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Abstract - **In this paper we address a question highly relevant for many companies developing and implementing ERP or other software internationally. These companies have to integrate subsidiaries all over the world by using standard business processes implemented within the software, while at the same time take care of country-specific and other local requirements. The paper presents a framework of three different strategies, evaluates these strategies, and reports case study results that allow the comparison of these strategies. It is shown, that these strategies are not only relevant for ERP projects, but also for other software projects, especially global e-commerce projects.**

INTRODUCTION

As global supplier and consumer markets are rapidly extending, the implementation of global business processes and cross-country information management has now become a key function for the strategic safeguarding of organizations. Not only global and international enterprises, but also enterprises with so far limited regional reach need to address the challenges and opportunities of emerging global supply chains and the rise of consumers and employees in electronic market places without frontiers. The important role of information and communication technology to support the quest for efficient global business processes has led to a rapid growth of information technology projects with global reach. As global enterprises turned to integrated business standard software applications (now commonly known as Enterprise Resource Planning, ERP, systems) such as SAP R/3 to support their global business processes, a global market place for software and services emerged. Due to customer demand software vendors had to establish local versions and sales presences, local support and, often also, development organizations outside their home market and language [1]. The capability of ERP systems and their complementary software solutions to technically construct multi-language, multi-currency, multi-country and multi-system IT landscapes by this increased dramatically. At the same time global businesses realized that mere *technical* localization of software or the availability of components in various local markets is only a first step in a solution for global business process support. Only lately the importance of business processes for global software development and implementation has been addressed in literature [2, 3].

Our *objectives* in this paper are, first, to supply a *framework* including strategies for dealing with local and global requirements, and second, to give *conceptual and empirical evidence* as to what strategy of dealing with these requirements might be the most successful in international software management. Though we especially address cross-country implementation, our findings can also be applied to other projects dealing with multiple local implementations.

CONFLICTING BUSINESS PROCESSES

When implementing ERP solutions such as SAP R/3 global companies and their project teams face the question whether and how to take into consideration country-specific business processes. Often a conflict arises between local requirements to enable such country-specific business processes on the one hand and the enterprise wide objective to introduce common global business processes on the other hand [4, 5]. Covering local requirements is said to be necessary for an entity to be accepted locally in existing markets, whilst others propagate global process and supply chain efficiency, lower cost of ownership of software solutions and landscapes in an increasing global networked environment. Certainly a comprehensive analysis and subsequent modeling of a multitude of country-specific business processes will increase complexity and cost of an implementation task. Similar challenges apply to continuous Change Management during and after implementations [6]. Obviously, with the number of countries the magnitude of the project and process coordination task increases. Customizing and rollout of a software solution may thus become a potential exposure to financial risks and might finally result in a challenge to the overall progress of the project.

Therefore, when confronted with country-specific business processes, a project team understandably might look for ways to avoid cost and search for their best approach to minimize risk and exposure. Most often, the straightforward concept then is to avoid country-specific business

processes as unnecessary and cost creating roadblocks. Many global companies that have chosen SAP R/3 as their worldwide strategic software solution struggle with this question after completion of initial projects, and thus often do not gain the full potential of SAP R/3 as a global integrated solution. Different strategies are chosen by the respective project teams (e.g., [7], [8], [9]).

Global project teams have triggered an understanding of the implications of a global supply chain and the requirements to satisfy a global customer base. At the same time they are experiencing the challenges of a full-scale global rollout to a large number of countries. The finding of the most appropriate implementation strategy becomes a critical success factor in these kinds of projects.

STRATEGIES FOR MANAGING BUSINESS PROCESSES

There is very little literature on strategies for developing and implementing global software solutions once the mere technical adaptation challenge is solved. As a conceptual framework, three different strategies of dealing with country-specific process requirements have been identified [4]:

TABLE 1
PROJECT MANAGEMENT STRATEGIES

Strategy 1	De-centralized (local) analysis, modeling and implementation of country-specific business processes
Strategy 2	Centralized (global) analysis, modeling and implementation of country-specific business processes
Strategy 3	Coordinated analysis, harmonized modeling and implementation of country-specific business processes

The de-centralized approach of *strategy 1* implies that the global enterprise attempts neither to coordinate nor to harmonize business processes across its various local business entities. Implementation of SAP R/3 (or other software) and the resulting need to analyze and model business processes is managed and controlled solely at local level. A global support, if at all in place, offers only technical implementation expertise. Thus at a first glance this strategy evades costs of coordination and harmonization. The project budgets of the individual local projects are kept comparatively low. With no requirement to coordinate business processes with other projects, a project will run independently and achieve most likely a fast(er) implementation. The decision for this strategy nevertheless does not consider that it may later cause a considerable amount of additional efforts and cost. This might happen to the completed local implementations of SAP R/3 when the lack of coordinated and global business process support subsequently affects the enterprises global efficiency. In this case, global information flow and supply chain management within the company will not at all be friction-free, due to incompatible data management and business processes across its parts which result from the de-central approach.

Strategy 2 chooses a completely different approach. In order to minimize the overall project cost the implementation project team creates one and only one global version of each business process. This master process will – as it is planned – be implemented identically in all local entities. To a certain extent some technical parameters of the SAP R/3 (or other) software are adapted to local needs in the course of customizing. Without this – fairly limited – adaptation the software would be useless in the context of the individual country. The strategy, however, does not consider country-specific analysis and modeling of business processes. The global master process is intended to be implemented in the local entities without any changes. It is taken for granted that local business processes will be changed in order to fit the master process. This strategy indeed avoids, at first, the cost of coordination as coordination within this project is limited to solicit input for a working master process prototype. It is assumed that a master template of a model entity can be created as a placeholder for any local entity. For implementation, a central project team subsequently might travel around the globe from site to site. Repetitive implementations are expected to result in a fast and low budget project. The decision for this strategy however overlooks the necessity to model in detail legal and other mandatory local business processes. Even given the local entities willingness to introduce the master template, ignoring such requirements could prove fatal to the project success. The global master template later most likely *has* to be adapted to the local requirements. It can be expected, that this approach thus results in a considerable amount of additional efforts and cost.

