–57.

Singh, S. (2012b). New Markets for Smallholders in India Exclusion, Policy and Mechanisms. *Economic and Political Weekly*, 47 (52), 95–105.

Singh, S. (2013). It Excludes Farmers. *Frontline*, July 26. https://frontline.thehindu.com/cover-story/it-excludes-farmers/article4888083.ece

Singh, S. and Bendi, D. K. (2016). Punjab-Soil Health and Green Revolution: A Quantitative Analysis of Major Soil Parameters. *Journal of Crop Improvement*, 30(3), 323–340.

Singh, S. and Singla, N. (2011). Fresh Food Supermarkets in India: An Analysis of their Inclusiveness and Impact on Primary Producers. *Millennial Asia*, 2 (1), 65–91.

Singh, S., Kaur, M. and Kingra, H. S. (2008). Indebtedness among Farmers in Punjab. *Economic and Political Weekly*, 43 (26/27), 130–136.

Singh, S., Kaur, M. and Kingra, H.S. (2007). Flow of Funds to Farmers and Indebtedness in Punjab. *The Punjab State Farmers Commission*, Chandigarh, Government of Punjab.

Singla N. (2017). Innovations in Agricultural Marketing in India: A Case Study of Supermarket in Punjab. In: Mani G., Joshi P., Ashok M. (eds) *Financing Agriculture Value Chains in India*. India Studies in Business and Economics. Singapore: Springer.

Sinha, C. P. (2008). Management of Floods in Bihar. *Economic and Political Weekly*, 43 (46), 40–42.

Sturgeon, T. J. (2001). How Do We Define Value Chains and Production Networks? *Background Paper Prepared for the Bellagio Value Chains Workshop*, September 25 – October 1, 2000, Bellagio, Rockefeller Conference Center.

Sweezy, P. M. (1946). *The Theory of Capitalist Development*. New York: Monthly Review Press.

Taylor P., Newsome, K. and Rainnie, A. (2013). Putting Labour in its Place: Global Value Chains and Labour Process Analysis. *Competition and Change*, 17 (1), 1–5.

Thakur, J., Bose, M. L., Hossain, M. and Janaiah, A. (2001). *Economic and Political Weekly*, 35 (52/53), 4657–4663.

Thakur, M. (2013). Land Question in Bihar: Madhubani as a Metaphor. *Economic and Political Weekly*, 48 (19), 19–21.

Thingalaya, N. K. (1965). Has the Farmer Benefited from High Prices? A Comparison of Trends in Harvest and Annual Prices. *Economic and Political Weekly*, 17 (23), 923–925.

Vaidyanathan, A. (2000). India's Agricultural Development Policy. *Economic and Political Weekly*, 35 (20), 1735–1741.

Wilson, J. (1986). The Political Economy of Contract Farming. *Review of Radical Political Economics*, 18(4), 47–70.

World Bank Data, (2018). https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=IN

World Bank, (2010). *Building Competitiveness in Africa's Agriculture: A Guide to Value Chain Concepts and Applications*. Washington DC: The World Bank.

Yaffe, D. (1974). Value and Price in Marx's Capital. Revolutionary Communist, Second Edition, 1976, 31–49.

Weber, Max (1957; first published 1922). *The Theory of Social and Economic Organization*. Translated by A. M. Henderson and Talcott Parsons; edited by Talcott Parsons. New York: Free Press.

Annexure-I

Jawaharlal Nehru University

Thesis/Dissertation Authentication Certificate

Name of the Author (Research Scholar)	MANISH KUMAR
Degree	DOCTOR OF PHILOSOPHY (PhD)
Department/Centre	CENTRE FOR ECONOMIC STUDIES AND PLANNING (CESP)
School	SCHOOL OF SOCIAL SCIENCES
Name of affiliated Institution for which JNU is granting the degree	JNU Only
Guide/Supervisor	PROF. PRAVEEN JHA
Thesis/Dissertation Title	Agricultural Value Networks in Contemporary India: A Comparative Study of Paddy in Punjab and Bihar.
Date of Submission	30 Dec. 2019

1. I hereby declare that, if appropriate, I have obtained and attached hereto a written permission/statement from the owner(s) of each third party copyrighted material included in my thesis/dissertation.

2. I hereby certify that the thesis/dissertation contained in this CD/DVD is complete in all respect and is same as submitted in print.

Signature of the Scholar

Signature and Seal of the Guide

Supervisor
CESP, SSS, JNU
New Delhi - 110067

Place : JNU, New Delhi
Date : 30. Dec. 2019

Annexure-II

Jawaharlal Nehru University
Thesis/DissertationMetadata Form

1.	Title	Agricultural Value Networks in Contemporary India: A Comparative Study of Paddy in Punjab & Bihar
2.	Alternative Title, if any	
3.	Name of Research Scholar	MANISH KUMAR
4.	Name of Guide/Supervisor(s)	1. Prof - Praveen Jha 2. 3.
5.	Name of Degree	PhD
6.	Level of Degree	
7.	Department/Centre	CESP
8.	School	SSS
9.	Name of affiliated Institution for which JNU is granting the degree	
10.	Date of Submission	30. Dec. 2019
11.	Subject Keywords	1. Agricultural Value Networks 2. Value Chains 3. Agriculture Economics 4. Paddy 5. Value Systems
12.	Coverage (for time periods or spatial regions only)	
13.	Language of the thesis	English
14.	File Format of thesis and accompanying material, if any (PDF, MPEG, etc.)	PDF

Supervisor
CESP, SSS, JNU
New Delhi - 110067

Annexure-III

Jawaharlal Nehru University
Consent Form for Digital Archiving'

Name of the Author (Research Scholar)	MANISH KUMAR
Degree	Doctor of Philosophy (PhD)
Department/Centre	CESP
School	SSS
Name of affiliated Institution for which JNU is granting the degree	JNU Only
Guide/Supervisor(s)	Prof. Praveen Jha
Thesis/Dissertation Title	Agricultural Value Networks in Contemporary India: A Comparative Study of Paddy in Punjab & Bihar.
Date of Submission	30.12.2019

1. I hereby give my consent to the Central Library, Jawaharlal Nehru University, New Delhi to archive and to make available my thesis or dissertation in whole or in part in the University's Electronic Thesis and Dissertations (ETD) Archiveand to make it accessible worldwide under the conditions specified below in all forms of media, now or here after known.

2. I retain all other ownership rights to the copyright of the thesis/dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Conditions:
[The University recognises that there may be exceptional circumstances requiring restrictions on public access. Requests for restriction for a period of up to maximum 3 years must be specifiedby the scholar explicitly. However the digital contents on JNU INTRANET will be available immediately after the award of Degree]

1. Release the entire work for worldwideaccess immediately		
2. Release the entire work for worldwide access after	1 Year	
	2 Years	
	3 Years	✓

Signature of the Scholar
Place : JNU, New Delhi
Date : 30.12.2019

Signature and Seal of the Guide

Supervisor
CESP, SSS, JNU
New Delhi - 110067

Supervisor
CESP, SSS, JNU
New Delhi