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ERP implementation in manufacturing SMEs: Lessons from the Knowledge Transfer Partnership scheme

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Abstract

This article examines how the experience gained from two Knowledge Transfer Partnership projects in the UK can usefully benefit companies faced with similar challenges in a developing world context. Specifically, it addresses the issues faced by manufacturing SMEs intent on replacement of their information systems with one integrated software suite – an Enterprise Resource Planning package. After exploring relevant literature, the article focusses on how the key change elements of process, technology and people can feature in assessing the readiness of such companies for the major upheaval involved in these major change projects. Through further analysis of the projects, it is concluded that the three change components must be kept in balance when implementing these major software suites, both in developed and developing world contexts.

1. Introduction

Enterprise Resource Planning (ERP) software packages have been deployed in the developed world since their emergence in the late 1980s. Whilst it was mainly the large corporations that first implemented these integrated software solutions, the past decade has seen an increase in the take-up of ERP systems by small to medium sized enterprises (SMEs) in the UK [1]. At the same time, organisations in the developing world have started to use these systems with mixed success [2].

The UK government's Knowledge Transfer Partnership (KTP) programme has been used to make available university expertise (sometimes referred to as the knowledge

base) to help several SMEs in the UK to implement ERP solutions. With similar organisations in the developing world now embarking on such projects, this paper examines what lessons can be learnt from this knowledge exchange in the UK that may be of value in a developing world context. More specifically, the overall aim of this paper is support current research being undertaken into manufacturing SMEs in Iran where ERP systems are now being implemented. The paper examines two manufacturing companies where ERP systems have been implemented in the UK in recent years via the KTP scheme, and explores what can be learnt from these case examples that may be of value in this different socio-cultural-political environment. As such, the knowledge transfer explored here is multi-faceted, as the analysis will be applied in a different developmental context (Figure 1). This introductory section is followed by a discussion of relevant literature. A description of the KTP case studies follows and the final two sections focus on an analysis of these findings and what lessons can be learnt that may be of value in a developing world context.

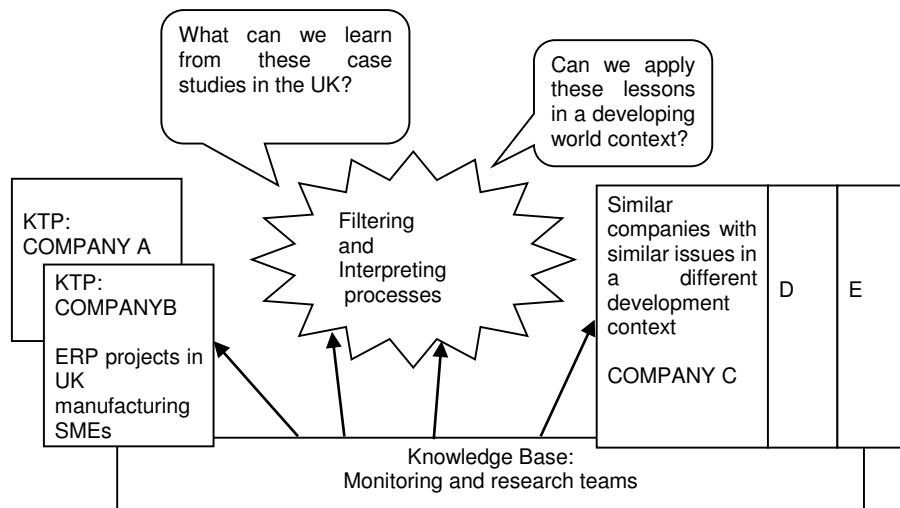


Figure 1. The challenge: how to extend knowledge transfer from developed to developing worlds.

2. Literature Review (background and related work)

ERP is generally conceived of as a software package which automates and integrates business processes, shares common data, and produces and accesses information in a real time environment [3]. ERP software can also be implemented in stages and therefore be used to integrate previously isolated IT systems and functional departments within a company. ERP is also viewed by some researchers

[4] [5] [6] as a fundamental method for achieving best practice within business operations – the implementation of the ERP package requiring the application of certain disciplines within main business processes. According to Turban et al. [7], ERP not only provides business discipline, it also allows the alignment of IT deployment with overall business strategy and business goals. Implementing ERP may thus also require change in core processes, often termed business process reengineering or 'BPR' [8]. However, the guidance on the mechanics and processes for implementing ERP successfully in SMEs in the developed world is limited [9]; and in developing countries, it has been mainly *large* companies that have invested in ERP software, and some of these have reported that their implementation was not as successful as they had expected [2] [10].

