Economic Benefits of an ERP System to a Low Tech SME

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Abstract: This case study describes the potential economic benefits for installing enterprise resource planning system in small to medium enterprises, using a study of a small enterprise in the UK. The motivation for the research is to investigate the claim of ERP vendors that their ERP solutions increase the performance of their customers, increase profitability and efficiency of work processes. The case study goes through three years of ERP implementation and this paper discusses what effects the system has had on the company's overall performance, what the benefits up until now are, and where there could be an enhancement to SMEs from the ERP system. The major benefits accrue from the more accurate estimates the system is able to provide and the resulting improvement in quotes.

1 INTRODUCTION

A study in 1998 by the IDC looked at the growth of ERP systems, expected it to grow at a rate equal to or greater than the software industry for which it caters. AMR Inc., which was then the leading industry and market analysis organisation specialising in enterprise enabling technologies, predicted that the ERP software market would grow annually at a rate of 37% of the next five years. Over 10 years later many large organisations have implemented an ERP system and research studies during that time have shown the difficulties they have faced (Esteves and Pastor, 1999). However, the uptake of ERP systems in low-tech, small to medium enterprises has been low and very few research studies have investigated the barriers these enterprises face in trying to implement an ERP system ((Sahran and Goni, 2010) (Esteves and Pastor, 1999) (Laukkanen et al., 2005)). The most important benefit that ERP would bring to the organization is the improvement in internal communications and the increase in efficiency of the information flow. Law and Ngai (2007) stated that ERP "allows seamless integration of information flows and business process across functional areas within a company", which is an extension of the benefits listed by Bocij. The view was further extended by Lozinsky (2008) on "As ERP improved on access of information, it will make possible more agile decision making for better negotiating with customers and suppliers".

The transitions from paper work and excel sheets to an ERP system has been causing a lot of issues to employees in SMEs and have been causing delays to companies when they start to use ERP. This research discuses a case study, that has adopted an ERP system after two previous trials with different software, and has overcome the barriers of implementing ERP in Small to medium enterprises (SMEs) using some successfully modified methods (Bani-hani, 2010). This research starts by describing the advantages and disadvantages of SMEs in terms of culture, human resources, employees and the acceptance of the system. Describing the Common mistakes SME's do when installing the system, barriers and what are the steps applied in this case study to overcome them. Followed by the potential economic benefits the system would bring to the case study used in the research. Findings and a summary are drawn at the end.

2 SME's ADVANTAGE & DISADVANTAGES

Small to medium enterprises usually have a few numbers of employees between 20-250, and usually in most of the organisations in UK SMEs are

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companies that have around 50 employees and this has its advantages where it will be much easier to spread knowledge between employees. This is due to the less formal strategies, which increase communication of knowledge, speed of decision making and improve informality, which improve employee's commitment and their receptiveness of knowledge management changes. This will also increase the ability to react faster to the market changes requirements and knowledge changing to satisfy the market needs (Rothwell and Dodgson, 1994).

SMEs have fewer layers of management, which means that decision making takes less time but at the same time it means less thinking, less searching and less use of knowledge management strategies. Ghobadian et al (1996) has mentioned that SMEs have a structural advantage over other enterprises, as they are less complex, which makes the ability to change much easier than larger organizations, and also increase cross-functional exchange, which makes decision making more efficient, SMEs also tend to have a more flexible culture than other organisations, small numbers of people with same beliefs and values, which makes it easier for smaller organisations to change and spread knowledge management, but SMEs have a problem when it comes to human resources as they attract less skilled people, as highly skilled employees tend to go to larger organisations, where they will have higher salaries, insurance, more stable situation and bonuses (Bani-hani, 2010). Achanga et al (2006) said that SMEs usually have a small number of staff which makes training almost impossible and longer as training means stopping daily work activities, and training individuals is very expensive for SMEs and usually cannot afford it. Large enterprises usually have more funds than small enterprises so they can afford a better ERP system, hardware and give employees more training which helps in the implementation phase of the ERP system.

