

## A PERCEPTUAL STUDY ON THE CRITICAL SUCCESS FACTORS FOR ERP ADOPTION IN THE SMALL AND MEDIUM ENTERPRISES

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### Abstract

*Adoption of Enterprise Resource Planning (ERP) can be said as one of the major strategic initiatives of today's organization particularly in a Small and Medium Enterprise (SMEs). This paper presents the approach, analysis and findings of a pilot study conducted for ERP Adoption in select SMEs in India. This paper analyzes the respondents' ranking on certain critical success factors (CSFs) for ERP Adoption. The CSFs identified from previous research studies conducted all over the world on ERP for SMEs were tested practically on a set of sample of SMEs in India. These CSFs were categorized into different phases of ERP Adoption, namely planning, acquisition, implementation, usage and percolation and extension. The SMEs forming part of the sample were operating in automobile-component industry in India and this is a pilot study conducted as a partial fulfillment of the on-going broader research.*

**Keywords:** Acquisition, CSFs, ERP, Extension, Implementation, Planning, SMEs, Usage & Percolation.



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## INTRODUCTION

The adoption of Enterprise Resource Planning (ERP) by Small and Medium Enterprises (SMEs) has created wide-spread interest for researchers in the academic world. Interestingly two different perspectives exist, one, from the organizational maturity perspective and the other from the ERP maturity perspective<sup>[3]</sup>. While the organizational maturity explains the SMEs readiness to adopt ERP for their business process integration, the concept of ERP itself has matured from being product-centric to service-centric. Since the 1980s many researchers both from the academia and industry have shown keen interest in tracking the adoption of Enterprise Resource Planning (ERP) for SMEs due to some of the limitations faced by SMEs in terms of resources namely financial, technological, intellectual etc (Rao, 2000)<sup>[17]</sup>. ERP adoption has been accepted as one of the popular innovative developments related to the information technology industry (Al-Mashari 2002)<sup>[3]</sup>.

The Indian Industry comprises of many Small and Medium Enterprises (SMEs) in various segments or clusters which are influenced by Enterprise Resource Planning adoption. However, the SMEs are constrained by size in terms of finance and business resources and they are hesitant and skeptical towards embracing information technology as a driver for growth (Dwivedy and Harigunani (2008)<sup>[8]</sup>, Misra (2009)<sup>[15]</sup>. SMEs, moreover, are limited in intellectual capital and supportive manpower to drive the strategic IT initiatives of ERP. Hence considering these factors, ERP adoption for SMEs is a complex process. For instance, the business model of the Indian automobile sector itself could be a major driver for enabling information technology enabled transformation. Automobile manufacturing is predominantly an assembly of thousands of parts that are manufactured by numerous players of different business sizes and in different levels (Tier-I, II, III) depending upon the complexities of the auto-components. These players supply majority of their finished products to the automobile manufacturing company, popularly known as the Original Equipment Manufacturers (OEMs). The OEMs are huge corporation churning out billions of rupees and are equipped with the state-of-the-art information technology enablers that are positioned to streamline, integrate and optimize business processes. On the contrary such enablement of information technology is very low in the SME segment. Most of these units are still using manual processes and spread-sheet based IT enablement in their core business processes. The definition of Small and Medium Enterprise generally depends upon certain key factors like number of full-time employees on roll, investment in plant and machinery, sales turnover etc. For the purpose of understanding some select definitions are given below.

The Reserve Bank of India defines SME, as an undertaking in which investment in plant and machinery, does not exceed Rs.1 crore (INR 10 millions), except in respect of certain specified items under hosiery, hand tools, drugs and pharmaceuticals, stationery items and sports goods, where this investment limit has been enhanced to Rs. 5 crore. Units with investment in plant and machinery in excess of SSI limit and up to Rs. 10 crore may be treated as Medium Enterprises-ME, (RPCD Circular No. RPCD.PLFNS.BC. 31/ 06.02.31/ 2005-06 dated August 19, 2005)<sup>[18]</sup>. The Small Industries Development Bank of India (SIDBI) defined SMEs in the manufacturing sector as those units whose investment in plant and machinery (original cost excluding land and building and the items specified by Ministry of MSME, the Ministry of Small Scale Industries, vide its notification No. S. O. 1722 (E) dated October 5, 2006) for micro enterprises does not exceed Rs. 25 lakh (INR 2.5 millions),

while small enterprises have investment more than Rs. 25 lakh but does not exceed Rs. 5 crore and medium enterprises more than Rs. 5 crore but does not exceed Rs. 10 crore.

