

Management of information technology and business process re-engineering: a case study

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Abstract

This paper investigates and addresses issues, problems and challenges that a regional company of a multinational corporation is facing in the implementation of IT-platforms (SAP R/3) and the business process re-engineering (BPR). While many organizations have reported significant improvement in business results from implementing SAP R/3 and BPR, others have failed or experienced various difficulties in achieving intended business and management results. This empirical study describes and discusses Siemens' experience in the process of implementation. The author argues that a holistic approach to IT management is needed, which recognises and emphasises active integration and interaction of strategy, business processes, management system and structure, and organizational culture.

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Introduction

Siemens AG with over 150 years' history, is a global leader in electrical engineering and electronic industries, currently operating in 190 countries and regions. It consists of eight broad industry groups including: information and communications; automation and control; power; transportation; medical solutions; components; lighting and financial services. Since 1999, the company has embarked on a global program of process harmonization and IT standardisation for its regional companies. The program called Spiridon consists of three basic elements:

- (1) harmonisation of end-to-end processes using standard and highly integrated IT platform (SAP R/3);
- (2) introduction of consolidated application and development centres offering cross-border IT services; and
- (3) installation of regional Siemens shared services operational units for transactional processing (mainly in financial processing areas).

As a subsidiary and a regional company of Siemens AG, Siemens (Australia) made a strategic decision to implement a Spiridon SAP R/3 Asia Pacific template. To maximise the opportunity provided by SAP R/3, Siemens (Australia) undertook business process re-engineering (BPR) in conjunction with the preparation and rollout of SAP R/3 template in Australia.

The aim of this study is to explore and discuss issues, problems and challenges that a regional company of a multinational corporation is facing in the implementation of IT-platforms (SAP R/3) and the BPR. The key research questions investigated include the following.

- What is the rationale for the implementation of the Spiridon project together with BPR?
- What are the key issues, problems and challenges during the process of the implementation?
- How the issues can be addressed?

The paper provides practitioners and academics with an insightful illustration of issues of utilization and management of information technology in a large corporation. The paper starts with a brief review of literature on the interdependency of SAP R/3 and BPR and is followed by a brief description

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of the research approach. Subsequently, key findings from different sources are presented and discussed. The paper concludes with a series of recommendations.

SAP R/3 and BPR – the synergies

SAP R/3 launched by SAP Aktiengesellschaft, Systems, Applications and Products in Data Processing, Germany in 1992, is an integrated software package which was developed from SAP R/2. SAP software has captured a large share of the integrated software package market in the world and became a popular management tool in large and medium enterprises. SAP R/3 has a wide range of functionalities and a high level of integration. It composes financial, manufacturing, distribution, logics, quality control and human resources application systems, and provides for one-time data entry and the sharing of a fast, seamless access to one single facet of information (Curran and Keller, 1998; Xu *et al.*, 2002). In this regard, it standardises core systems, business practices and management reporting throughout an organisation. It is particularly beneficial to multinational companies like Siemens. It has been widely utilized as an effective and efficient IT tool to drive and entail BPR.

“BPR by definition is the rapid and radical redesign of strategic, value-added business processes and the organizational structures that support them to optimise the workflows and productivity in an organisation” (Soliman and Youssef, 1998, p. 894). The main aims of BPR are to improve profitability and return on capital employed through optimising business processes, such as reducing management layers and cutting costs (Martin and Cheung, 2000). It involves fundamental changes not only to business processes but also to the way in which the organisation is managed and operates. On one hand, BPR relies heavily on SAP in undertaking organisation analysis, process mapping and modelling, project planning and management, etc. On the other hand, the implementation of SAP R/3 drives organisations to restructure and re-engineer their core business processes to accommodate the system.

As shown above, SAP R/3 and BPR are interdependent and have a great potential to bring about significant benefits to the organisations that implement them. Empirical studies show that recent developments in information technology such as SAP R/3 have powered BPR and helped to change business processes radically, extensively and fundamentally. The merger of the two concepts (SAP R/3 and BPR) has resulted in the latest movement called Business Engineering (Curran and Keller, 1998). There have been a

number of success stories published with regards to applying SAP R/3 to BPR. However, there are also failures, problems and challenges associated with implementing the two (Martin and Cheung, 2000, Al-Mashari and Zairi, 2000a). The problems and challenges may include substantial costs for extensive training and facilities updating, disruption to existing business operation, inconsistent or incomplete installations, employee resistance, traumatic experiences for the employees affected by downsizing, etc. The inability to accept change is the biggest challenge to SAP R/3 and BPR implementation. No matter how efficient SAP R/3 package is, it will never add value to a company if the company does not optimise its business processes. One common mistake in implementing SAP R/3 is said to be the exclusive focus on technical aspects at the cost of change management elements (Al-Mashari and Zaoro, 2000b). In this regard, the author maintains that a holistic approach to IT management is needed, which recognises and emphasises active integration and interaction of strategy, business processes, management system and structure, and organizational culture.