As for IT, Large enterprises have an IT department who is dedicated mainly for ERP implementation and training, etc... SMEs on the other hand usually have part time IT person who is responsible for IT support along with the ERP installation, implementation, maintenance, training and everything, which can lead to project delays, or sometimes abandoning the system in case of IT person leaving the company as it will be hard to find a replacement (Snider et al 2008), which was illustrated at the case study when replacing two different ERP systems with the change of the developer working on them. However, SMEs also has some disadvantages that make it difficult to use computer based knowledge management systems, Egbu has discussed the disadvantages are the inability to fund long-term and risky knowledge management programmes, weaknesses in technological competencies, which make use of knowledge difficult, as it needs an IT system to spread knowledge easier, faster, and more cost effectively, and a weakness in giving training and education to employees (Egbu, 2001).

Another disadvantage identified by Rothwell & Dodgson (1994) "SMEs have little management experience", and that applies because usually the manager of an SME is the owner of the organisation which makes decision making less formal and less professional.

One of the problems employees at SMEs have is being unable to refer to each other's work, if information was transferred effectively from one employee to another through an organized system, then problems would be solved easier, and learning will be in a better place in the organisation. Most of this work is tacit knowledge; knowledge that has been gained from project experience that needs to be transferred from one employee to another and here is where the conversion techniques need to be used, as this problem is sorted in bigger organization and need to be converted to suit smaller ones, for that studies have been undertaken to investigate the correlation between ERP and the size of the organization.

The following section will talk about the barriers found at the case study and how the size of the enterprise would affect ERP implementation process.

3 BARRIERS OF THE ERP IMPLEMENTATION FOUND AT CASE STUDY

Barriers found at case study from were as follow:

1. Low tech SME's usually attract people with low educational skills.
2. Unskilled employees, make it difficult to implement an ERP system, as it requires many hours of training to bring them up to just a basic level of IT understanding.
3. Lack of motivation for employees to endorse the new system.
4. Lack of training due to financial costs and lack of time.
5. Lack of process mapping.

6. Lack of knowledge (awareness) about the implementation process.
7. Lack of interest from the Top Management.
8. Inadequate project resources, as information are not updated regularly.
9. Resistance to change.
10. Unrealistic expectations.
11. Lack of project planning.
12. Fear of losing an authority/ job insecurity.
13. Lack of transaction time and cost during implementation of ERP.
14. SMEs are less disciplined when it comes to process definition and improving practices.

Those barriers have been overcome through applying change management techniques to employees at the case study (Bani-Hani 2010), and action research, but what are the benefits of ERP and what are the economic benefits found at case study.

4 BENEFITS OF AN ERP SYSTEM

Bocij et al (2006, p605) stated that the benefits an information system brings to the company are often harder to quantify as these benefits are often intangible in nature, like improving customer services, improving management of information, internal and external communication in the company. It will also support core business function and improve product quality. However the quantifiable benefit is the reduction in cost. Lozinsky (1998) stated that operating cost will be reduced which will lead to the increase of return on investment. Bendoly and Schoenherr (2005) have also stated the benefits from implementing an ERP would include the elimination of redundant or unnecessary processes to improve resources allocation and system wide standardizations.

5 POTENTIAL BENEFITS OF IMPLEMENTING ERP SYSTEM IN SMEs

The MD of the company's main concern is the financial status of the company, how much they gain, lose, ROI, etc. For that a study of the financial benefit of ERP to assure the MD was needed in order to prove how the system is more accurate than the manual estimates.

For this reason some comparisons were needed to take place, such as:

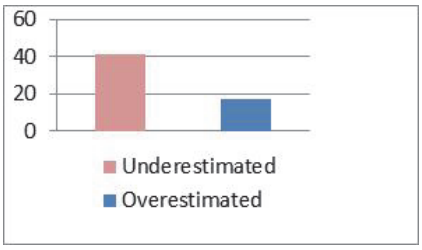

Figure 1: 41 Jobs, 70.6% of the tracked jobs were underestimated at the quote stage. 16 or 29,4% of the jobs were overestimated at the quote stage.