From its evolution as a mere inventory control package in the 1960s ERP today has been accepted as a driver of operational efficiency and growth of business (Pasha, 2007). ERP systems are always looked upon as large and complex systems and often called for fundamental changes in the current working of an organization. The foundation of the organizational core processes are re-laid during the process of an ERP implementation which affects the reporting and decision-making processes (Holsapple and Sena, 2005)<sup>[12]</sup>. Organizations that implement ERP expect productivity improvements, competitive advantage and meeting customer demands as key business drivers (Scott and Shepherd, 2002)<sup>[21]</sup>.

The market for ERP solutions have also evolved and matured both in terms of product and service offering. The maturity is seen in the technology by which the software and hardware infrastructure is developed and deployed. Over the last 10 years the financial perception of ERP solutions have also started to change from a capital expenditure perspective to an operational expenditure perspective due to the change in the offering of ERP solutions from an on-premise to on-demand mode. The result is that there is a general awareness amongst the organizations particularly the SMEs that ERP is less costly to adopt than what it was earlier (Aberdeen 2006)<sup>[11]</sup>.

ERP adoption by small and midsize businesses can be approached from the perspective of applying certain well defined critical success factors (CSFs) keeping in mind the diverse range of adoption issues and constraints relating to finance, technology and manpower availability (Rao 2000)<sup>[2]</sup>.

This research paper examines the certain pre-defined CSFs for ERP adoption in SMEs identified from past researches and tests its practical relevance by means of a survey. The respondents' ranking on certain critical success factors (CSFs) for ERP Adoption was analyzed in this paper. These CSFs were identified from previous research studies conducted worldwide on ERP for SMEs and were ranked by the authors in their previous study. These CSFs were categorized into different phases of ERP Adoption, namely planning, acquisition, implementation, usage and percolation and extension. The respondents involved in this study were SMEs operating in automobile-component industry in India and is a pilot project conducted as a part of the on-going research.

This research paper is divided into five sections. The next section i.e., Section Two discusses the relevant literature review. Section Three explains the objectives and methodology of the research study and justifies the need of the current study. Section Four presents the analysis and findings from the study. Section Five presents the conclusion and the scope for future work in this direction.

## **LITERATURE REVIEW**

Organizations are increasingly realizing the need to improve the efficiency of information flow between functional departments in order to stay competitive internally and externally. ERP adoption by SMEs has gained more attention and popularity due to near-saturation of ERP adoptions in large enterprises. Macro and micro economic factors like globalization, partnerships, value networks, and the huge information flow across and within SMEs today have also driven SMEs towards adopting ERP systems. SMEs are left to face risks of adoption because they have limited resources and specific characteristics that make their case different from their larger counterparts (Haddara and Zach, 2011)<sup>[11]</sup>. The design of ERP system enables fragmented departments to integrate with each other and streamline operational processes (Koch, 2003).

Six different stages for adoption and system acquisition decision in the ERP system life cycle, namely a) Adoption decision, b) Acquisition, c) Implementation, d) Use and maintenance, e) Evolution and f) Retirement was proposed (Esteves and Pastor, 1999)<sup>[9]</sup>. Certain select factors relevant to the ERP implementation context to small organizations were specified (Gable and Stewart, 1999)<sup>[10]</sup>. A methodical approach to the acquisition of ERP solutions by SMEs was proposed (Sistach *et.al.* 1999)<sup>[20]</sup>. Another preliminary empirical study of the diffusion of ERP systems in Austrian and British SMEs presented the work-in-progress of an international research project, wherein, the focus was on the early stages of making the adoption decision, there after evaluating and selecting an ERP (Tang and Bernroider 2003)<sup>[19]</sup>. Their study attempted to close some of the identified gaps in ERP research with an objective to link the results of the early stages of decision-making to implementation, usage and evolution success. Their study was restricted to the case of ERP software, but also provided insights into the potential of integrating ERP and other important applications like CRM and SCM.

