

Green Purchasing Practices: A study of E-Procurement in B2B Buying in Indian Small and Medium Enterprises

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Green Supply chain management is becoming reality from just been talked in the board rooms at the big corporate. Especially when it comes to a country like India, which is manufacturing intensive, a clear understanding about the current trends needs scientific research. This paper attempts to bring out the impact of important factors like Perception, Size of the company and Buying situation on adopting E-Procurement in Indian manufacturing SMEs. Since E-procurement calls for use of electronic media and avoids extensive use of paper and printing, this falls under the ambit of Green purchasing. The results show that Perception, Size of the company and buying situation do not impact the adoption of E-Procurement among the small and medium enterprises in India. Though they tend to use email and Internet to learn about the suppliers, they prefer traditional modes of procurement when it comes to actual buying. Procurement is characterized by a strong personalized relationship between the buyer and seller. Consequently, online procurement has not taken roots among the small firms in the manufacturing sector in India.

Key Words: E-Procurement, Green Purchasing, Green Supply Chain, Purchasing, B2B Buying, Indian SME

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I. INTRODUCTION

The term 'supply chain' describes the network of suppliers, distributors and consumers. It also includes transportation between the supplier and the consumer, as well as the final consume. The environmental effects of researching developing, manufacturing, storing, transporting, and using a product, as well as disposing of the product waste, must be considered a part of the same (Messelbeck and Whaley - 1999). According to Godfray (1998), the practice of monitoring and improving

environmental performance in the supply chain is understood as Green Supply Chain" Handfield and Nichols (1999) suggest that Green Supply chain should include all activities associated with the flow and transformation of goods from raw materials (extraction), through the end user, as well as associated information flows, as well as material and information flow both up and down the supply chain. Companies have integrated green purchasing, total quality management, customer focus, continuous improvement, and zero waste in their overall sustainability efforts (Rao, 2002). In this paper we would like to focus

on Green Purchasing with specific reference to purchasing methods essentially to eliminate paper usage, time delay with other advantages like global connect with suppliers, and seamless flow of information. E-Procurement is considered as an enabler of Green Purchasing. In this paper we present the literature review and our hypothesis followed by methodology, data analysis, results and discussion, and scope for future research.

II. LITERATURE REVIEW

Information Technology has been the back bone of Supply chain. It helps quickly cope with the changes in the business decisions and transfer inter-organizational communication in a seamless way (Devaraj et. al, 2007). Electronic procurement is currently one of the most discussed topics in supply management with the potential to dramatically change the way purchasing is carried out (Morrissey and Pittaway 2004, Buvik 2001; Rigby and Zook, 2002 and Kraljic, 1993). Indeed it constitutes a revolution through electronic purchasing (Davis and Ellis 2000; Gunasekaran et al 2000; Rugman 2001 and Quayle, 1998).

E-Procurement refers to the use of Internet-based (integrated) information and communication technologies (ICTs) to carry out individual or all stages of the procurement process including search, sourcing, negotiation, ordering, receipt, and post-purchase review (Croom& Brandon-Jones, 2004). According to the International Purchasing and Supply chain management Institute USA, IPSCMI nowadays approximately 50% of the American buyers use Internet in doing their Business operations. This gives us the clue that there is a transition in the way business is done (Caridi, 2004). In the present business environment, many practitioners and academicians believe E-Procurement as a major tool to bring in competitiveness through efficiency and effectiveness (Croom, 1999; Choy et al.,2004; Gabbard, 2001; Motwani et al., 2000; Presutti, 2003; Turban et al., 2000).On the whole

there supply chain competencies and procurement efficiencies are assuming strategic importance in organizations.

Evidence from USA suggests e-procurement has taken hold and is rapidly expanding (Caldwell et al., 2002). E-procurement has been successfully implemented in Public Procurement service of Korea. This Government electronic Procurement Service (GePS) is functional since 2002. This aims to establish a nationwide web-based procurement system dealing with whole procurement process including acquisition of all information on national procurement projects, requests, bids, contracting and payment for 27000 public organizations and 90000 private firms (PPS, 2002).A study conducted in UK and Italy suggests that Straight Re-buy situation represent most favorable ground for E-Procurement. This is due to the fact that both parties know each other well and just the quantity needed to be ordered is needed to complete the transaction. This is not the same case with Modified Re-buy and is more complex in New task (Sain, 2004).