The number of hours actually quoted for a door (Job tracker), recording hours to the system through the ERP from the shop floor work, live hours were collected, and the results were gathered after a test phase that lasted for more than a year. It was found that out of 60 jobs tracked, 41 were quoted wrong, underestimating how long it actually takes on the shop floor to be made. Products have been taking more time in manufacturing than the charge to customers.

	Job Number	Cus ty	Door Type	Quantity	Actual Hours recorded though the ERP system					Estimated Time from Tacit information					
					CNC	Mach Total	Assembly Total	Spraying	Total Hours	Mach Quote inc CNC	A'bly Quote	Spray Quote	Total	Diff Hours	Time / Door
3	2098-SPIR B		Solar	7.00	13.50	15.00	39.25	17.50	85.25	21.00	42.00	14.00	77.00	-8.25	12.18
4	2144-SPIR		Timka + sic	1.00	0.00	10.50	20.25	2.50	33.25	5.50	11.00	2.00	18.50	-14.75	33.25
5	2136-MISC		Rosette st	1.00	0.00	11.50	19.00	2.50	33.00	4.67	9.33	2.00	16.00	-17.00	33.00
6	2141-MISC A		1VP Comb	6.00	10.50	16.00	46.00	13.00	85.50	28.00	56.00	12.00	96.00	10.50	14.25
7	2175-SBD		3XGGG (x	4.00	3.00	18.50	22.50	3.00	47.00	18.00	36.00	3.50	57.50	10.50	11.75
8	2176-SBD		Solid core	7.00	8.50	7.00	2.00	3.00	20.50	32.00	66.00	7.00	105.00	84.50	2.93
9	2153-MISC		Vairous	4.00	0.00	63.00	96.75	16.50	176.25	27.00	55.00	5.00	87.00	-89.25	44.06
10	2141-MISC B		5-C 1VP	9.00	12.50	24.50	139.50	17.00	193.50	36.00	74.00	9.00	119.00	-74.50	21.50
11	2172-MISC		57mm 4XG	1.00	0.00	9.50	24.00	1.50	35.00	5.00	10.00	2.00	17.00	-18.00	35.00
12	2163 SBD		9 4VG, 1D4	12.00	0.00	37.00	120.50	8.00	165.50	47.00	95.00	16.50	158.50	-7.00	13.79
13	2174 SPIR		Mock Zara	7.00	0.00	14.50	48.75	13.25	76.50	25.00	57.00	14.00	96.00	19.50	10.93
14	2188 SBD		FD30 6 par	4.00	1.00	3.00	25.00	2.00	31.00	8.00	12.00	4.00	24.00	-7.00	7.75
15	2166 MISC		D12RF 12 p	1.00	0.00	4.00	23.00	3.00	30.00	7.00	14.00	4.00	25.00	-5.00	30.00
16	2157 SBD		Flat entrar	47.00	14.50	22.00	174.50	4.00	215.00	117.50	164.50	47.00	329.00	114.00	4.57
17	2170 MISC		2XGG	3.00	0.00	8.50	10.00	3.50	22.00	5.00	10.00	4.00	19.00	-3.00	7.33
18	2169 MISC		2XGG	2.00	0.00	3.50	21.25	3.50	28.25	11.00	27.00	4.00	42.00	13.75	14.13
19	2164 SBD		3XG-H Arc	1.00	0.00	4.75	12.25	1.50	18.50	3.00	8.00	2.00	13.00	-5.50	18.50
20	2146 SBD		FD30 5VP	5.00	2.00	3.00	17.00	2.00	24.00	7.50	15.00	2.50	25.00	1.00	4.80
21	2120 SDB		FD30 5VPC	3.00	1.00	5.50	15.25	0.75	22.50	5.00	10.00	1.50	16.50	-6.00	7.50
22	2177 SPIR		Dina + Slav	1.00	0.00	12.00	12.50	1.00	25.50	6.00	12.00	2.00	20.00	-5.50	25.50
23	2192 SPIR		Satini	6.00	0.00	14.50	81.00	7.00	102.50	30.00	60.00	12.00	102.00	-0.50	17.08
24	2186 DBS		Patt 10	1.00	0.00	2.50	5.50	0.50	8.50	2.00	4.00	1.00	7.00	-1.50	8.50

