# Electronic Procurement Adoption Framework – A Case Based Study of Indian Automobile Companies

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Automobile industry in India is one of the most competitive and plays an important role in economy and growth of the country. All automobile manufacturers extensively use Information and Communication Technology (ICT) for quality, delivery, and cost control. Electronic procurement has been considered as a very important change in purchasing process that offers tremendous benefits to an organisation. Adoption of electronic procurement is a very critical issue for the adopting organization. With the integrative literature review and case studies of automobile manufacturers in India, this research paper makes an attempt to develop an electronic procurement adoption framework for automobile companies. The proposed framework has three stages, pre-adoption, adoption and post adoption. With this framework automobile manufactures can (re)design their e-procurement system.

**Keywords:** Indian automobile industry, information and communication technology, electronic procurement, adoption framework, critical success factors.

## 1. Introduction

Procurement has been considered as one of the most frequently performed business activity. Companies usually spend major part of business income in purchase of goods and services. In the beginning of 1990s a boom of new technologies emerged which promised to redefine business practices, and threatened existing business practices by creating new business models (Sinha 2000, Barua et al. 2001). Following this growth in use of technologies in business to business markets, there has been a significant change in purchasing process of companies globally. This trend majorly affected procurement system of companies with a new terminology in the industry electronic procurement which covered both transactional as well as strategic sourcing of goods and services (Croom S., 2000).

Procurement is a service provided by a team of professionals. It works as an interface between various channels of a supply chain and marketplace (Knudsen D, 2003). Hence, it becomes necessary for information to be available in each department of a company to optimise the benefits of electronic procurement. Such

applications which are automating the buying process are designed to smoothen buying cycle, optimise costs, improve process and workflow. It was also said that such technologies lead to close collaboration and good relationship with the supply chain partners (Garcia-Dastugue and Lambert, 2003).

There are suppliers available for different products in different locations across the globe. Hence, it has become very necessary to connect them and share information without any loss so as to make sure raw material is available in right time (Bandyopadhayay et al., 2013). Electronic procurement has been considered as a very important change in purchasing process (Neef, 2001) which offers various benefits to an organisation ranging from effectiveness of purchase process, reduction in costs (de Boer et al, 2002), enhanced buyer supplier relationship etc (Croom & Johnson, 2003). Similarly Beauvallet et al. (2011) called electronic or web based procurement to be big revolution in purchasing process by delivering brilliant transactional benefits ( Croom, 2000; Essig & Arnold, 2001; de Boer et al, 2012 and Wyld, 2012). In addition to this, it acts as a catalyst towards a shift from traditional to model purchase function within an organisation ( Croom, 2010 & Osmonbekov et al, 2009).

Electronic procurement is seen as an automated process which is designed to facilitate the purchase or acquisition of goods or services over the internet (Botto, 2003). Electronic procurement refers to the use of internet or electronic medium in purchase process starting from identification of requirements to supply or material and development of end product (Davila et al., 2003). Some of the benefits of e-procurement include reduction in purchase transaction cost due to less paper work, removal of mistakes and effective purchase process (Croom and Brandon-Jones, 2007).

## 2. Indian Automobile Industry

Indian automobile embarked its journey in early 1990s. Now it is world's fastest growing passenger car market and holds second position in two wheeler market. Indian automobile industry produced about 3 million passenger vehicles in 2013-14 (Automotive Component Manufacturing Association ACMA, 2014). Indian automobile industry is one of the fastest growing industries with 3rd largest investor base in the country. India stands 7th largest car manufacturer on planet with an annual production of 17.5 million vehicles in total. According to ACMA (2015), India is expected to manufacture 5.1 million passenger cars in 2015-16 and is expected to reach 10 million by 2020-21.

Indian automobile industry accounts for 7 percent of India's GDP and is giving employment to about 19 million people(Make in India, 2015 &  IBEF, 2015). The total turnover of industry is expected to reach 145 billion in 2016 (Make in India, 2015). In addition to this, passenger vehicle sector is expected to increase at CAGR of 16% by 2020. Indian passenger car manufactures witnessed a good rise in sales of their cars. According to IBEF (2015), Maruti Suzuki witnessed 8.6% increase in sales at 118,551 units in February 2015. Similarly, Hyundai Motor India Ltd. reported 2.5% increase in sales at 47, 612 cars being sold.

ACMA of India has also promoted one division called as IT committee which facilitates and promotes adoption of technology in the sector. The key focuses of the committee are people, process and technology. This committee is highly involved in assisting and educating senior professionals with importance of ICT. Major focus is to improve and enhance business process with reduction in cost, timely delivery, high productivity and right decision.