Environmental awareness is looked as one of the factors which will lead to bolster the green initiatives in Supply chain practices. Consumers' point of view in greening along with policy makers, marketing specialists, business strategists can bring some change in the real world even if there are very limited ways of doing it (Heiskanen, 2005). The environmental behavior of the companies can be understood through their awareness and interdependence with the environment. This is well illustrated in a study with one of the companies in Hungary where the environmental values of the company are ingrained in the organization wide culture (Zsoka, 2007). In another study conducted among Australian Small and Medium Enterprises (SME), it was evident that the SME owners or Managers were aware that certain environmental practices lead to benefits for their business in the future (Gadenne, et.al 2009)

The uniqueness of this area brings in complicated issues (Sarkis, 1999). To just throw

light on one of the areas in green supply chain is green purchasing. Green purchasing comprises a number of environmentally based initiatives such as supplier environmental questionnaire, supplier environmental audit and assessments, environmental criteria on approved supplier list, requiring suppliers to undertake independent environmental certification, jointly develop cleaner technology/processes with suppliers, engage suppliers in design for environment, and product/process innovation, etc. (Lamming et al., 1999; Lloyd, 1994). Min and Galle (1997) have found in an empirical analysis that the adoption of green purchasing in companies is due to regulatory controls from the authorities rather than environmental friendliness. Drumwright (1994), conducted an empirical study of ten organizations and attempted to determine why organizations go for green purchasing and what were the characteristics of such organizations. Although some companies are involved in Corporate Social responsibility, there is a need for improved disclosure on social and environmental performance (Hockerts, 2004)

It is very obvious that the Cost benefit ratio will change from company to company

within the same industry (Lamming and Hampson, 1996). While it is necessary to take steps towards environmentally safe practices in supply chain, the extent to which these initiatives have succeeded or relate to organization success is yet to be determined,(Rao, 2002). The returns each company will get from a Social responsible investment like moving towards greener practices may not yield similar results to all company within an industry (Rivoli, 2003). Since Green products are costlier than their counterparts, green products often constitute fewer than 5% market share. Recent Cost Management techniques are able to give better decision making ability by actively manage cost than, traditional cost accounting systems, especially directly and indirect cost (Seuring, 2001).

E-procurement is gaining in popularity in India and Government departments, PSUs and a number of private sector organizations have started using e-procurement in a small way (Sahay, Ramneesh and Amit, 2006). However there is no comprehensive survey covering the extent of usage of e-procurement in the Indian context. This paper is an attempt to fill the gap.