The relationship of enterprise size to the constraints and objectives of ERP was investigated (Laukkanen *et al.* 2005)<sup>[14]</sup>. The survey data was based on forty four companies and revealed that significant differences existed between small, medium-sized and large enterprises in the

adoption of ERP system. The authors found that smaller companies experience bigger knowledge constraints than their larger counterparts in ERP adoption. An overview on the critical success factors across different stages of ERP life cycle for SMEs was presented (Niclas and Marcus 2005)<sup>[17]</sup>. The organizational effectiveness due to adoption of ERP functions and the related CSFs were analyzed (Juell-Skielse 2006)<sup>[13]</sup>. The ex-post evaluation of success factors of ERP in SMEs found that the introduction of ERPs into SMEs cannot be on a sheer reproduction of the experiences with larger companies and represents a new challenge with significant uniqueness to be addressed (Tommaso, 2007)<sup>[22]</sup>. His research was specifically targeted to the SMEs, which already completed the process of adopting an ERP system. The objective was evaluation of these experiences ex-post by examining some improvement indicators associated with the ERP project. A Unified Theory on CSFs for ERP adoption in SMEs was established with five decision areas namely Planning, Acquisition, Implementation, Usage and Percolation and Extension within which a set of 39 critical success factors were identified. (Bharathi, Parikh, 2009)<sup>[4]</sup>. CSFs for ERP implementation in SMEs were categorized into six categories namely vision, scope and goals, culture, communication and support; infrastructure; approach and project management. Some of their key findings amongst others were related to vision and strategic goals of the ERP implementation, senior management support, active user involvement, culture, internal communication, project approach and methodology and a proper mix of users in the project team (Doom and Milis 2009)<sup>[7]</sup>.

Some researchers have also criticized the CSF approach because they felt that the perception of respondents depended upon certain section of stakeholders only which lead to response bias (Davis, 1980)<sup>[6]</sup>. The need for clear identification of the respondent group and a method for identifying the information requirements was suggested (Munro and Wheeler, 1980). Another research suggested that a cross-section of management be interviewed, so that all levels and different process owners would be incorporated (Boynton & Zmud, 1980)<sup>[5]</sup>.

## **OBJECTIVE AND METHODOLOGY OF THE STUDY**

The objective of this study was to find the overall perception of respondents on the selected CSFs in each of the five stages of ERP adoption namely planning, acquisition, implementation, usage and percolation and extension.

For the purpose of accomplishing this objective five small and medium enterprises engaged in the business of automotive ancillaries were chosen as sample units for the study. All these units were situated in Pune which is one of the major automobile hubs in India. These units

supplied a variety of automobile components to the various OEMs (Original Equipments Manufacturers) situated mostly in and around Pune. This research paper is conceptual as well as empirical. For the concept building, the authors extensively relied on secondary data that contained tested and proven knowledge in this area from already conducted and published research studies from all over the world. Using the conceptual understanding the empirical study was conducted on these five SMEs based on a structured questionnaire.

The questionnaire was circulated to certain key process owners of these units namely the departmental heads of Information Technology, Production Planning and Sales. Few heads were also interviewed on the ERP culture in the organization. The questionnaire contained a set of 30 CSFs segmented into five phases of ERP adoption apart from some general questions relating to type and nature of the enterprise, business operations, business age, type and age of ERP, number of users etc. These CSFs were identified from various research studies from India and rest of the world. The respondents were solicited to rank the CSFs in each of the phases of ERP adoption based on their experiential perception. These ranks were then analyzed to test the solidarity of their perception.

The limitations of the study could be the less number of sample units chosen as the results or outcome may not be eligible for generalization of the whole population. Moreover, though responses were solicited from multiple process owners, the analysis of their perception was done collectively and the differences between them were not studied due to lack of responses and data completeness.

