

CREATING PROCUREMENT EFFICIENCIES IN AGRIBUSINESS IN INDIA

Akshay Tewari, Prashant Ghosh, Sunanda Sangwan

Jindal Global Business School, O.P. Jindal Global University, NCR of Delhi, India

Corresponding author:

Sunanda Sangwan

Professor, Jindal Global Business School

NCR of New Delhi, India

phone: +91 8930110855

e-mail: sunanda@jgu.edu.in

Received: 10 August 2012

Accepted: 25 August 2012

ABSTRACT

e-Choupal is an initiative of Indian Tobacco Company (ITC) Limited which came into existence in the year 2000 with an objective to link rural farmers via the Internet to procure agricultural products. Traditionally, agricultural commodities were procured in mandis, major agricultural marketing centers in rural areas, where the middleman make most of the profit. These middlemen used unscientific and unfair means to judge the quality and set the price of the product and therefore there has been less incentive for the farmers to invest and produce good quality output. With the formation of e-Choupal, the farmers were given a choice to sell their products freely diminishing the influence of the middlemen. This initiative also addressed issues like fragmented farms, weak institutions, and information asymmetry amongst farmers. This paper examines and evaluates the business model of ITC e-Choupal and studies the acceptance of this business by the farmers.

KEYWORDS

eProcurement, agricultural products, value added services, information and communication technology.

Introduction

Electronic Choupal¹ or e-Choupal is a web based B2B2C business model initiative of the Indian Tobacco Company (ITC) Limited introduced in the year 2000 to link farmer communities for procurement of agricultural products. It has an objective to create efficient supply chain aimed at delivering value to its customers around the world on a sustainable basis (www.itcportal.com) and to contribute to the rural development in India. The e-Choupal model has been specifically designed to address the challenges posed by the unique features of Indian agriculture, characterized by fragmented farms, weak infrastructure and the involvement of numerous intermediaries.

Traditionally, agricultural commodities in India are procured in major agricultural spot market in

rural areas known as “mandis” or local market yards [1, 2]. Here the middlemen procure from farmers and receive large share of the profits. These middlemen who are at the forefront of the numerous intermediaries in the complex agrarian distribution channel system, are commonly perceived as using unfair means and unscientific methods to judge the quality of the produce that sets the price a farmer would receive [3]. As a result overtime these practices have served as a disincentive for farmers to invest and produce higher and good quality outputs. e-Choupal aims to address such concerns by giving farmers an option to sell their products directly to the higher level of procurement chain and to diminish the impact of the local first level of procurement middlemen [4]. Through adoption and implementation of information and communication technology it aims to reduce information asymmetry and make agri-business

¹Choupal is a word of Hindi language, which means a meeting place in the center of village for all types of social, formal and informal meetings and activities.

more profitable through lower transaction costs and improved agricultural practices. It further aims to contribute to the larger setup of rural development in India by empowering farmers, an argument well supported by bottom-of-the-pyramid theory [5–7]. It also contributes to the debate on issues of weak institutional governance and information asymmetry amongst the policy makers and the farming communities. The subject matter of this paper focuses and studies the operational and other difficulties met by e-Choupal in the e-procurement process. It draws on a business electronic procurement analysis, to contribute in understanding how e-Choupal can perform better in achieving its objectives. We may note that e-Choupal is active not only in procuring farm products, but also in providing value added services for rural development. These services include soil-testing, selling of fertilizers and seeds according to the requirement of a farm land, providing weather forecasts, education, healthcare and so on (www.itcportal.com).

The paper is organized as follows: in the following section we employ e-procurement analysis to our case study to show price efficiencies created by e-Choupal and implicitly we understand the challenges faced by their model. We discuss key issues in this respect and finally, the paper concludes by summing up the main points with recommendations.