Figure 2: Job tracker comparison between ERP recorded hours and estimated hours.

Material updates (Purchase orders), as the MD uses prices from his own tacit knowledge, the company lost money on some jobs because they were using old prices, or losing customers because they were overpricing a number of quotes due to incorrect estimation.

Some of the results found were at the quotation stage, the ones sent to the customer, and it was found that in 2011 the case study has won 266 (39.87%) quotes and lost 379 (60.13%) quotes, 82 of them were due to overpriced products. Out of the (60.13%) 2011 lost quotes (31%) from them are lost due to prices, (3%) for long lead times and (3%) for changing needed specifications, (20%) due to high delivery charges and the other (43%) were lost due to customers changing their minds some for needing a third party to do all measurements, or for fittings,

and sometimes just because they lost a site contract or other reason.

In money terms, they have won £1,210,698.84 worth of quotes this year and lost £6,443,682.82 worth of quotes, £1,438,105.66 of them due to inaccurate pricing, which were taken over by our competitors'. Analysing the lost quotes due to prices, and redoing them again through the ERP system, a number of errors were found, but most importantly out of 82 quotes lost due to prices, 56 were estimated with lower prices from what the estimator sent to customer, 17 were underestimated due to un tracking the price changes, and 9 quotes files were unfound. No patterns were found for the results because of the un-systematic approach the estimator use, and asking the estimator, it was found that some quotes were raised in price to make a balance in some other lost jobs or mistakes done in jobs, the exact example was: "I was quoting a customer's quote and I received a phone call about a door at a customer site with a faulty meaning we have to remake the door from scratch and to make it up for the loss I've added around £200 to this quote", Company MD. This unsystematic approach has been causing the company losses in both quotes stage and job stage of the company work process.

6 FINDINGS FROM CASE STUDY

There are few questions to be asked in order to verify the results of the implementation:

Can you observe productivity in your planning area few months after ERP implementation? Do things which have been assumed as complex before implementation seem very simple after implementation? Can you now control your budget, stocks etc? Have you not stopped your and customer's production lines because of material shortage due to better planning system?

A successful ERP implementation in any case study needs to fulfil these arguments. At the case study, live prices are used for quotes, which if accepted and turned into sales orders, transferring them easily into a job that can automatically alert the purchasing department of what needs to be purchased for this jobs, updating quantities, scheduling a job for the shop floor, tracking it through the work, being able to determine job stages and update customers, has been accomplished, and made creating a job file much easier than previously as each file use to be typed manually into excel sheets, paper work. The case study was able to overcome a number of barriers to the implementation and can feel a financial difference in the quotes sent to customers, which help in losing fewer customers and with increasing the productivity of the company.

7 CONCLUSIONS AND FUTURE WORK

A successful ERP implementation is based on the understanding and clarity of the processes and work flow through the various departments in the organization. It also depends on the support employees get when using the system, especially from top management. There were many barriers to successful implementation, many of which were not predicted. Bani-Hani et al. described these focusing on the difficulty of persuading many of the employees that the ERP system could make their job easier and more successful.

This paper was able to identify the costs and benefits from the ERP system, and what difference it can make to the financial status of the company if used properly. In fact the improvement in accuracy played a major part in convincing the management of the value of the system. It was also clear that there is a critical mass of support that is necessary to persuade management to adopt the improved procedures.

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