India has various bodies which monitor Indian automobile sector and its component manufacturers. One of those is Society of Indian Automobile Manufacturers (SIAM). It is a body which represents more than 45 leading automobile manufacturers in India. According to SIAM (2014),

Looking above facts, it is very much clear that, Indian automobile industry is growing at a rapid speed and considering the benefits of technology adoption in an industry, it has become essential to understand importance of procurement technology in Indian automobile industry. The rapid demand of information and communication technology has wandered the speed of doing business as compared to traditional models. This has led to increased demands and implementation of ICT into business practice to improve the workflow (Yadav et al., 2014). Considering various benefits highlighted by researchers, models of technology adoption by various experts, this paper is an initiative towards development of a framework which can help Indian automobile industries to adopt technology with improved methodology to reduce the risk of loss in investment they make. Existing frameworks are studied and reviewed to propose this conceptual framework to adopt electronic procurement in Indian automobile industry.

India has the most competitive automobile industry in the world. However, it doesn't have its own facilities to cover 100% of technology or raw materials needs to make a car, said by Mr Vicent Cobee, Corporate Vice-President, Nissan Motor's Datsun.

The vision of AMP 2006-2016 sees India, "to emerge as the destination of choice in the world for design and manufacture of automobiles and auto components with output reaching a level of US$ 145 billion; accounting for more than 10 per cent of the GDP and providing additional employment to 25 million people by 2016."

## 2. Literature Review

Electronic procurement has been receiving tremendous attention from individuals and industries. In today's global business scenario, use of latest technology in organisations is no longer a second thought; rather it has gained huge importance. With this emergence, companies are forced to reengineer their business process from traditional ways to electronic platform (Lee, Ni &Koc, 2001). This fact proves that electronic procurement system has capability to revolutionize the contemporary way of doing business.

From other perspective, procurement is one of the most used activities in today's competitive business scenarios because every business depends on material to manufacture a product. It has become very important for companies to provide goods and services at 3R's concept i.e. right time, right place and at right cost. Significant

amount of time and money is spent on purchase of these goods and services. Electronic procurement as its name suggests, is a system which automates such purchase process (Boer et al. 2002).

Procurement process is very important and expensive activity in any business (Chan et. al., 2003) as organisations spent major chunk of their profits into purchasing of goods and services (Gebauer and Segev, 1998). It has been observed that procurement systems suffers from two major problems i.e. it is labour intensive activity and secondly, managers and procurement officers spend large amount of time and money on no value adding events (Puschmann and Alt, 2005).

Every company has a pressure to improve their efficiency and responsiveness in terms of product delivery, manufacturing, servicing etc. To fulfil this objective the lead time needs to be reduced to the maximum extent in order to meet demands from customers. In this context, Lee et. al (2001) suggested that companies are forced to shift from traditional to modern ways of procurement process and also made an attempt to identify the best feasible solutions of successful transition.

For a successful transition companies need to carefully adopt technology strategies. Davila et. al. (2003) identified two strategies for technology adoption. According to the first strategy, companies aggressively adopt the technology by experimenting with various solutions available and as per the second strategy technology adoption should be a step by step activity. Since technology adoption has become very important for sustainability of any organisation, it has become important to understand and learn various factors which are important to be identified in order to make this adoption successful.

It has also been observed that when the e-procurment system is implemented, end user is not price driven rather he is brand driven which ensures trust, payment security and delivery time (Carter & Belanger, 2005). The procurement process is significantly changed with introduction of technology in the system by eliminating various ineffective things, reducing time, and errors (Egbu, Vines & Tookey, 2004). Electronic procurement is consolidation of selling and purchasing on an information technology enabled platform (Wilson, 2002). Electronic procurement is defined in different ways by different researchers. According to Kumar and Agrahari (2007), electronic procurement is integrated purchase of goods and services using electronic means at every stage.

Looking at the importance of technology in procurement process, Gunasekaran and Ngai (2008) observed that adoption of procurement is very low in majority of the industries. It is now becoming essential to have an automated procurement system which can lead to competitiveness and cost minimization (Ogot et al., 2009). Private and public sector organisations are continuously adopting Information Technology to smoothen and automate their procurement process (Mose, Njihia & Magutu, 2013). Multiple and frequent changes in business advancements and technological shifts have increased the level of competition in the industry and hence, has increased the need for innovation in order to survive and growth. This advancement can be either in terms of cost improvements, process improvements, new markets, customers or technologies (Gupta et al., 2013).

A recent study found that any organisation which adopted electronic procurement strategy have witnessed many performance benefits like reductions in transactional cost and high efficiency (Chan and Lee, 2012).