Explanatory Framework: Electronic Procurement

In business and supply chain management literature, web based procurement also known as electronic or e-Procurement has been widely studied to evaluate how organizations can generate value by creating efficiencies in the procurement process [8]. It is defined as the sourcing of goods or services through web based technologies by various supply chain networks and stakeholders involving electronic ordering, bidding and rendering via portals, extranets, private platforms, marketplaces and/or electronic data interchange [9]. Organizations use e-procurement to generate various benefits for themselves including cost reduction, better inventory management to increase profitability. It is conceptually a complete business to business interaction which includes identification evaluation, negotiation, and configuration of all the trading collaborators into the supply chain network, which then responds to changing market demands with greater efficiency and effectiveness. Activities like advertisement of tenders, submission of tenders, ordering of materials or supplies, sourcing via third parties, interaction between buyers and sellers, con-

tract management, research into supplier markets and integration of procurement within the financial and inventory systems can all be done via the internet [10]. Activities like advertisement and submission of tenders, ordering of supplies or material, sourcing via third parties, two way communication between buyers and sellers, contract management, research on supplier markets and integration of procurement within the financial and inventory systems can all be done via the internet. Steps at every stage of the purchasing process starting from the identification of the requirements till the final payment, with the probability to initiate contract management can also be performed online. The digital process can improve the pre-existing procurement system by eradicating the manual, paper-based, administrative and bureaucratic elements [10]. Main benefits include reduced product price and knowledge creation and dissemination of information, and making the system more transparent to eliminate unethical and unscientific processes of e-procurement. The pressure of competition and the government regulations, are requiring adoption of e-procurement to be mandatory to bring in greater transparency and elimination of unethical practices in emerging markets like India [2].

Any organization that seeks to leverage the advantages of the democratization of technology and information grows in multi-dimensions especially in spatial terms, and it is imperative that it considers e-Procurement to accompany other operational strategies [11]. It provides competitive edge to sustain economic viability from a long-term perspective [8, 12] and the same is applicable to the agriculture sector as well.

In India agripreneurship has gained much momentum in last decades with several policy initiatives of micro financing to empower the bottom of the pyramid (BOP) [5, 6, 13]. Farmers in India have also come to realise the significance of value addition in agriculture through managing risk and uncertainty [12]. e-Choupal originated with the idea of engaging digital technology and customized extension services to empower farmers and raise rural incomes [5–7].

In this paper we examine the e-Choupal business model that has profited several farmers yet its success has not been aptly realised. The model has adopted new approach for growth and development of the rural economy in general and its challenges can be balanced provided there is better management in its operations. By employing e-Procurement perspective, we suggest that understanding various operational processes and engaging managerial skills and entrepreneurial expertise, this model can continue to expand and obtain its objectives.

Methodology

We have used case study methods approach to deduct managerial lessons and implications. The case study method has been long held as an effective method to study complex models [14]. The data collection was done predominantly through secondary sources and this presented the limitation of several factors affecting our work. Case Study research is basically a learning process and the most important results are from the experiences of the various participants with direct or indirect active intervention of the researcher [15]. Through the case study knowledge about the existence of a phenomenon is acquired in an exploratory method. For our data collection we conducted expert interviews through unstructured method and subsequently prepared a questionnaire to capture farmers and district manager's perceptions of e-Choupal. All 30 respondents were selected by convenience sampling method and were participants of e-Choupal system.

e-Choupal Case Study

Traditional Procurement Process

It is well documented that Indian farmers face several problems in relation to the cultivation, harvesting, the sale of the produce and getting the right price for their produce [16, 17]. They are largely dependent on the government for various inputs like weather forecast, modern and scientific farm practices and insurance coverage [18]. Similarly for seeds, fertilizers and pesticides farmers approach dealers who would source them from wholesale suppliers.

In most Indian States agricultural activities are regulated by the national governments Agricultural produce marketing (APM) Act. The APM Act enables the state government to regulate spot markets or "Mandis", which operate under the State Agricultural Marketing Boards (SAMBS) and the Agricultural Produce Marketing Committee (APMC) at the local levels. The Committees' primary responsibilities are establishing and managing markets, as well as managing the licenses of commodity traders within these markets.

The agricultural spot markets or mandis can be segregated into two namely the auction markets and the terminal markets [18]. In auction market farmers sell to traders through an auctioneer employed by either the APMC or the commission agent who is responsible for conducting the auctions, weighing the produce and coordinating payment and delivery. In these markets, the farmers bring their produce according to a number system. The auctioneer then

leads the traders from truck to truck holding auctions for goods as they progress. These goods are presented and bid on by the traders in an open outcry through ascending first price or English auction mechanism. The exact weight of the produce is then measured and the farmer is paid according to the price set in the auction. The traders then pack the produce shipping it either to domestic market or to international markets [2]. Domestic markets serve as terminal markets which include traders, wholesalers, retailer and consumers [18].