In spite of uncertainty and failure in the adoption of information systems (IS), the overall deployment of ERP and IS in general is increasing in the developing world. There remains much disagreement about the effectiveness of these projects and senior management in implementing companies has often questioned the relevance and benefits to their business performance [2]. Increasing professional skills and training is viewed as a key element for successful IS project delivery by Noudoosbeni et al. [11], who argue that lack of planning and management as well as inadequate training led to IS project failure in Malaysian companies. This study corresponds with the findings of Buruncuk et al. [12] in Turkey. Other researchers [13] [14] suggest that the lack of human capability and economic conditions in developing countries lead to IS failure and prevent overall economic growth. Research of companies in Iran [15] [16] [17] highlight a range of issues that have hampered IS deployment in general in the country - lack of managerial skills, low IT maturity, poor training, poor internet access, governmental policies, and poor business planning; but there is very little literature on the more specific issues faced by SMEs attempting to implement ERP software. There nevertheless appears to be a significant market for ERP software in SMEs in the developing world. The studies of Dezar et al. [18] and Arabi et al. [19] indicate that 90% of businesses in developing countries are SMEs; but adoption of ERP systems by SMEs in developing countries is a new activity, in part due to the high expense and technical complexity of such systems [20].

Iran can serve as an interesting example of the potential of ERP systems in a developing world country. Talebi [21] asserts that the great majority of businesses in Iran are micro, small and medium-sized enterprises. According to Molanezhad [22], the majority of SMEs in Iran are in the manufacturing sector. He also suggests that due to the location of Iran in the Middle East, its access to Russia, Europe and Asia, and also its considerable market size, ERP systems have significant potential in supporting Iranian SMEs grow their business and increase their employment. Hakim et al.[23] assert that 'IT, as a new industry in Iran, has not found its rightful place within organizations, as the managers are still adamant and adhere to the traditional management systems, and show resistance to the required organizational and infrastructural changes'.

Heeks' research [24] identifies some key aspects of change that provide a frame of reference for effecting the organisational transition associated with, and required by, the implementation of an ERP system. Heeks puts forward four aspects of an organization that must change as it adopts major new IS. He sees these as constituting a 'Design-Actuality' gap – i.e. a gap between where an organization may be currently be, and where it needs to be to successfully adopt major new systems. These four elements are Process, People, Structure and Technology (Figure 2). In line with Heeks' model, King-Turner [25] has more recently argued

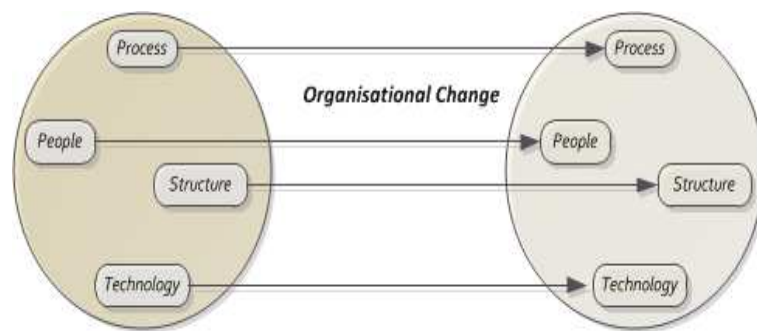


Figure 2. Design - Actuality Gap Model [24]

that the success of ERP projects relies on the three pillars of technology, people, and process. ERP implementation will require significant changes to processes, staff skills and work practices, as well as technology capabilities. Structure may change also, but this is seen as a function of major process change, and thus is omitted from our analysis as a main element.

This paper addresses the following research questions (RQs):

RQ1. How can the three change elements of process, people and technology be utilised when assessing the readiness of a manufacturing SME for ERP implementation?

RQ2. What lessons can be learnt from completed KTP projects as regards ERP package selection in a manufacturing SME?

RQ3. Can guidelines be developed for implementing ERP systems in SMEs in other contexts, including developing world countries? .