From the above facts, it has been observed that electronic procurement carries numerous benefits. It has become equally important in Indian automobile industry as well which has been discussed in introduction part of this paper. In the literature, there is few technology adoption frameworks exists, but no framework talks about technology adoption in the context of automobile industry. To bridge this gap the author in this study has tried to develop a comprehensive framework that can be used solely for Indian automobile industry.

## 3. Methodology

Considering the nature of this study, which is exploratory, an Integrative Literature Review is done to review existing technology adoption frameworks followed by three case studies of car manufacturers to understand the dynamics of e-procurement adoption in Indian automobile industry.

### Integrative Literature Review

This research paper used integrative literature review method to critically examine the existing frameworks for electronic procurement adoption. Integrative literature review studies about various critiques, reviews and integrates so as to develop a new framework highlighting various perspectives on the top from various researchers (Torraco, 2005). The models selected for a study appear to provide a strong base to develop a conceptual model for the industry (Cataldo, 2012). Every literature studied is distinctive since it is done by tracing various literatures on the selected topic; authors reviewed all these literatures and existing frameworks in electronic procurement adoption before proposing the new framework.

### Case Study

In order to understand present situation in Indian market, we targeted 3 car companies which are known to be innovative and initiators to implement technology in their organisation. We started with these companies and went to take interviews and had an indepth study in available journals and online channels.

Yin (1994) has defined case study analysis as "an empirical enquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident and relies on multiple sources of evidence". This research paper used exploratory case study method to study the phenomenon of e-procurement adoption in its contextual conditions and tried to answer the questions evolving in this scenario. Based on the study done for three automobile companies with manufacturing facilities in India, certain common dimensions of e-procurement have been identified. Since in the case study method statistical generalisation is not recommended, we have attempted for an analytical generalisation technique to recognise similarities of objects and issues within the context to facilitate better understanding.

**Review of existing frameworks**

To understand a change as organisational change, it is always important to consider different dimensions used in theories about organisational change (Boudreau and Robey, 1999). During the process of describing any social and technical system (Bostrom & Heinen, 1977) said that any working environment is made up of two independent, but correlative interacting systems i.e. social and technical. The technical system consists of processes, tasks and technology required. Social system consists of people with attributes like attitude, skills and values.The idea started in the year 1965, when Leavitt proposed a social technical system model (Figure 1) for organisational change which says that technology implementation brings a change in social as well as technical aspects of an organisation.
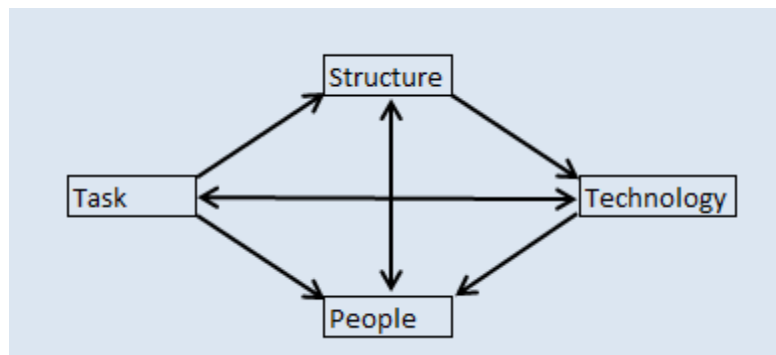


**Figure 1: Leviatt Diamond of Organizational Change**

This model consisted of task, people, process and technology. This model depicts a fact which says that if one variable is changed, it will affect other variables. According to Leavitt (1965), the success of an information system is possibly affected by a connection among technology, tasks, structure and people. Lyytinen, K. & Newman, M. (2006) supported Leavitt context of effect on other variables with a change in one variable. Introduction of information system involves a concept that change in organisations' technology automatically triggers a change in other components of an organisation (Sarker, 2000).

Technology Organisation Environment model was developed in 1990 (Tornatzky and Fleischer, 1990). The author identified three different corners in an organisation which influence the process through which an organisation adopts and implement technological capabilities: Technology, Organisational and environmental (Figure 2).
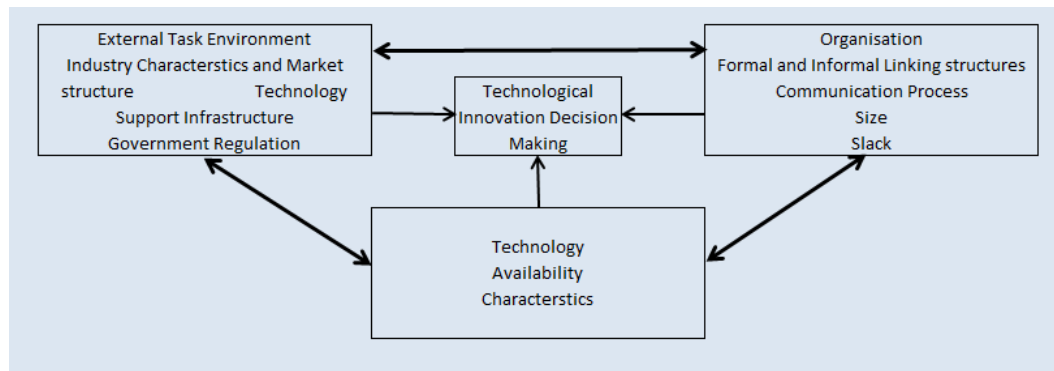
**Figure 2 : Technology, Organizational and Environmental Model (Tornatzky and Fleisher, 1990)**