**ANALYSIS AND FINDINGS OF THE STUDY**

**Table : 1 The profile and relevant basic details of the sample units.**

<b>Basic Details</b>	<b>SME 1</b>	<b>SME 2</b>	<b>SME 3</b>	<b>SME 4</b>	<b>SME 5</b>
Type of the organization	Medium	Medium	Medium	Small	Medium
No. of Years in Business	>20	>15	>20	>10	>20
No. of Employees	100-150	100-150	150-200	50-100	100-150
ERP in place currently	Yes	Yes	Yes	Yes	Yes
No. of Years since ERP Implementation	6	1	4	3	7
Time (in months)	7	12	5	5	6
Core Functions targeted in ERP	Inventory, Production, Procurement	Production, Procurement, Sales, HR	Inventory, Production, Procurement & Sales, Logistics	Accounts, Production, Procurement	Inventory, Production, Procurement

Nature of Business	Manufacturing , Subcontracting	Manufacturing	Manufacturing , Subcontracting	Manufacturing	Manufacturing
Systems in place before ERP	Yes (Tally)	Yes (Tally)	Yes (Tally)	Yes (Tally)	Yes (Tally)
Type of Product used	ERP Branded	Branded	Branded	Un-Branded	Branded
Functions in ERP	Use Inventory, Production, Procurement	Billing & Production Planning	& Inventory, Production, Procurement, Sales, Logistics	Production, Procurement	Inventory, Production, Procurement
Type of ERP	On-Premise	On-Premise	On-Premise	On-Premise	On-Premise
ERP Investment (Millions of Rs.)	NA	1.5(approx)	NA	NA	NA
No. of daily routine Users	20-25	10-15	20-25	10-15	10-15

The above table presents some interesting observations prima facie. All the five units had been using ERP for their operational routine. Prior to adopting ERP all the units had used information systems primarily to capture their accounting transactions mainly to conduct their accounting cycle (journalizing to reporting). All the units used ERP to mainly carry out certain core processes in production, inventory, and procurement functions. SME 1, 3, 5 were more than 20 years old while 2 was over 15 years old and 4 was over 10 years of old in business. However, the organizations had differed widely in their ERP age, i.e., number of years since ERP was adopted. The unit's ERP adoption age can be compared to the units' business age to find out seniority in the adoption of ERP. It is found that SME 4 adopted ERP after seven years (10-3) of its existence in the business while the other units took much longer period to adopt ERP viz., SME 1 twelve years, SME 2 fourteen years, SME3 sixteen years and SME 5 thirteen years.

The following section exhibits and explains the respondents' ranking of CSFs in each of the five decision phases of ERP Adoption. The outcome of the following analysis will justify the objective of the paper by analyzing the ranks given by the respondents on the CSFs identified in each of the five decision phase of ERP adoption by SMEs. The ranks assigned by the respondents in all the five SMEs were consolidated and averaged to calculate the final ranks. The overall association of the respondents' ranking was also studied using Kendall's Coefficient of Concordance. In other words this test was conducted to find out whether there exists any common consensus between the respondents' perception on the ranking of the CSFs in each of the five phases of ERP adoption.

**ANALYSIS AND FINDINGS ON RESPONDENTS' RANKING OF CSFS IN PLANNING PHASE**

**Table 2 : The Respondents' Ranking on CSFs relating to Planning Phase.**

Critical Success Factor	SME 1	SME 2	SME 3	SME 4	SME 5	Mean
Owner's (Proprietor / Partners/ Director) commitment	1	1	2	3	1	1.6
SME culture (maturity) in terms of receptiveness to change	4	2	1	1	2	2
SME Vision and growth perspective	2	3	3	2	5	3
Project Planning and Scheduling	5	4	4	4	3	4
Goal and Scope of ERP	3	5	5	4	4	4.2

**Table : 3 The ranking of Planning Phase**

Critical Success Factor	Rank
Owner's (Proprietor/Partners/ Director) commitment	1
SME culture (maturity) in terms of receptiveness to change	2
SME Vision and growth perspective	3
Project Planning and Scheduling	4
Goal and Scope of ERP	5