3. ERP implementation in manufacturing SMEs: Lessons from the KTP scheme

This section focusses on two manufacturing SMEs that implemented ERP systems with support from the KTP scheme. Although other research has examined the implementation of ERP software via the KTP scheme in larger companies [9], this paper focuses on manufacturing SMEs, and examines what lessons can be learnt that may be of value to similar companies in the developing world. The methodology is multiple case studies, allowing generalisations to be made, grounded in the findings from the cases. Questionnaires, interviews, and observation were used over an 18 month – 2 year period. Observation is one of the most valuable ways to collect evidence, whereby the researcher may observe individual behaviour, culture, and the impact of technology on the organisation. This was facilitated by personal involvement in the running of these projects as a member of the knowledge base supervisory team.

3.1 Fixing Point (2006-8)

Company profile: Fixing Point is a family business based in Cheltenham that designs, manufactures and distributes a wide range of non-standard, high quality, technically advanced products to the roofing, cladding and walling sectors of the construction industry. It had 53 staff in 2006, and turnover was £5.4 m.

Rationale for the ERP project: The existing legacy systems in the company had limited capability, particularly in product costing, and were not well integrated. Management information was processed by a number of standalone packages and a range of spreadsheets, across four main sites around the UK. This was labour-intensive and produced data discrepancies, which impacted on customer service. Stock management across these sites was also problematic, and resultant 'out-of-stocks' and inadequate resource capacity to meet deadlines resulted in unacceptable customer service levels.

A key issue that needed addressing in Fixing Point was the integration of order processing, manufacturing and stock control for the flashing and fabrication product group. In order to achieve this objective, Fixing Point elected to replace their legacy systems with one integrated package - an ERP system - and re-engineer business processes to support the company's growth plans. Fixing Point wanted to establish a common hardware platform and associated technical standards for IS across all three product divisions, using standard procedures and practices which would aid the culture shift to a 'one team' approach within the company. The new system needed to reduce the amount of duplicated processing and eliminate the need for spreadsheet based control systems that were the norm. A significant improvement in the quality and availability of data was required.

Package selection: Fixing Point embarked on a two year project to replace their legacy systems in July 2006. Getting the ERP package with best fit to requirements was viewed as critical to overall project success, and after discussion with colleagues from the local knowledge base, the Project Board (comprising senior management from the company and three university staff) agreed to use a combination of standard methodologies to guide the package selection and project management aspects. A simplified version of the PRISM Buy-Build methodology was used in conjunction with some elements of the PRINCE2® project management methodology. First, business processes were mapped at a high level and key users were interviewed to establish what systems currently existed, how they were performing, and current and future information needs. This allowed the project team to identify issues and information gaps in the company. Questionnaires were used to establish where and how key data items were treated – particularly product and customer data. Of the current systems, where were these key data items entered, processed and reported upon? Were there problems with data inconsistencies, and why? The findings were used as the basis for the production of key areas for improvement, key performance indicators (KPIs) and the list of user requirements for circulation to potential suppliers. Suitable ERP vendors for a manufacturing SME were selected and invited to send proposals. This process took about 3 months in total.

The company then short listed the proposals and selected four vendors for a system demonstration. Following the demonstrations, Fixing Point selected the final two suppliers for further demonstration and investigation, including a workshop and detailed discussion on functionality, user requirements and price negotiation. This process took a further 5 months. At the end of this phase, Fixing Point chose the EFACS E/8 ERP System from Exel Computer System Ltd. This is a component based ERP package that allows some customisation and flexibility in the way it is implemented - the package can be adapted to fit specific functional requirements.

Project implementation: Key users were sent for training on key functional aspects of the new system, and took responsibility for mapping the new system's capabilities against Fixing Point's business processes. Activities during this period included unit testing of the main business modules, pilot data migration of key business information, customisation of the system where business gaps existed, and a range of workshops for training, enrolment and decision making. All these activities were overseen by the Project Board. After some delays due to other business issues taking priority, the implementation phase was completed after 6 months effort. The delays were due to unexpected internal and external factors that significantly impacted the company. For example, changes in staffing meant that key systems users were not able to complete their testing within the time frame. The Project Board elected not to rush with the implementation, but rather to ensure a high quality implementation, thorough testing and adequate training for all users to underpin a smooth transition, less staff resistance, and a successful embedding of new process change across the company. Activities in this period included further training of key users, integration testing of all modules of the new system and pilot testing with all

users. The system went fully live after a month of parallel running in July 2008, this approach ensuring that users had ample time to familiarise themselves with the new system and associated procedures.