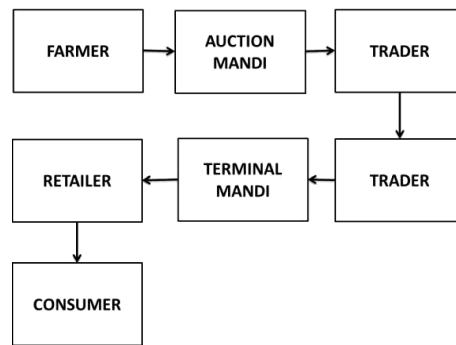


Fig. 1. Traditional Procurement Process Source: [21].

The above figure shows the process where the farmers harvest the crop and bring their produce to mandis (local market yards) which happens multiple times around the year in small batches. But the goals of having such a system of market yards are not being achieved due to multiple reasons. The supply chain consists of many intermediaries and with every intermediary the cost of produce increases for the final product at each level. With the middlemen adding their profit margin to the cost, the farmers receive the least return on their produce in the entire value chain.

e-Procurement and e-Choupal

e-Procurement process was introduced through e-Choupal to smoothen the flow of information to the farmers by dislodging middle men from the chain of information flow [19].

International Business Division of ITC started the initiative of e-Choupal meaning a village meeting place on an electronic platform. e-Choupal is a virtual market place where farmers can directly make transaction with ITC using the e-Choupal procurement system and can realize better price for their produce [3].

The business model enables the participation of both small and large farmers. Internet is used for the flow of information between ITC and the farm-

ers. With direct access to information and technology farmers have become more market oriented.

One of the most important players in this system is the village Sanchalak (moderator) who acts as an interface between the farmers and the ITC. The moderator is a person among the farmers who embraces technology faster. The company trains him/her for using Computer/internet for disseminating information among the fellow farmers. Apart from agriculture developmental programs run by ITC like imparting education, water shed management, dairy development, health programs and teaching scientific methods of farming is imparted through the moderator [12]. The moderator encourages farmers to become the member of E-Choupal by explaining to the farmers various benefits e-Choupal can provide. It also uses all the existing institutions, protocols and legal frameworks imposed by various states so that many others across India can join the market as the transaction time is very low as in (2).

While the Sanchalak acts as an interface between the farmer community and ITC the supply of farm produce from the farmer's door step to the production unit is still in the hands of the intermediaries known as the Samyojak [12]. The samyojak bears the risk of transportation of the raw materials procured from the farmers, both from the direct chain of the e-Choupal system as well as the indirect channel of the mandi and gets paid from ITC e-Choupal accordingly. By leveraging the responsibility of transportation of the goods, the organisation insures that the intermediaries are not totally removed from the value chain to avoid unemployment amongst them. But as e-Choupal grows, and the volume of transaction with the farmers increases many folds, the dependency on intermediaries for the supply chain could prove otherwise, both for the organisation and the farmers. With the growing transaction between the two parties, the role of the Sanchalak also becomes critical and more powerful.

Benefits of e-Procurement in e-Choupal

ITC e-Choupal has helped the farmers in many ways, such as encouraging entrepreneurship and leadership among the farmers, access to the latest technology for knowledge in the Agricultural sector, sustainable income levels and skill development for improving productivity [3].

The e-Choupal business model is easily replicable and scalable, can be customized to meet the specific local needs and prompts organizational commitment

among the farmers. The involvement of local farmers and maintenance of the rural IT infrastructure by ITC has led to the success of this business model in India. Currently the model is in practice in 40,000 villages spread across 10 states in India

Every intermediary in the legacy system of procurement results in an increase in the cost of produce to the predecessor as he/she adds profit margin to the cost [12]. But the farmers get the lowest price and margin in the whole value chain as it is placed right at the bottom of the grid as in (2). Apart from this, intermediaries dupe the farmers by blocking information for their own good [3]. This information asymmetry has prevailed since long times in the rural supply chain and introduction of a transparent transaction system was a must [12].