In this model, technological context was describing internal as well as external technologies required by a firm. It also includes set of available technologies external to the firm (Thompson 1967, Khandwalla 1970, Hage 1980). Organisational factor was refereeing to descriptive measures like size, scope and management structure. Finally, environmental factor was describing scenario where an organisation conducts its business i.e. competitors, government, laws, etc ((Tornatzky and Fleischer 1990). This framework was adapted in many studies and has provided a framework which can be used to understand adoption and integration of different types of IT tools. This model is an enhanced model of Diffusion of Innovations theory (Rogers, 1995) which didn't included environment. Hence, TOE model was able to explain intra-firm innovation diffusion (Hsu et al., 2006).

Information system needed a more comprehensive definition which covers various evaluation perspectives. To do so, DeLone and McLean reviewed existing information system success and classified it into six different categories. In order to meet this need, a model was created which consisted of interdependencies between success categories (DeLone and McLean 1992). It was in early 1980s during first international conference on information system when (Peter Keen, 1980), demonstrated key challenges in information system. Keen paper worked on technology acceptance model (Davis 1989; Davis et al. 1989), Information system benefits model (Kohli and Grover 2008; Müller et al. 2010; Peppard et al. 2007; Shang and Seddon 2002) and many other models.
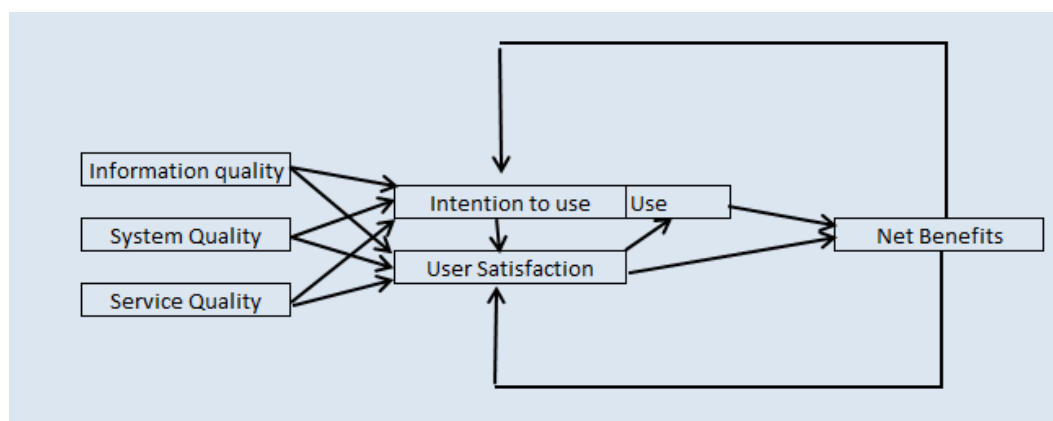
**Figure 3: Information Systems Success Model DeLone & McLean (1992); DeLone& McLean (2002); DeLone& McLean (2003)**

This model was updated in 2003 with consideration of measurement challenges of growing electronic business world. Keen also said that variables like user satisfaction or hours of usage would mislead researchers and create information system issues. Many researchers tried to fill this gap of IS success and this lead to more difficulties in comparisons. This lead to an integration of large literature into one with a more comprehensive model (DeLone and McLean, 1992) of IS success. DeLone and McLean defined six dimensions: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. Many researchers challenged that this model was incomplete and should have more dimensions in it (Ballantine et al. 1996; Seddon 1997; Seddon and Kiew 1994)). Ten years after, DeLone and McLean (2002, 2003) proposed updated model (Figure 3).