Project outcomes: The EFACS ERP suite effectively supported the Fixing Point business plan at the time, which saw a 10% growth in sales year on year across the period, with turnover growing from £5.4m in 2005/6 to over £8.0m in 2009/10, and a steady continued increase in profits and margins. Training and skilling of end-users has progressed, providing systems experts in report generation and business intelligence gathering from the ERP database. Key users have been trained to maintain and manage the ERP system. In terms of systems capabilities, the EFACS ERP now allows the integration of flashing and fabrication, pricing, sales and manufacture. Data entry has been streamlined, eliminating costly duplication; and stock management is now speedier and more accurate, minimising over-stocking and under-stocking across the company's four UK sites.

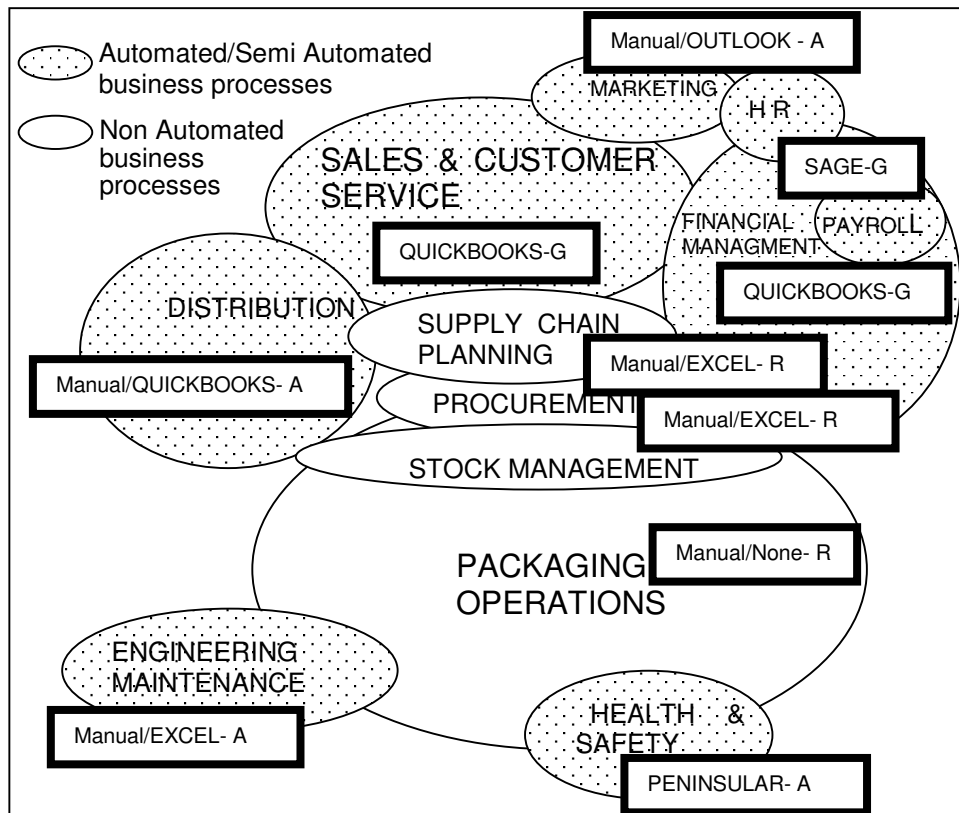
3.2 Contrapak Ltd, Hereford (2010-12)

Company Profile: When Contrapak Ltd embarked on their ERP project in 2010, they employed 52 staff, with a turnover of £1.2m. The company's areas of expertise were sachets and bagging, blending and formulation, shrink wrapping, labeling, pouch filling, liquid filling, high speed counting, hand assembly and repacking. The key strengths of the business at the time were seen as chemical powder blending and the ability to fill into virtually any container or sachet/bag available on the market. Contrapak also had the largest dedicated water soluble packing unit in the country.

Rationale for ERP project: The company's 2009 business plan set out the requirements for significant growth in the coming years. These requirements included new systems across the company, but in particular, in the key process areas of production planning and stock control, which were largely manual. This was causing major problems in effectively scheduling customer jobs on the various packaging lines, and there was a clear need to reduce inventories and improve production lead times. Most of the other areas of the company were already automated to some degree, and it was assumed that *ad hoc* interfaces could be built as required. There was a dire lack of management information and process integration: it had proved very difficult to get accurate consistent information from existing systems; and many of the key processes were 'silo-like' and not properly integrated. As the project progressed, the need to integrate planning with upstream order capture information came to the fore and led to the adoption of a more holistic view of the supply chain process and the election of an ERP solution.