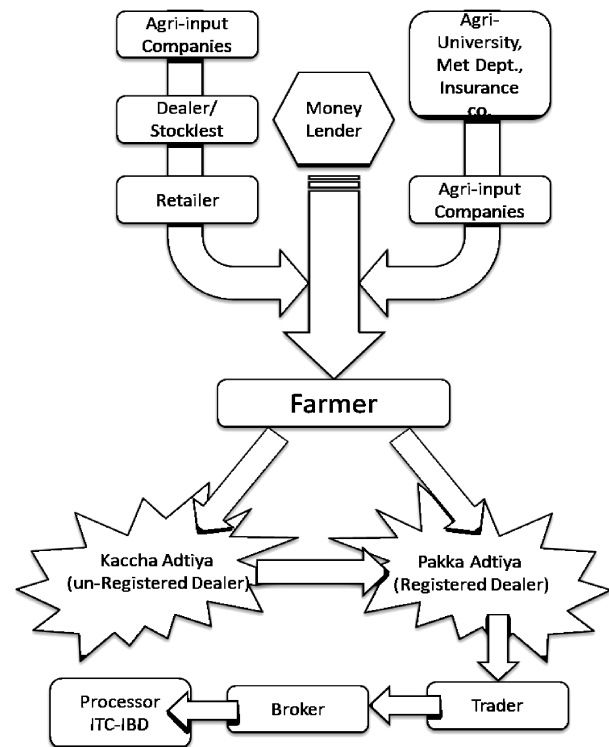


Fig. 2. Intermediaries in the legacy System, Source: <http://www.itcportal.com/itc-business/agri-business/e-choupal.aspx>.

ITC e-Choupal has helped in improving the standard of living of the farmers by introducing fair price realization for farm produce. It makes real time Price related data available of various crops listed in the local, national and international markets so that there is less price discrimination [4]. Also Historic and up to date information of supply and demand of the agri-commodity in national and international markets is made available to the farmers. In addition to that, experts' opinion on future speculated price

movements are also shared with the farmers which enable farmers to calculate profitability even before sowing the crops [2]. This helps in their better decision making process.

All measure taken facilitates the procurement process of ITC e-Choupal as ITC can buy the output from the farmers' doorstep. It strongly maintains transparent pricing and international weighing standards which is a win-win situation for both the farmers and the company. This information asymmetry in pricing is controlled by Commodities Exchange where various commodities and derivatives products are traded. Most commodity markets in India are traded in agricultural products and other raw materials (like grains, cotton, coffee, milk products, metals, etc.) and contracts based on them. These contracts include spot prices, forwards, and futures market where a farmer hedges his commodity. The farmer sells the produce to ITC through the moderator. Placing of indent for seeds pesticides fertilizers and other farm inputs is done by the moderator on behalf of the fellow farmers by the use of internet.

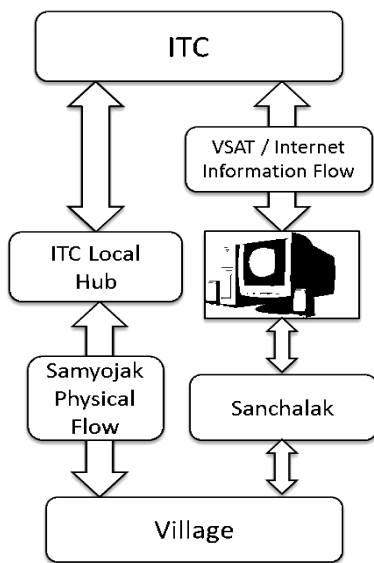


Fig. 3. Role of Sanchalak and Samyojak and the working of the entire e-Choupal System. Source: <http://www.itcportal.com/itc-business/agri-business/e-choupal.aspx>.