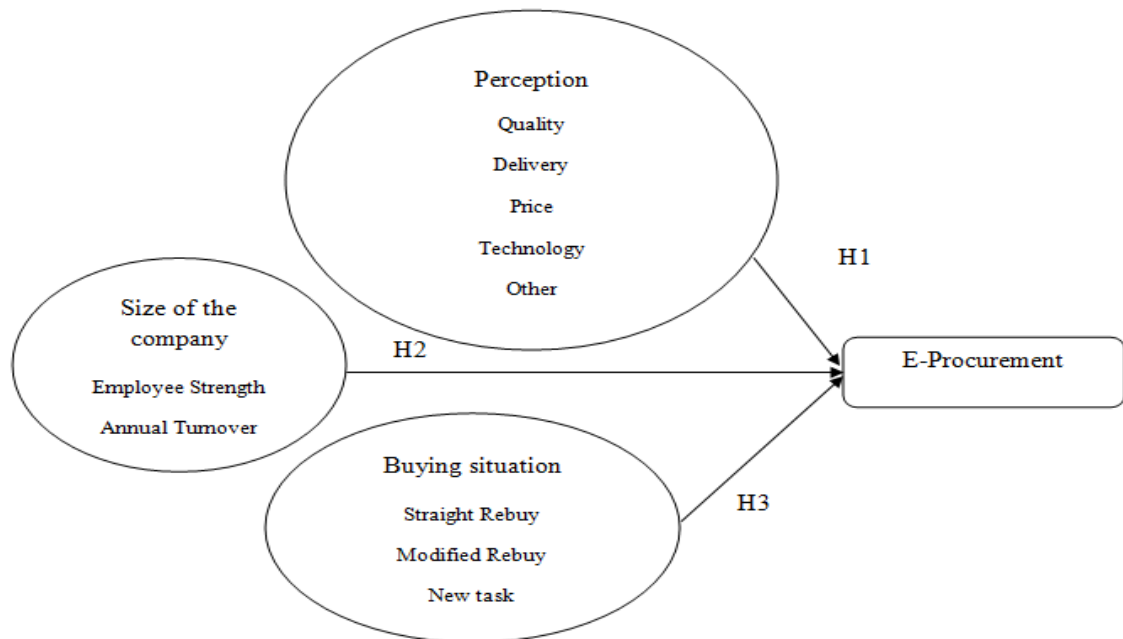


FIGURE 1. Conceptual Model

III. CONCEPTUAL MODEL

The proposed model shown in Figure – 1 hypothesizes that adoption of E-procurement is a function of perception, company size and buying situation. The components of perceived perception of e-procurement include quality, delivery, price and technology. Employee strength was used to measure the size of the company. Buying situations considered are, straight re-buy, modified re-buy and new task.

IV. HYPOTHESIS

4.1 Davila (2002) reported that, “The overall respondent perception is that e-procurement technologies will become an important element in the management of supply chains. Except for a small group of companies that have chosen to sit on the side and let others experiment, organizations are actively involved in these technologies.” In a study by Tan (2010), it is revealed that the technological barriers to adoption of Information technology relates to the perception of the complexity of the technology. Hence, the deficiency in simple know how leads to this barrier to adopt. Hence we feel this as another important construct that needs to be studied in the Indian context. Hence,

H1: Positive perception of the E-Procurement potential benefits has a direct and positive impact on the adoption of E-procurement.

4.2 Size of the company is another construct we considered for studying. There were several studies that have been done around size of the company and technology adoption. The model developed by Patterson et.al (2003), included firm size along with environmental and Organizational factors. But we would like to test the same in Indian context. Lancioni et al. (2003) studied the internet usage by firms in seven different applications in purchasing and procurement. This study categorized the firm size into two groups. One based on employee strength

and the other based on annual turnover. Since our study is on Indian context, we would like to study the relationship between Size of the firm and its impact on online buying. Therefore,

H2: Size of the company has a direct and positive impact on the adoption of E-procurement.

4.3 Sain (2004) has studied the levels of suitability between Buying situations and E-procurement. He also classified the buying situation into three categories broadly and then subdivided into six categories. The three broad categories exactly match our dimension. They found that e-procurement has a more supportive role when the complexity of buying situation is high. We would like to understand this relationship more from Indian context, hence we propose the third hypothesis as below.

H3: Complexity of buying situation has a direct and positive impact on the adoption of E- procurement.

V. RESEARCH METHODOLOGY

5.1 Data Collection Procedure

A structured questionnaire was administered to Managers in Operations / Supply chain Management function. Small and Medium scale companies in Manufacturing industry with financial turnover of less than Rs. 10 crore (100 million) and more than Rs. 1 crore (10 million) were sampled. Since Chennai is the manufacturing hub of India, sampling was done in and around the city of Chennai in south India.

5.2 Sampling Method

A convenient sampling was done. This is because of the limitations like availability of Operation Managers during the study. A total of One hundred and forty seven companies were approached personally and one hundred and

twelve responses were obtained. From that one hundred responses were found complete in all respects. The only reason why we were able to get higher response rate is, we could talk to the target respondents in their native language like Tamil, Telugu, Hindi and Malayalam which helped them understand and appreciate the importance of the study.

5.3 Selection of Respondents

We used response from single respondent from each organization. The use of multiple respondents is costly in terms of financial resources and response rate, forcing a lot of researchers to opt for a single informant (Miller and Roth 1994, Youndt et al. 1996). A way to minimize the potential bias introduced by using a single informant is to carefully select the target respondent. Hence the target respondents used in our study were Purchasing Managers or Supply Chain Managers in the middle management of the company.