Research methods

This researcher adopted a field research approach to her exploratory inquiry into the recent organizational changes at Siemens (Australia) in relation to corporate strategy, technology, culture, organizational structure, management system, and human resources. The researcher spent over five months on the field study at the Australian site of Siemens in 2003. The greatest advantage of the field research in the form of a case study is that the researcher is able to explore and illustrate specific issues in more detail in a real context. However, like other research design, field research has its limitations as it lacks the sound basis required for making “scientific” generalisation and is costly and excessively time consuming (Sarantakos, 1998). Data collected during the field research are primarily from three sources, using various methods and techniques to address the research questions of the study.

First, a documentary research on Siemens’ business reports, newsletters, memos, agenda and other official publications was conducted to overview Siemens’ business operations and management in general and the overall process and strategy of the implementation of SAP R/3 and BPR in particular.

Secondly, ten semi-structured in-depth interviews with middle and senior managers of Siemens (Australia) were conducted, through

which the researcher captured the perceptions of the managers about the recent organizational changes including the rollout of SAP R/3 and the BPR. The interviews explored both internal and external factors that drive the changes.

Finally, an electronic survey was conducted to elicit responses of Siemens employees at the Australia site to a number of statements in relation to SAP R/3 and the BPR. The survey complemented the data and information obtained through other research methods of this study and helped develop conclusions and recommendations about the issues investigated in the project.

Findings and discussions

This section reports and discusses key findings in relation to the implementation of SAP R/3 and BPR at Siemens (Australia).

Findings from company documentation

To address the challenges of globalisation and improve the efficiency and effectiveness of company-wide services and strengthen its competitive advantage, Siemens AG decided to standardise and streamline its core systems, business practices and management reporting throughout the company. The IT tool that Siemens chose to achieve the aims is SAP R/3. The implementation program is called Spiridon named after the first Olympic hero in history. The Spiridon program was described as:

One concept, one set of business processes, one application management center, one common interworking structure and one SAP R/3 development platform supported by one cross-border IT Application Centre (Siemens, 2003).

The implementation focuses on the areas of accounting, planning and controlling, reporting, order management, service management and sourcing. The main benefits of the implementation of the program are said to be a reduction in IT costs, enabling faster portfolio adjustments and through platform standardization supporting eBusiness transformation processes (Siemens, 2003).

Siemens AG started to prototype and localise the IT software package first in Asian Pacific region in October 1999 and then extended the implementation to its European companies. By October 2003, SAP R/3 has been rolled out either partially and fully into a number of Siemens' regional companies. In Asian Pacific areas, eight Siemens companies have adopted the system.

In September 2002, Siemens (Australia) decided to join in the waves of rollout to replace its obsolete SAP R/2 with SAP R/3. Siemens

(Australia) has an employee team of over 2,200 and comprises a corporate management group, several business units and support units, a number of corporate support services and branch offices in most states in Australia. As a part of Siemens worldwide organization, Siemens (Australia) has the support of the Siemens worldwide network, which provides support for all products and services supplied. The business units in Australia are product/system oriented, in line with the divisions in Siemens AG. These business units interface directly with the appropriate division in Siemens AG for their product, plant or system applications (Siemens Ltd, 2002). In other words, Siemens (Australia) follows the same business processes of Siemens AG in Germany.

It was believed that the implementation of SAP R/3 in conjunction with BPR would significantly simplify and standardise Siemens' core processes, which would lead to reduced operating costs, increased operational efficiency and business benefits (Siemens, 2003). Figure 1 shows the summary of the process and timeline of implementation of SAP R/3 at Siemens (Australia). The figure shows that Siemens has taken a rollout strategy, which involves project planning, preparation (prototyping, localisation, data migration, user training, etc.) and launching. The rollout strategy takes advantage of the experience and lessons gained from other sites of Siemens that have already adopted SAP R/3.