Assessing requirements: Process mapping was carried out to develop a better understanding of Contrapak's main business processes and to generate ideas for process improvement, as well as profiling existing information systems in key process areas (Figure 3). Analysis of current business needs was carried out,

focusing in particular on the planning and management of the packaging lines and related stock control. Detailed flow charts for current business processes were mapped graphically to facilitate a better understanding of the processes and current documents used; and key users were involved in workshops to verify process flow details and establish current and future information needs. The findings were used as the basis for identifying the key improvements that new systems could deliver. Using a red-amber-green analysis, the strategic soundness and functionality capabilities of existing systems were mapped in each process area.



Systems status 2009: R = Red – replace, A = Amber – possibly retain, G = Green – can be retained.

Figure 3. Process Mapping and Systems Profiling at Contrapak

The project team also spent some time focusing on key data items, and recording into which systems customer, product and project data were entered. This was developed into a top-line requirements analysis for all main process areas.

Package selection: Five suppliers were identified that could provide the required functionality in the packaging and stock control areas of the business at acceptable cost. Four of these software houses also offered other modules covering some of

the other main business process areas – order capture and customer relationship management, finance and ledgers, plant maintenance and quality control. This was to prove instrumental in the change of scope that followed. Other factors considered in choosing the appropriate system included compliance of vendors' software solution with Contrapak's current IT infrastructure, and the assessment of all suppliers' responses to the initial system requirements and specification document sent out to all prospective vendors.

The five software companies presented their products at Contrapak over 3 separate days in 2011. The full Project Board, comprising managing director, finance director, sales and marketing manager, production manager and technical director, plus the IS project manager and supervisor from the knowledge base, were present. The five products on the short list were Factory Master, Sage, Priority EMS, Infor and EFACS, and they were scored against 9 criteria. The company entered into commercial negotiations with the two companies scoring highest, and after considerable debate, elected to implement the Infor product.

Project implementation: After a week of in-depth testing, the Project Board agreed to expand the project scope to include new software modules for order entry and financials/ledgers from Infor to complement the production planning and stock control modules from the same supplier. This recognised the integration of supply and demand chain processes and allowed a replanning of the project, which was now to focus first of all on setting up the basic product information in the master Item file and then all the basic financial data in new Ledgers, thereby allowing the turning off of the old QuickBooks finance system. With the new financials in place, a second phase ushered in new order entry functions in Infor, that initially were posted directly through to the financials system. As the knowledge base involvement ended in 2012, the project leadership role was handed over to the packaging operations manager, whose first task was to progress the testing and final commissioning of the MRP and related stock functions of the software suite. These functions would allow automated materials planning, producing the scheduling and control of product supply and necessary inventory movements. The initial estimated project duration of 9 months (to install new planning and stock systems) had become an 18 month project to install a full ERP system.

Project outcomes: The Infor ERP package went live at Contrapak in 2012, and the business functions of financials, order entry, planning and stock control were managed, albeit briefly, via the new system. The company was starting to see the benefits of packaging machine use optimization and integration of the planning and scheduling functions, but in 2013, the company went into administration. The company had over-reached itself in attempting to undertake a large contract with a new high profile customer, and the company's liabilities became unmanageable. However, the vast majority of the packaging lines and labeling facilities were sold on to a new entity, Wyepak Ltd (managed by the former operations and packaging management from Contrapak), who are now trading nearby in a new 20,000 sq. ft. factory. The burden of implementing the new ERP system was not of significance in the collapse of the company, but with hindsight it is clear that financial constraints in

this low margin business limited the amount of human and other resources that were available at the key critical phase of systems implementation, when the in-house staff took on full project management responsibilities from their knowledge base partners. With the problems associated with the imminent closure of the company in 2013, the ERP project lost momentum, and the Infor system is not currently used by Wyepak, in part because of issues of license transfer and maintenance costs.

4. Analysis: Learning from the KTP experience

This section uses the KTP case studies, in conjunction with the literature review, to address the three research questions.

4.1 How can the three change elements of process, people and technology change be applied in assessing the readiness of an SME for ERP implementation?