From the above table it is found that proprietor/partners' commitment is ranked as most important over the other factors. In the planning phase the lowest sum of ranks has been found for the CSF "Owner's (Proprietor/Partners/ Director) commitment" which means that all the respondents place this as the first and foremost CSF. It was commonly found that irrespective of the adoption stages, the involvement of top management has been perceived as critical to the success of ERP adoption by the all the sample units. The respondents believed that the top management commitment very crucial to the success of ERP adoption. Also they felt that consistency and visibility of such commitment should be felt in all the stages of ERP adoption. Owner's Commitment has been ranked 1 in the planning phase. Commitment is defined as the top management's belief, involvement, support, motivation and appreciation to accept ERP system as a driver for business growth. Such commitment was perceived to be significant in defining the SME's vision and growth in the long-run. The respondents perceived that such commitment should be translated and visible in every stage of ERP adoption.



The overall association of the respondents' ranking for the CSFs in the Planning Phase is presented below.

Null Hypothesis: There is no significant agreement in the rankings assigned by the respondents' for the selected CSFs.

**Table 4 : Statistical Findings at the planning phase**

<b>S</b>	<b>38.44</b>	<b>46.24</b>	<b>23.04</b>	<b>0.04</b>	<b>27.04</b>	<b>134.8</b>
	250				W=	0.5392
	Critical Value	K=5	N=5	0.449	Reject	

**ANALYSIS AND FINDINGS ON RESPONDENTS' RANKING OF CSFS IN ACQUISITION PHASE**

**Table 5 : Respondents' Ranking on CSFs relating to Acquisition phase.**

Critical Success Factor	SME 1	SME 2	SME 3	SME 4	SME 5	Mean
Cost Benefit Analysis	1	3	2	1	4	2.2
Software package selection, evaluation	4	2	3	2	1	2.4
Existing IT compatibility of the SMEs	3	6	1	3	2	3
Role of consultant	2	5	4	6	3	4
SMEs Process Owners' interaction	6	1	6	5	5	4.6
Implementation Vendor Analysis	5	4	5	4	6	4.8

**Table : 6 The rankings are summarized at Acquisition phase.**

Critical Success Factor	Rank
Cost Benefit Analysis	1
Software package selection, evaluation	2
Existing IT compatibility of the SMEs	3
4Role of consultant	4
SMEs Process Owners' interaction	5
Implementation Vendor Analysis	6

From the above table it is found that cost-benefit analysis is ranked as most important over the other factors. Cost-benefit analysis is defined at the relationship between expected savings and the costs associated with ERP adoption like consulting, package, implementation, migration, upgrades, training and support etc. Cost Benefit Analysis calls for a lot of participation by the owner(s) or partners of the SMEs in convincing about the initial investment and the latent/future benefits of ERP.

Amongst other factors, analyzing the existing IT infrastructure needs a special mention because these units are limited by size and scale of operations; hence they are not capital intensive. So a careful study of the status of working of the existing hardware and IT application should be done. It would much beneficial because SMEs can afford to spend capital expenditure on an incremental perspective instead. It is imperative to reconciling existing IT infrastructure so that it becomes easier to make the right choice of the product, selection of implementation and knowledge (consultant) partner etc. One of the respondents SME4 had separate software applications running for accounting and another for production planning (generated Master Production Schedule on a weekly basis). This company using a third-party vendor integrated the existing transaction processing applications by adding procurement and inventory functionality to create an ERP system for themselves.

The overall association of the respondents' ranking for the CSFs in the Acquisition Phase is presented below.

Null Hypothesis: There is no significant agreement in the rankings assigned by the respondents' for the selected CSFs.

**Table : 7 Statistical Findings at Acquisition phase.**

<b>S</b>	<b>90.25</b>	<b>30.25</b>	<b>42.25</b>	<b>20.25</b>	<b>42.25</b>	<b>42.25</b>	<b>267.5</b>
	437.5				W=		0.611429
Critical Value	K=5	N=6	0.417	Reject			