However, the "go live" date of the SAP R/3 template implementation has been delayed for six months. The key reasons for the delay were said to be "identified uncertainty relating to the cost model Siemens (Australia) would inherit, the uncertainty over the promised functionality in the template, and risks associated with data migration which is far more complex than originally realized" (Davidson, 2003). Table I clearly shows that by the end of March 2003, the majority of the implementation tasks had not been done. These financial, technical and managerial problems indicate the high complexity of the implementation and the importance of project planning, and risk and change management. It is noticed from Table I that Siemens (Australia) put in place change management along with project management from the very start of the program.

The placement of these management mechanisms helped Siemens to identify the problems and risks and respond to them positively and in a timely manner. To address the financial constraints to SAP R/3 implementation, Siemens (Australia) rescheduled the go live date from April to October 2003 when a new financial year started. Siemens (Australia) also reinforced its change management strategy to ensure its business units

Figure 1 An overview of Spiridon SAP R/3 implementation at Siemens (Australia): tasks and timeline

Task	Timeline (Month/Year)														
	09/02	10/02	11/02	12/02	01/03	02/03	03/03	04/03	05/03	06/03	07/03	08/03	09/03	10/03	
Rollout Preparation	█														
Definition of Scope		█													
System Configuration/Localization			█	█						█					
Key User Training									█						
Test/Training/Documentation Prep.					█	█	█	█	█	█					
Integration Testing											█				
User Acceptance												█			
End User Training											█	█	█		
Data Migration			█	█	█	█	█	█	█	█	█	█	█		
Go Live Prep.													█		
Project Mgt/Change Mgt	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Go Live														█	

Source: Davidson (2003)

ready for a smooth change-over to SAP R/3 and new business processes. Measures taken included running a series of Business Unit Change Impact Workshops which involved both managers and frontline operatives, and developing a key user training concept and program. The key user training program helped to build specific business unit prototypes by capturing sufficient input from the key users, and ensured the effectiveness and efficiency of the end-user training held later within the business units (Table I). Data migration tended to be one of the biggest challenges to the implementation of SAP R/3. After nine years in SAP R/2, Siemens (Australia) had to clean up all the old data in SAP R/2 and only migrated valid data into SAP R/3. It was reported that Siemens (Australia) has migrated around 2,800 system and product business sales orders, around 3,000 purchase orders, 700 maintenance contracts, 13,000 equipments, etc., during the data migration. The data migration cost more resources and time than expected and tended to be a hard lesson that Siemens has learned from the implementation.

The preparation for rollout of the SAP R/3 went hand in hand with BPR, an overhaul of core business processes and structures at Siemens (Australia). The first phase of the BPR was assessing the existing business processes and structures, and implementing a new Business-Field and Special-Project structure in Siemens' four key business units (Information and

Communication Network; Power Generation; Transportation Systems; and Power Transmission and Distribution). The new business and management structure was designed to help Business Fields to have a clear market and customer focus to ensure continuous and stable business growth on the one hand, and to set-up special project teams for large scale projects with a fixed start and completion timeframe on the other. The special project structure would also create follow up opportunities for business fields (e.g. ongoing maintenance). The restructuring was prompted and enabled by the SAP R/3 rollout. The primary purposes of the restructuring were to optimise Siemens' resources and increase cost savings and sales. It was reported that possible financial benefits from the BPR would be in excess of AU\$10 million. A recent independent review of the estimated BPR outcomes suggested that additional cost saving and revenue enhancements of AU\$30 million were achievable at Siemens (Australia). The second phase, namely, the realisation of the identified BPR benefits and objectives has recently commenced in four of the major processes of Siemens: Sales/Tender Process, Project Management, Supply Chain Management, and Service Management (Anon, 2000). As the process of the realization has recently started, its results are not yet known. Nevertheless, the BPR and its objectives have posed a formidable challenge to Siemens employees at every level of the organisation.

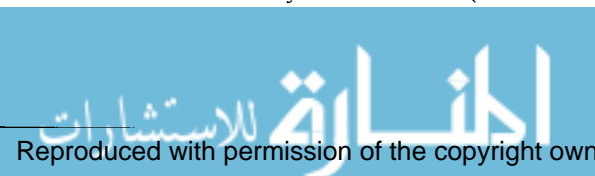


Table I Perceptions of Siemens' managers on the implementation of SAP R/3 and BPR