According to Gunasekaran and Ngai (2008), e-procurement works in such way that buyer software enables users to automate transactions and focus mostly on buying organizations activities such as order placement, catalogue management, payment, reporting and so on. During the process of study the role of "e" in procurement, Puschmann & Alt (2005), observed that supply chains in procurement sector are supported by information technology. Electronic purchase helps organisations to develop an improved connection with its trading partners and hence helps to increase its competitiveness (Ngai &Wat, 2002). It is observed that most of the products and services are procured using electronic data interchange and internet, this implementation of electronic procurement is expected in both manufacturing as well as services sector (Gunasekaran and Ngai, 2008). According to Gunasekaran & Ngai (2008), electronic procurement works in a way that buyer system enables users to pay automatically and focus on order management. A new model was proposed by Gunasekaran and Ngai (2008), i.e. Framework for adoption of electronic procurement, which was first demonstrated in Hong Kong (Figure 4).
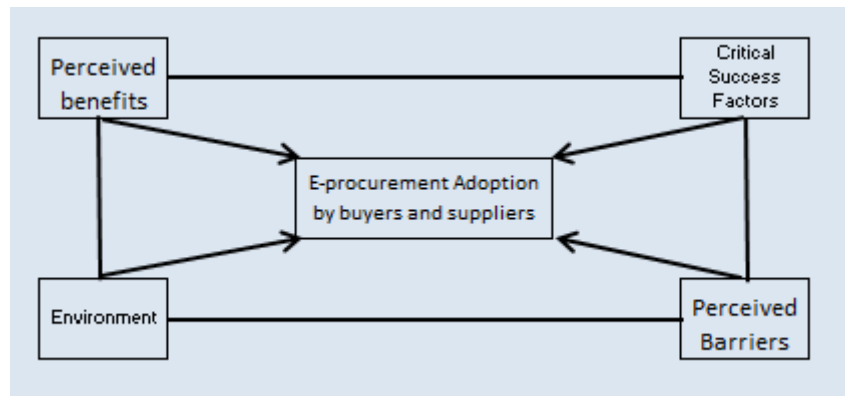
**Figure 4: Framework for adoption ( Gunasekaran &Ngai, 2008)**

This model highlighted various important aspects of any procurement adoption technique. Author told that there are four important parameters needed to be kept in consideration before implementing the technology i.e. Benefits, barriers, critical success factors and environment. In this model, authors stated that any barrier in a system influence successful adoption of electronic procurement technology. Hence, finding out such barriers is very important in developing the right path of implementation of technology in an organisation. These barriers can be from strategy, infrastructure, people, culture, etc. Similarly, real benefits include strategic impact, financial and non-financial outcomes, etc. If an organisation keeps these in mind, it will become easy for them to adopt the technology with much ease.

All four above mentioned frameworks were critically analysed to identify the critical factors to be considered while developing an e-procurement adoption framework.

| Author, year | Framework Name | Major Factors/Findings |
|---|---|---|
| Leviatt , 1965 | Diamond of Organizational Change | **Technology, Structure, People and Task**. If one variable is changed, it will affect other variables |
| Tornatzky and Fleischer, 1990 | Technology, Organisation and Environment model | Three different corners in an organisation which influence the process through which and organisation adopts and implement technological capabilities: **Technology, Organisational and environmental** |
| Information system success model, 2003 | DeLone & McLean | Interdependencies between success categories i.e. **user satisfaction and intention to use.** |
| Gunasekaran & Ngai, 2008 | Framework for adoption | Identification of **success factors. Benefits and Barriers** while adoption of technology. |

As can be seen from above table Leviatt's diamond of organisational change model was inclined towards Technology, structure, people and task where every individual variable is dependent on each other. Further, Tornatzky and Fleischer (1990) described how technology, organisation and environment became absolute corners of adoption of technology in an organisation. DeLone & McLean (2003) further added his expertise by conceptualising emotional intelligence of user satisfaction and users intention to use technology in an organisation which helped organisations to understand needs of its employees to make adoption successful. Finally Gunasekaran & Ngai (2008) identified various factors which were acting as benefits and barriers during and after adoption of technology. As seen, every model once integrated can help us to come out with an integrative result with an expertise and critical things which are important for electronic procurement adoption, author in this paper used them to design a comprehensive framework to provide it to the industry.

## 4. Case Studies
Many Indian automobile industries are following a practice of electronic procurement concept in order to automate their process of procurement. This section presents three top Indian automobile manufacturing companies process of procurement they are following which makes them different from other competitors as case studies.

### 4.1 Case-1: Organisation A
Organisation A is an automobile brand based in Delhi and Bangalore. It is a subsidiary of automobile and motorcycle manufacturing company headquartered in Japan. The company alone makes about 1.5 million passenger cars every year. At present it is having about 1200 employees providing 14 cars with 150 variants.