It is easy to spend a lot of time at the start of ERP projects in researching current processes and systems, and this can take several months. The experience of the KTP projects suggests there are simple techniques that can speed this process, and lead to a clear assessment of the readiness of the company for an ERP project. Many of the theories and models of information systems analysis are based on a logical progression from business strategy to evaluation of information requirements that leads to information systems and information technology strategies. Process analysis, producing 'current' and 'new' process maps, also features in some IS strategy development models; and data analysis and data modeling can also play an important role in determining what systems are required. In an ideal world, much of this makes sense and can help develop an overall IS plan, of which an ERP project may be a central element, that is well geared to supporting current and future business aspirations. However, neither Fixing Point nor Contrapak had the time or resources to undertake such a comprehensive review and assessment of IS strategy. The mandate was to implement integrated systems to support the growth aspirations outlined in the company business plans. The need to move quickly towards a new ERP system meant that compromises had to be made, whilst respecting the principles of established methodologies.

An understanding of the company business plan and the key objectives for the next 3-5 years is important, but there is not normally a need to delve further, unless the company is undergoing a major change of direction. A useful first step is to identify main business processes as was done in both KTP case studies, as a framework for mapping current systems and also as a point of reference should any significant business improvements or changes in procedures be identified. The mapping of the current systems portfolio identifies which systems, if any, are strategically sound, what systems are missing or in need of replacement, and what lies somewhere in between – possibly redeemable, but possibly to be replaced. This can be done by mapping systems to business processes and starting to apply a simple Red-Amber-

Green (RAG) assessment of main systems and applications (Figures 3 and 4). The management and operatives in each process area should be consulted, individually or in joint workshops, and other staff – notably any existing IT support staff – should also be involved. These are simple but effective tools in developing and communicating an assessment of the current status quo, and can help give momentum and generate support for the project.

Establishing what data is used where, and what information is needed to support current and future company requirements, can require extensive data analysis and the design of corporate data models at various levels. However, in an SME, especially if the systems solution is to be built around an ERP package, much of this analysis can be left out at this stage, and returned to as and when circumstances demand. Nevertheless, it is useful to establish in what current

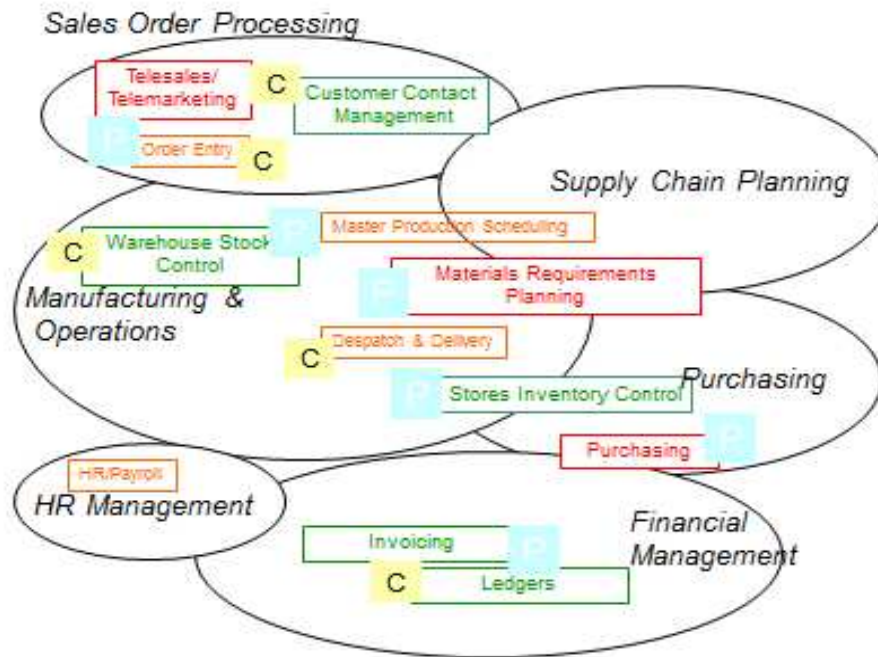


Figure 4. Process mapping, information systems profiling and key data entry: an example of a pre-ERP scenario in a manufacturing SME. Green indicates a strategically sound system; amber indicates a system that may be improved and retained; red indicates a system in need of replacement. C = Customer data entered into system; P = Product data entered into system.

systems the main corporate data entities (normally customer and product data in a manufacturing SME) are entered and updated, and if there are any significant data duplication problems caused by multiple data entry in different systems (Figure 4).