Theme	Key point
Implementation of SAP R-3	<p>It is one centralised and standardised system for everyone</p> <p>It is an ongoing process</p> <p>It is more friendly to users and easy to learn</p> <p>It allows us to standardise the processes in all key areas</p> <p>We are losing a lot of flexibility within the system</p> <p>There are concerns over the ways of implementation because the old ways of implementation in another country were mostly unsuccessful</p> <p>Some business units are reluctant to implement it</p>
Implementation of BPR	<p>A good exercise to redefine and streamline business processes</p> <p>It is a cost cutting exercise (looking at where we can make savings)</p> <p>A process of enhancement</p> <p>Uncertain about achieving the (cost cutting) target</p> <p>"How can I survive?" is the major concern of some employees</p>
Perceived challenges	<p>The road from "high level strategy" to practical implementation can be long and difficult</p> <p>Data migration and cleaning-up</p> <p>Having the right people in the right place</p> <p>Staff training</p> <p>Technological and commercial risks it takes to implement the new IT-platform</p> <p>Constraints of resources (business and technical expertise, time, etc.)</p> <p>Collaboration between various groups in such a diverse company</p> <p>Helping employees to cope with changes and respond positively to them</p>
Organizational culture	<p>Preserved/stereotyped</p> <p>Bureaucratic (sticking to the established rules)</p> <p>Conservative (resisting and/or reluctant to changes)</p> <p>A mix of different cultures</p> <p>Individualistic</p>

Findings from interviews

Ten middle and senior level managers at Siemens (Australia) were interviewed. Table I collates the main themes and the corresponding responses from the interviews.

The interview responses indicated an overall positive view and attitude of Siemens managers interviewed in terms of the implementation of SAP R/3 and BPR, while the considerable challenges of SAP R/3 and BPR facing Siemens were recognized. The interviews also revealed various concerns over the implementation. Insufficiency in resources and lack of a cultural environment that

welcomes and fosters the change are major concerns amongst the managers interviewed. Success in BPR implementation requires positive organizational change in organizational structure and design, management processes and organizational culture. Studies show that increasingly aggressive, competitive and dynamic market place emphasizes on organizational innovation and change (Drejer, 2002). Mounting evidence shows that adaptive and entrepreneurial organizations are likely to sustain in today's corporate world than the organizations with bureaucratic and lethargic cultures (Bartol *et al.*, 2001). Therefore, the organizational culture of Siemens remains a big issue for the organization to address in the process of the rollout and BPR.

Findings from survey

Stratified sampling was used to select a total of 230 employees of Siemens (Australia) for the survey (due to constraints of resources to the research, a larger sample was not allowed). The criteria used for sampling are job level, length of service at Siemens, business unit, and job location in Australia. The questionnaire consisted of 32 questions and was made available online to the sample for a period of two weeks in late May and early June 2003. A total of 51 completed responses were collected, which yielded a response rate of 22 percent. The data were analysed using descriptive analysis technique available on the SPSS for Windows software package. As the survey looks at the general scenario of innovation and change at Siemens (Australia) over the past few years, only the responses directly linking to the implementation of SAP R/3 and BPR were reported in Table II.

The majority of the respondents (92 percent) were sales persons, professionals and front line and middle level managers. Most people who participated in the survey have worked for more than five years at Siemens (Australia).

The survey instrument was adopted and modified from stages of concern questionnaire (Hall *et al.*, 1979, Schaafsma and Athanason, 1994). The instrument has been widely used in Europe, the USA and Australia to identify concerns about the impact of technological changes on employees, customers, management and organizational goals. Overall, respondents were not very much concerned with the implementation of SAP R/3 and BPR, given that all mean scores except for item 3 were below 2.0 ("somewhat true of me"). In other words, respondents were generally positive towards the implementation. The results showed that the highest level of concern for the respondents was in

Table II Survey responses to implementation of SAP R/3 and BPR

SAP R/3 and BPR	Mean ^a	Standard deviation ^a
At this time I know very little about implementing the two	1.82	0.92
I don't know how they can help us here	1.71	0.86
I would like to find out more about how I am going to make them work with the limited resources here	2.18	0.83
I am concerned about how they will affect my workload and changes in my work practices	1.69	0.88
I am more concerned to know what effect they will have on my job security	1.39	0.95
I am concerned about my inability to manage all the requirements of SAP R/3 and BPR	1.27	0.81
Co-ordination of tasks and people for the implementation is taking too much of my time	1.83	0.95
I am more concerned about how our (external) customers will benefit from us implementing them	1.96	1.02
I would like to help other staff to improve their implementation	1.84	1.08
I would like to change the whole implementation approach	1.27	0.93

Note: ^aA three-point scale was used for ranking the statements in Table II, in which 1 means "not true of me"; 2 means "somewhat true of me"; and 3 means "very true of me". A "zero" was used to record "not relevant" responses

item 3 ("how I'm going to make them work with the limited resources here") and the lowest level was in item 6 ("inability to manage them") and item 10 ("change the whole implementation approach"). The results highlighted an important issue of resources. The finding correlates with that of interviews which identified lack of resources and funds as one of the main challenges facing Siemens (Table II). In terms of standard deviation, the results show that there is not much discrepancy in the responses as most of the standard deviation scores are below 1.0 except for items 8 and 9.