Organisation A India was founded in 1981. It started with a strong dealer base of 300 across the country. Initially after start up in the country, Organisation A had a large amount of data to be dealt with. At that early stage, Organisation A was totally dependent on its home grown systems to manage its business. But unfortunately, these systems proved to be inefficient and didn't let procurement managers to communicate with its suppliers properly. This in turn, led to large turnaround time, and high procurement cost of products. Organisation A faced many problems during manufacturing of its products due to increase in demand in the sector. Some of the problems were lack of control over the manufacturing and procurement of material process. Along with this, they didn't have proper information of the required quantity and time of need.

One of the executives of company told that company at that time was looking for a system which can make things easy for the company. Hence, it will lower down the complexity and reduce dependency on people. With this company adopted phased migration strategy from its old system to Oracle E-business suite. Post implementation, company started training campaigns and successfully achieved its desired implementation and its expectations.

Organisation A implemented Oracle solutions in its systems which provided various benefits of high efficiency and automated order management of raw materials from suppliers. This also helped company to do forecasting of future needs of raw materials which were getting ordered automatically through the system. The software which Organisation A implemented was Hyperion.

Oracle software helped Organisation A implement it to manage the purchase of goods and services from suppliers. Before this system, some subsidiaries had a simple system, while others were based on basic spreadsheets to manage the process. This makes it difficult for the organization as a whole to have control over the capital and purchasing services, leading to increased costs and excess inventory.

Hyperion Reduced procurement costs by streamlining purchasing processes. With this system or Oracle Hyperion, Organisation A was able to standardise its platform to monitor procurement. The company also established its reputed list of suppliers in the system to reduce number of suppliers and ensure lowered costs. This system was able to send an automated workflow purchase orders along with approvals and maintains its staff in accounts payable aware of procurement activities (Ray, 2011).

This organisation witnessed many benefits as mentioned above like reduced procurement cost and timely ordering of raw materials. In addition to this many barriers were being noticed by organisation like initial learning and training to be provided to the employees. But as discussed with experts, it was also observed that training to employees was considered to be one of the most important success factor post implementation of technology.

## 4.2 Case-2: Organisation B

Organisation B Motor Corporation is one of the world's largest automobile manufacturers, headquartered in Japan. It has about 350,000 employees in its organisation globally. It established its Organisation B branch in India for its manufacturing facilities. Organisation B manufactures its car in Bidadi, Karnataka with a capacity of 80,000 vehicles per annum. As per the Organisation B system, its procurement system has certain elements in it which are termed as process of procurement.

This process says that, initially Organisation B executives, looks out for prospective business partners who promote products to Organisation B. Further, the company shortlists the candidates and asks for estimates in costs of the products. Once selected, the company picks a sample from supplier and see its quality. If it is accepted then, they proceed with survey process and further with negotiations. Finally a contract is signed to become a supplier to the company.

Organisation B procures materials for its automotive unit from various suppliers. Some of the products are car air-compressors, engines, forklift trucks, etc. Finding suppliers with good quality and low cost is not enough for Organisation B and hence it also believes in finding those suppliers whose products are environment friendly and meets the demand of society. Organisation B has a policy to give chance to every supplier who can meet above demands. Organisation B invites various suppliers to register as a supplier online.

Organisation B uses Just in time approach to manufacture its orders. The approach was named as Kanban (signboard in Japanese) in Japan. This term was introduced in Organisation B to maintain high level of production and its quality. It is an effective tool which supports production system as a whole. Its major benefit is it maintains upper limit of work and also informs about overloading of the system. It helps to align inventory levels with actual consumptions. There is a signal which tells supplier to produce a raw material and deliver a new shipment when it is consumed. These signals are tracked by replenishment cycle by bringing visibility at supplier as well as buyer end. Kanban follows the concept of rate of demand to control rate of production. This logic was applied in Organisation B in 1953 by Taiichi (Ohno, Taiichi, 1988). Kanban is connected with Oracle in Enterprise resource planning software, where Kanban uses signalling demand to suppliers via email notifications. When any stock gets depleted, there is a signal alert on Kanban Card, "Kanban trigger" is created, and a purchase order is released with a defined quantity for the supplier defined on the card and then supplier is expected to dispatch the material within a specified lead-time. If a red card is there in empty parts list, then it means more parts are needed and supplier is required to manufacture and send them.

As seen above, organisation 2 faced serious challenges in terms of finding best supplier. But kanban system helped this organisation to smoothen the process of raising alarms to the suppliers in case of short in inventory.