This will be of value in highlighting where data maintenance issues have to be addressed. It is also useful as a top-level guide for data cleansing and migration of data to the new ERP product in due course.

The assessment of people capabilities and skill levels is vitally important at this stage. This can provide the basis for the development of subsequent training programmes, and the identification of systems module owners and key end-users. It is these personnel who will champion the ERP product, and be responsible for a range of issues relating to system configuration, user access and package upgrades.

4.2 What lessons can be learnt from completed KTP projects as regards ERP package selection?

At package selection stage, it is of value to re-interview key management and decision-makers in the company to get a top line view of their current and future information needs. This can be done using a simple questionnaire, the results of which can be fed into subsequent package evaluation. Information needs can be linked to Critical Success Factors (CSFs) or Key Performance Indicators (KPIs) if these are known at company or departmental level. Key personnel who will feature in the ERP implementation can be formally recognized – the process leaders who will take main responsibility for making the ERP function effectively in their area of influence, and the key systems users who, as noted above, will champion the new system and assess the need for changes in processes and procedures.

Whilst analyzing questionnaire responses, it is useful to spend some time looking at the available ERP software products and talking to key suppliers or distributors. This can give a stimulus to new thinking – until you know what is available, you might not realise what could be of benefit to you. Discussions with current ERP software suppliers are important to understand their product development strategy, what functionality will be in their next software releases, what their underlying database strategy is, and what commercial arrangements and technical links they have with other software vendors. All this can help develop and shape the options for ERP package selection.

It is advisable to identify at least two ERP suppliers which need to be carefully assessed and costed. A business case should be made for each option, with clearly identified benefits and payback periods. It is important that company management make and own the decision, and understand the full implications of the chosen ERP product. This is not always straightforward, as putting in a new ERP suite of software will often cause significant upheaval and changes in working practices. This needs to be made clear and weighed up in the final decision.

4.3 Can guidelines be developed for implementing ERP systems in SMEs in other contexts, including developing world countries?

Once the ERP product has been selected and received appropriate budgetary and executive authorization, a phased implementation plan or roadmap needs firming up, and this will likely need to be re-presented for more detailed investment approval. Once underway, there are a number of guidelines that can be distilled from the KTP projects to support successful implementation. These include:

Process Change: As regards the project implementation process itself, the KTP projects suggest that it is not necessary to follow any specific project management methodology closely – in a manufacturing SME, only selected elements of these methodologies are likely to be appropriate. Both Fixing Point and Contrapak used some products and tools derived from a mainstream project management methodology (PRINCE2), combined with some concepts and procedures from a package selection and implementation methodology (PRISM Buy-Build). Slavish adherence to any one methodology is unnecessary and may be counter-productive, but following sound project management essentials *is* necessary.

The case studies also suggest that overelaboration on process change is inadvisable. A degree of process improvement may be necessary at implementation stage, but this should be strictly controlled by time and resource availability. It should not be allowed to delay agreed implementation timescales. A focus on process improvement in the key areas where new systems were particularly required is likely to be beneficial. At Fixing Point, this was in the product pricing area, and at Contrapak it was in the line scheduling and stock management operations. Keeping things in balance is key – radical change in a manufacturing SME will be difficult to manage and an incremental, step by step approach is likely to produce better outcomes.