Rural India has always faced a shortage of electricity. The e-Choupal system is run on UPS (power backup) and renewable power sources like solar cells[20] with user interface completely designed in the local language of the area which immensely supports the first time computer users. The e-Choupal system is implemented on Internet which serves as

the backbone of the system operated through local public telecom infrastructure or VSAT/wireless connectivity solution [3] and smart card technology to uniquely identify an e-Choupal user and offer customized and personalized information based on the preference of the user as in (3).

a)

Soybeans Example		Rs per MT
Farmer Incurs	Trolley Freight to Mandi	= 120
	Labour	= 50
	Kacchha Adat	= 150
	Handling Loss	= 50
		370
Processor Incurs	Commission to Agent	= 100
	Cost of Gunny Bags (net)	= 75
	Freight to Factory	= 120
	Handling at Mandi	= 40
		335
Total Chain		705

b)

Soybeans Example		Rs per MT
Farmer Incurs	Trolley Freight to ITC Hub	= 120
	Labour	= 50
	Kacchha Adat	= 150
	Handling Loss	= 50
		370 120
Processor Incurs	Commission to Sanchalak	= 50
	Cost of Gunny Bags (net)	= 75
	Freight to Factory	= 120
	Storage & Handling at Hub	= 40
	Cash Disbursement Costs	= 50
		= 100
		335 215
Total Chain		705 335

Fig. 4. a) Tabular Representation of Costs incurred in the legacy system. Source: Prahalad C.K, Seminar on Bottom of the Pyramid and CSR, IIM-K, Sept. 24, 2008, b) Prahalad C.K. Tabular Representation of farmer's and Processors gain through e-Choupal. Source: Seminar on Bottom of the Pyramid and CSR, IIM-K, Sept. 24, 2008

In return, the moderator has a transaction-based income stream (inputs & output). Some of the Sanchalaks are making close to Rs. 100,000 as income from solely their e-Choupal operations. The farmer gets associated to e-Choupal due to increased profits, value added services, saving in time and effort, and the ability to use the e-Choupal for multiple transactions. Procurement transaction costs are reduced from the industry standard of 8% (farmer incurs 3% and the processor incurs 5%) to 2% (with farmer saving all his 3%, and the processor – ITC – saving 3%) The total cost incurred on the initiative so far has been Rs² 50 Million (Rs 35 Million capital cost towards computers and other hardware at the kiosks as

²Rs: Indian National Rupee(Currency of India)

well as central servers + Rs 15 Million revenue expenditure incurred towards portal development, people overhead etc). But ITC has accrued a benefit Rs. 20 Million, which is the equivalent of full investment on 40% of the Choupals (kiosks). This came from the procurement of 60,000 tonnes of soybean. Further ITC's market share in soybean processing industry increased in one year from 8% to 12%, reducing the difference with the market leader (20%) [12].

Challenges of e-Procurement in e-Choupal

From our primary research data and interview from the farmers in rural India, we deduct several challenges that the present setup of e-Choupal is facing.

e-Choupal has its limitations when it comes to physical delivery of produce from farm to their processor unit. It is still done by the existing intermediaries because these intermediaries have the prerequisite expertise in storage, transportation and counter party risk reduction which are difficult to implement as a process in e-Choupal system [3]. But the middle men role is not completely eradicated from the supply chain because they deliver critical value at every stage for a very low cost in an under developed rural infrastructure environment. This produces a tougher challenge to the successful implementation of the e-Choupal model (www.itcportal.com).

Another potential threat for ITC may be that the Sanchalaks may form a union and bargain with ITC to obtain a larger share from the revenues generated from the company's value chain [1].

There are many shortcomings in the e-Choupal system and the model is declining in popularity and membership as in Table 1. With farmers having access to rapidly improving wireless communication makes them savvier with various technological price discovery mechanisms. The widespread growth of Information and communication across India in both the rural and urban areas has given farmers newer amenities to decide the apt price for their produce and enables them to make their individual supply chain management more leaner and cost effective. The recent technological advances include the launch of a cost effective tablet aimed to empower the students and the farmers in rural India by decreasing information asymmetry. There are technological shortcomings in the e-Choupal system where farmers have to sell their produce on a given day at the closing