**ANALYSIS AND FINDINGS ON RESPONDENTS' RANKING OF CSFS IN IMPLEMENTATION PHASE**

**Table 8 : The Respondents' Ranking on CSFs relating to Implementation phase.**

<b>Critical Success Factor</b>	<b>SME</b>					<b>Mean</b>
	<b>SME 1</b>	<b>2</b>	<b>SME 3</b>	<b>SME 4</b>	<b>SME 5</b>	
Involvement of Process Owners	2	1	1	1	1	1.2
Identification of mission critical functions/ processes	4	2	4	3	2	3
Project Management	1	3	6	4	3	3.4
Configuration vs. Customization (Gap Analysis)	5	7	2	2	5	4.2
Implementation road map & Methodology	3	6	5	5	4	4.6
Training needs identification	6	5	3	7	7	5.6
Functional Testing	7	4	7	6	6	6

**Table 9 : The rankings are summarized at Implementation phase.**

<b>Critical Success Factor</b>	<b>Rank</b>
Involvement of Process Owners	1
Identification of mission critical functions/processes	2
Project Management	3
Configuration vs Customization (Gap Analysis)	4
Implementation road map & Methodology	5
Training needs identification	6
Functional Testing	7

In the implementation phase the lowest sum of ranks has been found for the CSF “Involvement of Process Owners” which means all the respondents place this as the first most CSF. It was ranked first amongst the chosen seven CSFs because the extent of involvement of certain key process owners during implementation and testing phase can ensure timely reinforcement of project objectives and reduce the gap between expectations and deliverables. In the Implementation phase, the top management was expected to empower the process owners of core processes to involve themselves in ERP implementation which usually relies of additional time and effort from such functional heads.

It was perceived by the respondents that process owners particularly from the accounting, production and purchase departments would foster involvement in the ERP initiative and can accelerate faster buy-in from the appropriate user-group in such departments. However, the SMEs do not have abundant manpower, some of which does not even have a full-fledged IT department. Involvement of process owner is a challenging task because the process owners are full-time busy involving themselves in their departmental routine and sometimes they are do cross-functional activities.

The overall association of the respondents’ ranking for the CSFs in the Implementation Phase is presented below.

Null Hypothesis: There is no significant agreement in the rankings assigned by the respondents’ for the selected CSFs.

**Table : 10 Statistical Findings at the Implementation Phase**

<b>S</b>	<b>9</b>	<b>9</b>	<b>25</b>	<b>4</b>	<b>196</b>	<b>169</b>	<b>64</b>	<b>476</b>
	700						W=	0.68
Critical Value	K=5	N=7	0.395	Reject				

**ANALYSIS AND FINDINGS ON RESPONDENTS' RANKING OF CSFS IN USAGE AND PERCOLATION PHASE**

**Table 11 : The CSFs relating to the Usage and Percolation Phase are ranked by the Respondents' at the Implementation Phase.**

Critical Success Factor	SME					Mean
	SME 1	2	3	4	SME 5	
Percolation of owner's commitment	1	1	1	2	2	1.4
Periodical and timely communication	3	2	3	1	1	2
Feedback on user satisfaction	4	5	2	4	3	3.6
Periodical review on implications on time, cost and benefits	5	3	4	3	4	3.8
Gap Analysis before and after training	2	6	6	4	5	4.6
Mandatory ERP environment	6	4	5	6	6	5.4

**Table 12 : The rankings are summarized at the Implementation Phase.**

Critical Success Factor	Rank
Percolation of owner's commitment	1
Periodical and timely communication	2
Feedback on user satisfaction	3
Periodical review on implications on time, cost and benefits	4
Gap Analysis before and after training	5
Mandatory ERP environment	6

It was found that Percolation of Owner's Commitment was ranked first from amongst the CSFs relevant in this phase because the respondents believed it will instill confidence in the users of the ERP system and will enable faster percolation of ERP-enabled working in the SME. Amongst other factors, the respondents emphasized that the IT department should clearly mention the timely updates on the progress of ERP implementation so that the functional departments can also plan their preparedness to use the ERP. The respondents also felt that feedbacks should be solicited from key users of each department on working in the ERP system. This will enhance confidence in the users to acclimatize to the ERP routine and also indicate problem areas if any where support and training can be arranged proactively than being reactive.

The overall association of the respondents' ranking for the CSFs in the Usage and Percolation Phase is presented below.

Null Hypothesis: There is no significant agreement in the rankings assigned by the respondents' for the selected CSFs.