5.4 Questionnaire Description

The questionnaire mainly focused on three research questions along with other information like the respondent's age, educational background, experience in online buying, number of hours spent in internet etc. Perceived impact of e-procurement on Quality, Delivery, Price and Technology were collected from the respondents. Size of the company was measured using two variables, namely, the Employee strength and Annual turnover. Under Buying situation, three types of buying situations were considered, viz. Straight Rebuy, Modified

Rebuy, and New Task. A Likert scale of 1-5 range was used to capture the complexity of buying situation. This is adapted from "A Survey to assess online B2B Procurement in India" Xavier M J, Sabari Raghavendran, Gopala Ganesh, International Conference on Technology and Business Management, March 2010. The relevant portions of the questionnaire are presented in the Appendix.

VI. RESULTS AND DISCUSSION

6.1 H1: A Linear Regression analysis was performed with the Value of online purchase as dependent variable and the average of perceptual scores on the 4 dimensions (quality, delivery, price and technology) as independent variable. The results are summarized in table – 1. As the P value is high (0.099), we conclude that the relationship between perception and online purchase is statistically not significant. Qualitative interviews with the respondents revealed that they use internet as a major channel for sending mails, and to understand the suppliers available in the market and their contacts. Once they are done with it, they switch back to conventional mode of Procurement. This is also influenced by Buyer – Supplier relationship. We believe that in Small and Medium scale companies, relationship plays a key role in Business activity, and it still needs to be empirically tested. Though they think that Internet is a useful medium for purchasing, actual purchases are not in proportion to their perceived value, as they tend to use Internet to develop relationships; but prefer to use conventional mode of buying physical goods and services.

Table 1. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
dimension0 1	.167 ^a	.028	.018	4980.077	.028	2.781	1	97	.099

a. Predictors: (Constant), Perception as a whole on Procurement

6.2 H2: The relationship between company’s size and amount of online procurement too turned out to be statistically not significant as shown in table – 2 (p=0.767). Since the study was restricted to firms with less than Rupees 10 million turnover, they all tend to be very similar

to each other. In these small firms, the buyer-seller relationships tend to be much stronger and personalized. Consequently they tend to use phone to place orders and like to have personal touch in each of the transactions.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
dimension0 1	.077 ^a	.006	-.016	5255.376	.006	.266	2	89	.767

a. Predictors: (Constant), Employee strength at this location, Total sales revenue in 2008

6.3 H3 The relationship between the complexity of buying and online procurement also turned out to be not significant as shown in table – 3. In modified rebuy, the respondents are more comfortable with making telephone calls to suppliers and asking them to send the goods with

slight modification. Following this call, would be a formal e-mail confirming the same. However, Straight rebuy is also treated in the same way, when e-Procurement is still an easier mode. Buyer behavior needs to be studied for any other moderating factors in this type of buying.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
dimension0 1	.069 ^a	.005	-.027	5118.357	.005	.151	3	94	.929

a. Predictors: (Constant), New Task, Straight Rebuy, Modified Rebuy

6.4 Testing for Collinearity and the Interaction Effect.

An endeavor was made for testing the impact of all the predictor variables namely, overall perception on e-procurement, employee strength, total sales revenue, new task, modified re-buy and new task on the dependent variable of overall investment on B2B procurement. This was done with the objective of testing the collinearity and interaction effect. Hence, a hierarchical regression analysis (HRA) was performed and the model significance was assessed. Before submitting the variables for analysis for testing the interaction effect, the

variables were standardized so that the mean value for each of the predictors in the model is equal to zero and the standard deviation equal to one. This was followed by multiplying each of pair of the predictors on their respective standardized values. In HRA, in step 1, we introduced the main effects of all the predictors (in their original units of measurement). This was followed by submitting all the possible interaction effect variables (nothing but the multiplied standardized values of each possible pair of the predictor variables in the model).

Both the models were not significant and yielded an R-square value of .049 and .179 respectively (for model 1 and model2). It was

also observed, at this stage, that the predictors ‘modified rebuy’ indicated a tolerance value of less than .20 thus signifying the presence of collinearity with the other variables, namely straight buy and new task in the model. Hence, it was decided to drop the variable ‘modified rebuy’ and re-run the HRA whose results are reported in Table 4 which indicates that even

after the removal of modified re-buy, the model for main effect (row one in Table 4) and the interaction effect (row two in Table 4) did not reveal any significant result ($p > .05$) thus confirming our earlier observation that none of the predictor variables have significant effect on the volume transacted online in the B2B context.