### 4.3 Case-3: Organisation C

Organisation C is Indian automobile company founded by one of the renowned businessmen in 1945 (Organisation C, 2014, Last accessed: 26 February 2015). The company has manufacturing plants located in Jamshedpur, Pune, Pantnagar, Sanand, Dharwad and Lucknow. Organisation C research and development (R&D) centre is established in Jameshedpur, Pune and Lucknow. There was a time when Organisation C was established, they face many problems like lack of real time data availability to manufacture a car, information flow, collaboration between manufacturers and suppliers, etc. In addition to this, the company found problems in cost structure, where materials cost were amounting to 65% of entire cost. For this reason company went to SAP and oracle based systems in 2000 when system implementation ensured savings of Rs. 2000 million (50 million USD). The company implemented e-sourcing with an objective of cost reduction, smooth transactions with lower cost, transparent process and global reach. In 1999, SAP (a Germany based Enterprise Resource Planning software providing company) introduced a package which helped them to manage vehicle order to deliver process. In addition to that, it helped them to deliver components by suppliers. Organisation C is using SAP R/3 (SAP 3.1H to SAP4.6C) solution in order to do its procurement.

In 2001, company signed a contract with freemarket.com which is one of the world largest supply chain management companies. The first initiative of e-auction was done in June 2001. Organisation C extended its system of purchase to various other departments like tools, engineering, etc. With this initiative, Organisation C covered about 370 million USD of spend from 2002 to 2004. The company did 25% direct and about 55% of indirect purchasing through this new system (Sople, 2011).

Various benefits faced by company were reduced cost, reduction in cycle time, enhanced flow of information, reduction in procurement overheads etc. This transferred benefits to suppliers of Organisation C since it reduced their marketing costs with assured contracts. Other benefits accrued were reduced procurement time, reduced procurement cost, better value to money spent etc. Finally it got upgraded to SAP ECC 6.0 in 2008. This system helped Organisation C to maintain inventory levels at all stages. Siebel systems implemented this software in Organisation C. The software covers various things like self-service procurement, catalogue management, strategic purchasing scenario (spend analysis), request for quotation from suppliers, etc. The process followed by Organisation C is Tender floatation, evaluation of tender, selection of vendor, material and transport exchange, material acquisition. In addition to these, Organisation C got help in supplier collaboration which helped them to provide supplier with order management system and reduce manual invoice system. At present Organisation C major sourcing is from China, where it sources its products like tires, power steering units etc. Most of its steel is procured from Belarus.

Organisation C has been a great inspiration for other companies. It faced serious challenges and barriers of implementation like support and training to employees. But post implementation things changed drastically when employees of the same organisation were able to use the same technology to streamline procurement process.

Like if we see in organisation A which faced many data integration problems. But it implemented Hyperion Oracle suite to solve its problems. Similarly, organisation B was using signals system of Kanban tool to let its supplier know requirement of raw materials to be supplied without having any manual interference in between. It in end saved lot of time and showcased high efficiency. Organisation C, as said been a benchmark for many organisations implemented SAP R/3 (SAP 3.1H to SAP4.6C) in order to do its procurement activities like self-service procurement, catalogue management, strategic purchasing scenario (spend analysis), request for quotation from suppliers, etc.

Hence, it is being observed from the case studies discussed above, that adopting technology is helping organisations to achieve numerous goals in the automobile manufacturing organizations, be it is production or procurement or customer service. Each sector and each department of automobile industry is being benefited with such initiative.

## 5. Proposed framework

Based on integrative literature review and case studies made on three Indian automobile companies with respect to their electronic procurement adoption policies and frameworks certain common factors and items have been identified. These factors are recognised by electronic procurement researchers as very important for any organisation considering adoption of e-procurement technology.

After doing an in-depth literature study, understanding of various models like Leavitt (1965) model of organisational change, TOE model (1990) by Tornatzky and Fleisher , Information system success model by DeLone & McLean (2003),

Framework of adoption by Gunasekaran and Ngai (2008) etc, we developed this framework which is a result of various inputs from industry as well as academics expert. The framework says that, at conceptual level to make system technologically enabled, an organisation should always keep in mind the Technology, Environment and Organisational (TOE) model which consists of almost all aspects of an organisation. The items identified here define intention of a user to use this system and his satisfaction level by decreasing the fear of job loss during adoption of technology.

In this paper, author has proposed a comprehensive framework for electronic procurement adoption divided into various sections using various frameworks proposed by researchers in the industry. The sequence and workflow of various forces behind technology adoption is shown in figure 5.

To understand much better, author has conceptualised framework in three main streams i.e. **pre adoption i.e. idea stage, during adoption and post adoption i.e. evaluation of the technology benefits.**

The case studies discussed in this paper provide a broad idea on present scenario of technology use and practices followed in the procurement department of Indian automobile industries. Following the concerns of reduction in cost, making technology enabled systems to avoid any information loss and to attain benefits as described by various researchers, organisations are willing to adopt electronic procurement technology in their organisations.