rate of the previous day [12]. This is not agreeable to the farmer as the daily fluctuation of wheat prices can be high (rates moving up and down by nearly Rs. 500 per quintal). With access to Internet and Service providers like Reuters Market Light (RML) from Thomson Reuters etc. providing the current market price and rates of commodities in the form of bulk text messages in various languages which is easy to read and understand [21]. This does not include the technicalities have made farmers more aware of the demand for food grains, market situations and the current food requirement and consumption of the nation. The analysis of the service provider also includes the measurement of crop perishability, quality of transportation links between the markets, storage facility availability and proximity to an international port [21]. It also helps connect a farmer/supplier to a consumer in the vicinity who would be interested in the produce. With Information readily available to the farmer, they have more options to sell their goods at a better price which has enabled a few to go back to the intermediaries who have readily obliged to the price asked by the farmers. This price given to the farmer is not the exact market price but is competitive enough to beat the last evening quotation given by ITC e-Choupal.

Details related to price are obtained from MCX (Multi Commodity Exchange) which is an independent commodity exchange based in India. MCX is one of the leading commodity exchange with 83% market share in 2009 (www.mcxindia.com). There are many smaller and local players in the Commodity exchange market which are concentrating on their local area and states giving up to date information on the spot prices, forwards, futures and options on futures which work independently and have no relation with MCX. Farmers are getting educated and aware of the various routes through which they can sell their crop at the best price available. They are now more aware of the Minimum Support Price (a price released by the government below which crops of any kind cannot be bought by a consumer) and with information available they are now able to hedge the crops in the forward market to minimize their risk and maximize their profitability. Information asymmetry's has negligible presence in the system due to the continuous improvement and automation of the system which have made farmers a Primary partner in the business dealings and now holds a major component in the value chain of the entire agri-business process in India.

Table 1
Paired Samples Statistics.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Price Info	1.97	30	.183	.033
	Price Info	5.00	30	.000	.000
Pair 2	Right_Agri Inputs	2.03	30	.183	.033
	Right_Agri Inputs	4.03	30	.414	.076
Pair 3	Crop Info	2.30	30	.466	.085
	Crop Info	4.23	30	.568	.104
Pair 4	Quality	1.97	30	.183	.033
	Quality	4.83	30	.531	.097
Pair 5	Storage	2.00	30	.000	.000
	Storage	3.17	30	.531	.097
Pair 6	Standard of Living	2.00	30	.000	.000
	Standard of Living	4.53	30	.507	.093
Pair 7	Soil testing	2.03	30	.183	.033
	Soil testing	4.83	30	.379	.069
Pair 8	Ease_Agri Inputs	2.03	30	.183	.033
	Ease_Agri Inputs	4.17	30	.461	.084
Pair 9	Cash	1.80	30	.407	.074
	Cash	4.87	30	.434	.079
Pair 10	Weather	2.93	30	.254	.046
	Weather	3.77	30	.430	.079
Pair 11	Farm_methods	2.17	30	.379	.069
	Farm_methods	3.87	30	.507	.093
Pair 12	Comfort_Mandi	2.50	30	.509	.093
	Comfort	4.53	30	.507	.093
Pair 13	Faith_mandi	3.50	30	.509	.093
	Faith	4.57	30	.568	.104
Pair 14	Preference	3.40^a	30	.498	.091
	Preference	3.40^a	30	.498	.091

^a) The correlation and sample t-test cannot be computed because the standard error of the difference is 0.

Conclusions

This business model has evolved over time to reach break-even but it has proved to be a success commercially due to the comprehensive knowledge aggregation of rural markets in India. The model has accomplished success as a transaction model for both Indian farmers and ITC by reducing the role of intermediaries and information asymmetries. There are still several logistical issues which are beyond ITC's domain but the logistic channel has been leveraged to the existing intermediaries in such a way that there is less information asymmetry leading to exploitation of the farmers.

We have observed that the farmers are getting educated to mediums other than e-Choupal for getting real time prices for the trading of commodities. As a result farmers can now approach both e-Choupal and the mandi system with full knowledge of price. Hence if ITC can overcome the challenges/technological im-

pediments of the existing system, this will attract more involvement from the existing pool of member farmers and more participation from rest of the farmer communities.