**Table : 13 Statistical Findings at the Usage and Percolation Phase**

<b>S</b>	<b>0.4444</b>	<b>53.7777778</b>	<b>106.7778</b>	<b>93.4444444</b>	<b>0.444444</b>	<b>44.44444</b>	<b>299.3333</b>
	437.5				W=	0.68419	
<b>Critical Value</b>	<b>K=5</b>	<b>N=6</b>	<b>0.417</b>	<b>Reject</b>			

**ANALYSIS AND FINDINGS ON RESPONDENTS' RANKING OF CSFS IN EXTENSION PHASE**

**Table : 14 The Respondents' Ranking on CSFs relating to Extension phase.**

<b>Critical Success Factor</b>	<b>SME 1</b>	<b>SME 2</b>	<b>SME 3</b>	<b>SME 4</b>	<b>SME 5</b>	<b>Mean</b>
ERP working culture in the SME	1	2	1	2	3	1.8
Extent of process standardization	3	1	4	1	1	2
Business relationship with OEM	2	4	2	3	2	2.6
Role in demand and material planning	5	3	3	4	4	3.8
Identification of processes extended interface	4	6	5	6	5	5.2
Analysis of additional IT infrastructure	6	5	6	5	6	5.6

**Table : 15 The rankings at the Usage and Percolation Phase**

<b>Critical Success Factor</b>	<b>Rank</b>
ERP working culture in the SME	1
Extent of process standardization	2
Business relationship with OEM	3
Role in demand and material planning	4
Identification of processes extended interface	5
Analysis of additional IT infrastructure	6

From table it can be found that ERP enabled working culture was ranked first from amongst the other relevant CSFs by the respondents, because the respondents felt this factor is critical for ensuring process efficiency and the SME's readiness to support integration of external processes with its larger counterparts. Business relationship with OEMs was perceived with high rank by the respondents for extending the ERP integration. This factor also has a strong

bearing with the top management of the SMEs considering the fact that these SMEs were suppliers to the large domestic and international OEMs for more than a decade.

In the Extension Phase too, the respondents perceived that top management can impact in enabling an ERP-enabled working culture for ensuring readiness in inter-organizational process integration between their larger customers, i.e., OEMs.

The overall association of the respondents' ranking for the CSFs in the Usage and Percolation Phase is presented below.

Null Hypothesis: There is no significant agreement in the rankings assigned by the respondents' for the selected CSFs.

**Table : 16 Statistical Findings at the Implementation Phase**

<b>S</b>	<b>72.25</b>	<b>20.25</b>	<b>2.25</b>	<b>72.25</b>	<b>56.25</b>	<b>110.25</b>	<b>333.5</b>
	437.5					W=	0.762286
Critical Value	K=5	N=6	0.417	Reject			

In general it can be observed in all the five phases of adoption there exists significant agreement in the rankings assigned by the respondents' for the selected CSFs.

### **CONCLUSION AND FUTURE SCOPE OF WORK**

This paper has examined the perception of SME respondents on the selected CSFs in each of the five stages of ERP adoption namely planning, acquisition, implementation, usage and percolation and extension. The examination of the perception was made possible by a pilot study conducted on 5 SMEs operating in India and belonging to the automobile components industry. This research as said earlier is a part of the on-going broader research in this area has reinforced the efforts of the authors in the right direction. The overall consensus in ranking of the respondents has given confidence to expand the sample size because of the uniformity in the perception of SMEs towards ERP adoption. All the SMEs have emphasized the role and involvement of top management (owner(s)/partners/director(s) in the various stages of ERP adoption. Also this study enables the researches to broaden the sample scope to those SMEs into different categories based on their ERP adoption experience.

This study will also help in sensitizing certain CSFs particularly in the Usage and Percolation and Extension phases of ERP adoption wherein high level of users buy-in and standardization is called for. The findings of this research paper can be tested in other SMEs clusters in various geographies to analyze the similarities and differences in the perceptions of the stakeholders (decision-makers, process owners, users etc). Further this study can be extended

to incorporate multiple stake holders as mentioned above and also categorizing the SMEs according to their ERP age (number of years since ERP adoption), the results of which could be more convincingly generalized.

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