Environment is a surrounding of an organisation where it exists and is giving **environmental effect which comes from factors influencing adoption of technology**. Environment is considered for another reason where reduction in emission of greenhouse gases and keeping green manufacturing is important and help it in maintaining benchmarks in terms of using technology with high standards (Gupta et al., 2013). Similarly, when an organisation which exists in this environmental surroundings is planning to implement information technology enabled procurement system (**organisational effects** comes into role) which again leads to some factors affecting implementation at organisational level, and its every department is dependent on technology use, its environment and organisation structure. Hence, it can be taken as a basic building block and should be considered as a most important element while making any change in organisation. Our framework hence used the same methodology to build up a framework where environment and organisational effects are considered to be basic things to be considered during implementations which are existing in Environment and Organisation sections.

Post environment, we integrated organisation looking forward to implement the technology and it helped us to understand organisational effects which are important to be understood during implementation.

Finally, at this stage, decision is taken to implement the technology to enable e-procurement system. For this reason technology adoption is working as a basic building block of **during adoption** period. Here, Framework of adoption by Gunasekaran & Ngai (2008), came into role when Benefits, and Barriers play an important role to understand electronic procurement implementation strategy. Critical

success factors play very important role since without them any implementation will be a total failure (it's just like fuel refinery without fuel underground).
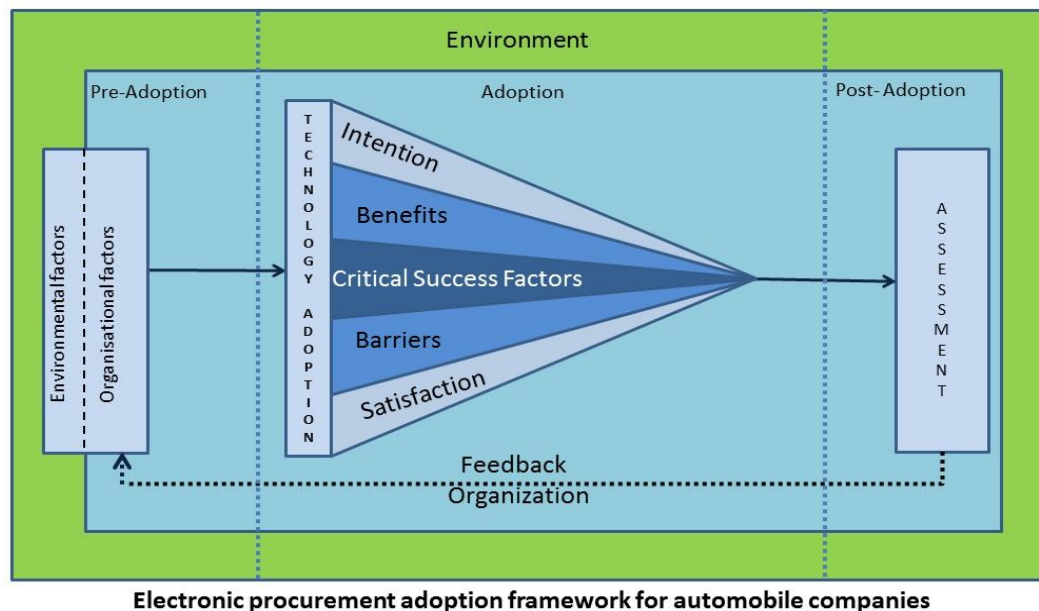


Electronic procurement adoption framework for automobile companies

**Figure 5: Electronic procurement adoption framework for automobile companies**

Every barriers, benefit and external factor is a reason of adoption or rejection of any model or decision taking. Hence, the final stage for adoption of technology in our framework came from DeLone & McLean's Information system success model framework. According to which intention to use and satisfaction of user are considered as most important parameters in adopting technology in an organisation. Hence, intention to use or user satisfaction is considered to be the next stage of our model.

Finally, adoption is done depending on user satisfaction and his intentions. Once adopted, system is sent to evaluation i.e. assessment stage to study success of the model implemented. This stage is termed as **post adoption stage.** Above mentioned is framework (figure 5) which has been filtered out from various discussions and study of frameworks as discussed above.

## 6. Conclusion
E-procurement is the way to go for all those companies that are keen on casting their nets wider on the market. In India, it is taking the market by storm and even the offline clients are seeking for great deals on the e-market. To sustain in business even in the highly competitive and unforgiving Indian automobile sector, e-procurement is not an option but a necessity.

The proposed framework by authors for electronic procurement will help to conceptualize and design a new era in procurement industry of Indian automobile sector. The need is to make purchase more economic and efficient; while it makes profits from its operations. As e-procurement help both the buyer or supplier to maintain low cost of their end products vis a vis higher profitability, this framework would help all player in this industry to adopt this system. This conceptual framework needs validation at the field level which may be scope of future research.

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