Conclusions

It has been widely accepted that SAP R/3 plays a crucial role in re-engineering and optimising business processes to help the implementing organizations to gain competitive advantage in today's turbulent business environment. While many organizations have reported significant improvement in business results from implementing SAP R/3 and BPR, others have failed or experienced various difficulties in achieving intended business and management results (Martin and Cheung, 2000; Spathis and Constantinides, 2003).

The case study indicates that Siemens (Australia) is positive about, and has a great potential in, improving its performance through SAP R/3 rollout and BPR but it has also experienced serious challenges and problems. The problems include lengthy delays in major task completion and rollout, costs overruns than expected, functionality uncertainty, difficulties in data clean-up and migration and cultural barriers to changes. These problems are by no means limited to this case only. The following recommendations are proposed as a framework to broadly address the problems. They are related but not limited to the case study.

- *Recommendation 1.* Take a holistic approach to IT management which recognises and emphasises the synergies and integration of strategy, business processes, management system and structure, and organizational culture. The achievement of intended business results from SAP R/3 implementation counts heavily upon their active integration and interaction. It is important that organisations address business process issues in a holistic fashion (Zhang and Cao, 2002).
- *Recommendation 2.* Build and nurture an organizational culture that favours innovation and changes. Organizational culture has an important impact on IT management. It reflects the norms and deeply rooted values and beliefs that are shared by people in an organization. Slevin and Covin (1990) emphasized the importance of an appropriate organizational culture in developing effective innovation behaviour to address market dynamics. While an organizational culture cannot be imposed by top management in a short period of time, it can be built over time. The key determinants of an innovative organizational culture are strategy, structure, support mechanisms, behaviour that encourages innovation and changes (Martin and Terblanche, 2003). An agile organizational culture is needed, which focuses not only on technological side of organizational agility, but also the human side of organizational agility (Crocitto and Youssef, 2003).
- *Recommendation 3.* Give greater weight to BPR after SAP R/3 implementation rather than before or during the implementation. Empirical studies show that the functionalities and the real potential of SAP R/3 for local business operation are not fully known until the implementation is completed. Furthermore, it is difficult for most employees to assimilate all the radical changes if SAP R/3

and BPR are run concurrently (Welti, 1999, Cooke and Peterson 1998 in Al-Mashari and Zaoro, 2000b). Therefore, this author argues that Siemens should refuel rather than wind up its BPR after the SAP R/3 rollout.

- *Recommendation 4.* It is vital that SAP R/3 management team has the level of project management expertise required to plan, organize, control and monitor every phase of implementation. It is vital that project managers are able to drill down and recognize issues at the operational level and take necessary corrective actions during project execution (Czuchry and Yasin, 2003). Siemens' experience illustrates this vital need. The timeline and milestones of SAP R/3 implementation must be realistically defined and regularly monitored. Tight control in terms of implementation schedule and the participation of human resources is crucial.
- *Recommendation 5.* Benchmarking should be used in all the aspects of SAP R/3 and BPR implementation. Benchmarking against best practices in the implementation within Siemens' global network and other similar companies enables Siemens to identify the magnitude of gaps in implementation and take proactive and effective measures to close the gaps. Siemens company-wide benchmarking should be a systematic exercise to identify and capture best practices and transfer them across all its regional companies that decide to rollout SAP R/3. In parallel with the best practice benchmarking, hard lessons learned, failures and problems related to SAP R/3 and BPR implementation should also be made known across Siemens' network to avoid repeating the similar mistakes and take preventive actions.

This study investigates and addresses issues, problems and challenges that a regional company of a multinational corporation is facing in the implementation of IT-platforms (SRP R/3) and the BPR. The insightful case study contributes to a better understanding and appreciation of the complex nature of the issues raised in employing IT to optimise business processes. The framework proposed to address the issues serves as a guideline for managers to reflect on and for researchers to look into.

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