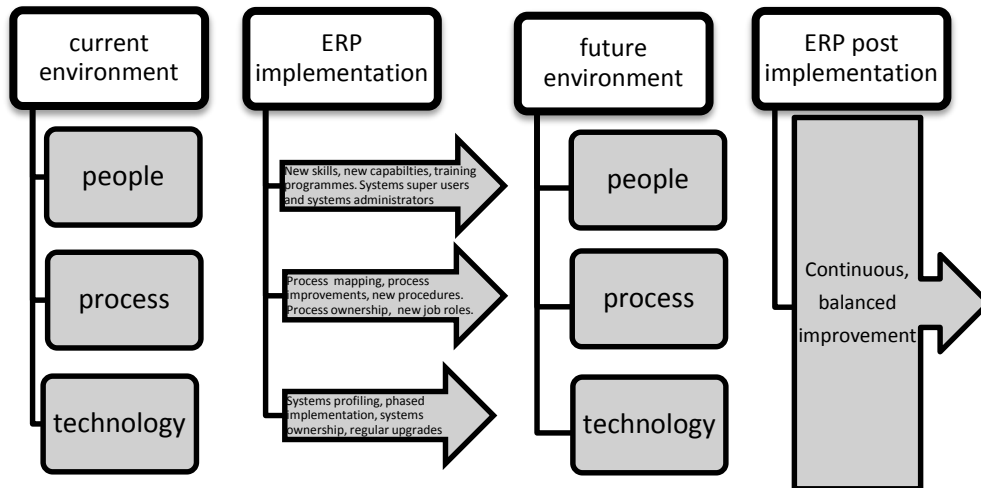


Figure 5. Continuous, balanced improvement in People, Process and Technology areas.

People Issues: Nevertheless, implementing ERP systems often confronts employees with significant changes in their job briefs, which are often accompanied by new working practices. Employees will be required to change, and more importantly they should feel involved in that change. It is therefore crucial that employees understand the rationale for the new ERP system and feel a shared ownership of both the new system and the project. There are a number of tools and methods for charting change in the people capabilities as an ERP is implemented. Although not used in the two case studies analysed here, the People Capability Maturity Model (PCMM) may be of value in establishing the maturity of workforce practices and charting improvements in workforce skills and capabilities. This can lead to a program of continuous workforce development within which training programmes can be embedded and cross-referenced with process improvement and technology implementations and upgrades [26]. This model consists of five maturity levels - Initial, Managed, Defined, Predictable and Optimizing – that can be applied at process level to help gauge advances in people skills and coordinate them with related process and technology change.

Technology Change: The ERP product should be implemented in tandem with proportionate improvement in process and people skills. This is best done if a phased approach is taken to technology implementation, probably starting with the main area where systems problems exist, but trying to focus fairly early on in the implementation programme on getting the core backbone of sales order entry,

manufacturing requirements planning, stock control, and financials management in place first. As noted above, keeping change elements in balance is likely to be key to achieving successful outcomes. Implementing an entire new ERP suite without appropriate process improvement or people skills development is unlikely to prove successful; and continuous review and upgrade in all three areas will be required post implementation (Figure 5).

5. Concluding remarks

Implementing new information systems is not easy and many ERP projects fail or fall well short of their expected outcomes, although there are some recent examples of success in this field in the developing world [27]. McAfee [28] notes that 'the coordination, managerial oversight and marshalling of resources needed to implement these systems make for a change effort like no other'. In the two projects discussed in this article, a number of approaches, methodologies and techniques were used in implementing mainstream ERP packages. These include project management and package evaluation tools, process and data mapping techniques, and systems profiling. These were the *content* (the 'what') of knowledge transfer but it also important to try to understand something of the mechanism (the 'how') of knowledge transfer.

The KTP programme establishes a clear framework for exchange of expertise and knowledge and reporting of project progress; but this in itself does not guarantee effective knowledge transfer. The experience of these two projects and others [29] highlights the criticality of the make-up of the knowledge base team, their experience, knowledge and skills and how they bring them to bear in a fast-moving dynamic project environment. It is not easy to distill from these experiences what the key lessons are or develop templates for future project success. The harnessing of tacit (as well as explicit) knowledge by all parties involved in software projects is one interesting area of research that may prove fruitful in a knowledge exchange context [30]. The knowledge base team has a unique opportunity to provide leadership to bring all parties together with the necessary chemistry to engender and develop the transfer of knowledge – tacit and explicit. This was pinpointed by Berger several decades ago thus: 'in order to optimize the transfer of learning, the worlds of the organization, the individual and the training programmes must be integrated. To achieve integration, it is essential for one or all of the interested parties to manage the interface between these worlds' [31]. In the context of the KTP programme, it is the knowledge base team who must step up to the plate to undertake this crucial role, particularly in the SME sector.

In the developing world, there is a great opportunity for researchers and professionals with experience of such projects in the developed world to play this role, distilling the lessons learnt from project implementation in one culture and interpreting and applying them in another. Over and above all this, and in the specific context of ERP systems implementation, is the more general need for the financial

and human resources to undertake such a major project, which can seriously disrupt a company for the project implementation period and beyond: the demise of Contrapak highlights the precariousness of small companies attempting a step change in their use of core systems and associated processes. This notwithstanding, this article has attempted to advance the transfer of learning by discussing an approach to ERP project implementation, which will now be applied and further refined in the context of similar projects in Iran.

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