References

- [1] Annamalai K., Rao S., *What works: ITC's e-Choupal and profitable rural transformation*, Case study, University of Michigan Working Paper, 2003.
- [2] Chen Ying-Ju, Shanthikumar J. George, Shen Zuo-Jun Max, *Training, production, and channel separation in ITC's e-Choupal network*, Working paper Berkely, ITC 100914, 2010.
- [3] Bowonder B., Gupta Vinay, Singh Amit, *Developing a Rural Market e-hub, The case study of e-Choupal experience of ITC*, Socio-Economic Report Planning Commission Study-ICT4. Retrieved from http://planningcommission.nic.in/reports/sereport/-ser/stdy_ict/4.e-choupal%20.pdf, 2007.

- [4] Anupindi R., Sivakumar, S. *Supply chain reengineering in agri-business - A case study of ITC's e-Choupal*, in H. Lee and C.-Y. Lee (Eds.), *Supply Chain Issues in Emerging Economies*, Handbooks in Operations Research and Management Science, Elsevier-Springer, 2006.
- [5] Prahalad C.K., Hart Stuart L., *The Fortune at the Bottom of the Pyramid*, Strategy and Business (Booz Allen Hamilton Inc.), 2002.
- [6] Prahalad C.K., *We must see India and Bharat as one*, Forbes India, interview by Neelima Mahajan-Bansal, Forbes India. Retrieved from <http://forbesindia.com/interview/boardroom/we-must-see-india-and-bharat-as-one/4312/1#ixzz1rbklneH1>, September 19, 2009.
- [7] The Hindu Business Line, *ITC plans personalized crop management services via e-Choupal 3.0*, February 15, 2012.
- [8] Johnson P. Fraser., Klassen Robert D., *E-Procurement. Management of Technology and Innovation*, Operations Management and Research, 46, 2, 2005.
- [9] Schoenherr Tobias, Tummala V.M. Rao, *Electronic Procurement: a structured literature review and directions for future research*, 2007.
- [10] Bartezzaghi Emilio, Stefano Ronchi, *Internet supporting the procurement process: lessons from four case studies*, Integrated Manufacturing Systems, 14, 8, 632–641, 2003.
- [11] Davila Tony, Gupta Mahendra, Palmer Richard J., *Moving Procurement Systems to the Internet: The Adoption and Use of E-Procurement Technology Models*, Stanford GSB Research Paper No. 1742, Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=323923, 2002.
- [12] Kumar Richa, *E-Choupals: A Study on the Financial sustainability of Village Internet Centers in Rural Madhya Pradesh*, Information Technology and International Development, 2, 1, 45–74, 2004.
- [13] Mohapatra Sanjay, *Technology Enabled Entrepreneurship under Poverty Alleviation Programme*, Management Review: An International Journal, 3, 2, Retrieved from http://ximb.academia.edu/SanjayMohapatra/Papers/28-0213/Technology_Enabled_Entrepreneurship_Under_Poverty_Alleviation_Programme, 2008.
- [14] Yin R., *Case study research: Design and methods*, (3rd ed.), Thousand Oaks, CA: Sage Publishers, 2002.
- [15] Eisenhardt K.M., *Building Theories from Case Study Research*, Academy of Management Review, 14, 4, 532–550, 1989.
- [16] Gorla N., *Hurdles in rural e-government projects in India: lessons for developing countries*, Electronic Government: An International Journal, 5, 1, 91–102, 2008.
- [17] Heeks R., *Information Systems and Developing Countries: Failure, Success and Local Improvisations*, The Information Society, 18, 2, 101–112, 2002.
- [18] Ghosh A., *Initiatives in ICT for rural development: an Indian perspective*, Global Media Journal, 2, 2, 2011.
- [19] Subramaniam Chandrasekar, Michael J. Shaw, *A Study on the Value of B2B E-Commerce: The Case of Web-based Procurement in Integrated Series in Information, Systems*, 1, Vol. 1, E-Business Management, pp. 439–461, 2002.
- [20] Bulusu Sridevi, *E-Procurement in India: Public versus private sector*, Proceedings of the Fifth Asia Pacific Industrial Engineering and Management Systems Conference, 2004.
- [21] Parker Chris, Ramdas Kamalini, Savva Nicos, *Is IT Access Enough? Evidence from a Natural Experiment in India's Agriculture Markets*, 2011.