Table 4. Hierarchical Regression Analysis Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.217 ^a	.047	-.009	5264.683	.047	.841	5	85	.524
2	.262 ^b	.069	-.075	5433.693	.021	.256	7	78	.969

a. Predictors: (Constant), New Task, Total sales revenue in 2008, Overall across all criteria, Employee strength at this location, Straight Rebuy

b. Predictors: (Constant), New Task, Total sales revenue in 2008, Overall across all criteria, Employee strength at this location, Straight Rebuy, Q4XQ09C, Q09AXQ09C, Q10E6X09A, Q3XQ09A, Q4XQ09A, Q10E6XQ09C, Q3XQ09C

VII. CONCLUSION

Several Multi-National companies prefer to start and expand their business in India due to the high economic growth and favorable business environment that prevails in India. Manufacturing sector contributes to a major extent in Indian GDP. Hence, there is large number of Small and Medium size players in this sector. Given such a situation, western corporate eyeing on India that have either adopted Green manufacturing practices or in the process of adoption should have an in-depth understanding of the same practices in India. While advanced level research has started long back in this topic in many other countries, no research has been done to understand basic level of Green Purchasing in Indian context. Although some multinational companies follow few of the green practices which are drilled down from their headquarters, Indian small and medium sized enterprises in the manufacturing sector do not seem to have much awareness about green procurement. This results show that, Size of the

company as a whole (in terms of annual turnover and employee strength), various Buying Situations as a whole (Straight rebuy, Modified rebuy, and New task), and Perception as a whole towards online buying (Price, Quality, Technology and Delivery) do not impact E-Procurement. As discussed earlier, Small and Medium companies would look at relationship building with their suppliers and customers for increased growth and prosperity. This throws light to the practicing managers in Small and Medium companies that through adopting E-Procurement seriously along with undivided focus on relationship management would help them reap benefits at a faster pace than just being focused on relationship management with traditional procurement practices.

VIII. DIRECTIONS OF FUTURE RESEARCH

This serves as a first step for getting into next stages of research like Buyer – Supplier relationship on E-Procurement, other green

purchasing practices like preference for low carbon foot print items etc. This study can be expanded to bigger organizations in terms of manpower, sales revenue and overall turnover. The results could be different from what small and medium sized companies are doing. The same can be extended to service industry like Hospitals, Banks, Educational institutions, Hotels to throw light on Indian Service sector. Since technology used in companies are changing rapidly, a longitudinal study can be done over a period of two to three years and analyze how well companies are catching up with technology upgrade.

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APPENDIX

Measures of quality perception and different buying methods

In your opinion, on various procurement criteria listed below, which method of procurement is better: traditional B2B or on-line buying (Internet/www) or no difference? (For each criterion, please indicate which procurement method is better.)

Procurement Criteria <i>(circle one number for each)</i>		Which method of procurement is better?				
		Traditional B2B is Much Better	Traditional B2B is Better	No Difference	Online is Better	Online is Much Better
1	Quality, as a whole	1	2	3	4	5
2	Delivery, as a whole	1	2	3	4	5
3	Price, as a whole	1	2	3	4	5
4	Technology, as a whole	1	2	3	4	5

Consider three buying situations: (1) Straight Rebuy, where an exactly identical procurement occurs again, (2) Modified Rebuy, in which the product or service may remain unchanged, but there are significant differences in specifications, quality, quantity, delivery etc., and (3) New Task, which, as the name implies is a totally new buying situation. Now, in your opinion, which method of procurement is better in each of the three situations (For each buying situation, please indicate which procurement method is better.)?

Buying Situation <i>(circle one number for each)</i>	Which method of procurement is better?				
	Traditional B2B is Much Better	Traditional B2B is Better	No Difference	Online is Better	Online is Much Better
Straight Rebuy	1	2	3	4	5
Modified Rebuy	1	2	3	4	5
New Task	1	2	3	4	5