Even though *strategy 3* implies a higher initial investment it therefore promises to be more successful. From the start of the project country-specific business processes are analyzed. Unlike with strategy 1 however, using strategy 3 means that the objective of the process modeling task requires a comparison and – if necessary – a harmonization of business processes across local (country) entities (we have suggested and explained a procedure for this elsewhere [4], see *Figure 1*). This implies that country-specific requirements are identified well before the roll-out process. They can now be incorporated in the implementation planning. Business processes are analyzed and described in all countries. A joint evaluation of each process follows, and exemplary business processes are chosen and implemented as best practice for the global enterprise. Only when this best practice is identified, a master template covering all implementation countries is created. Best practice processes are listed in a best practice catalogue for implementation. Mandatory country-specific business processes not included in this catalogue are additionally realized in the

local entities. Using the local implementation wherever feasible leverages on leanings during best practice discussion. This strategy undoubtedly increases the commitment and cost in the analysis and design phase of a project. Project experience nevertheless indicates that the consideration of country-specific requirements early in the analysis and design phase will result in overall lower total implementation cost. The reason for this is that higher additional adaptation costs result for an *ex-post* implementation of country-specific business process requirements.

To be able to compare the effects of the different strategy approaches to global projects, an indicator for project success has to be chosen. The general question addressed is, which global implementation strategy will achieve the best enterprise wide result and lead to efficient global business processes? An overall evaluation of the results of the respective strategies for the global *company* would involve a number of variables such as reduction in processing costs and duration of business transactions. An evaluation of the *project's* overall success though can well be based on short term performance indicators as project cost, especially project resource cost, and project duration. For the following case study, the second approach is used.

CASE STUDY: COMPARING DIFFERENT STRATEGIES

The case study analyzes the cost of an SAP R/3 implementation project in the oil and gas (downstream) industry in six West European Countries. The initial procedure chosen by the six local operating units of a leading global enterprise in this industry was to jointly create a harmonized process implementation. This procedure complies with strategy 3. Actual external and internal billing and accounting data were drawn from the project log and analyzed to calculate the cost of this strategy. As the by far dominating cost factor during implementation was human resource cost (internal and external resources), we used all human resource cost for our calculation (i.e. consulting, concept, programming, quality assurance, deployment, project management etc.). Subsequently, results for the other strategies were calculated using a function-point-based extrapolation model and actual project cost structures. Project data from other projects, which were pursued following the other strategies, was used for cost structure analysis and as extrapolation basis. To achieve comparability of the results, a function-point-based model was used to normalize the respective budget figures. Due to company policy, the actual financial data had to be converted in percentages, not showing the real budget figures involved. Overall project cost was a high seven-figure amount in British Pounds. (To comply with page restrictions, detailed calculations could not be included in this version of the paper; cf. the longer version [10].)

Strategy 3

Applying strategy 3, first the business processes were jointly analyzed and modeled. Where necessary, country-specific business processes were additionally dealt with at a local level.

The results were as follows: coordinated business process development consumed 55% of the overall implementation cost. The introduction of local processes not included in the best practice catalogue caused the remaining 45 % of the implementation cost. Whilst there is an almost equal distribution of project cost between harmonization cost and local development cost, the analysis revealed a significant difference in the types of process adaptation necessary at these two levels. Harmonization was chosen when required to adapt, extend or modify common core processes, whilst the local budget was used to enable local process interfaces and local business reporting requirements.

Strategy 1

A simulation calculation based on actual project information was used to determine the cost of the alternative strategies. First, the de-central approach according to strategy 1 was calculated. If all processes would have been analyzed, modeled and implemented only at local level, this would result in drastic reductions of central coordination cost. However, the *total* project cost would increase by 58%. The increase was a result of uncoordinated duplication of efforts in the analysis and modeling of core processes. Cost for local interfaces and business reporting remained almost identical. This strategy might have created several individual solutions, designed and therefore well working for the respective country. However, a significant increase in cost will appear for *ex-post* harmonization of processes and systems. This becomes necessary once the incompatibility of company-wide, *cross-country* processes starts to affect overall company efficiency.

Strategy 2

Finally, the cost of strategy 2 was calculated. Again a simulation was used to calculate the cost of one single global template based on business processes of one operating unit chosen to be the master country. The cost of this template creation would have been less than half (46%) of the overall project cost of the actually chosen strategy of harmonization. However, project experience (supported by the little literature which addresses this topic, e.g., [9]) shows that at least some business processes are almost certainly very different in other countries. Thus, the adaptations necessary to create six working local solutions would increase the total project cost. In case all five countries need ex-post adaptation, overall project cost would rise by

(at least) 62%. Already with three countries requiring adaptation, strategy 2 proves to be more expensive. Unless by coincidence there are no or extremely little country-specific business processes, the project cost could rise further. Strategy 2 initially seems the "cheapest" solution. However, an ex-post local adaptation of a global template results in potentially the risk to need additionally five separate re-implementation projects. This finding could be supported by looking at some very early project steps, where non-harmonized business processes needed re-work in the harmonization team.

DISCUSSION

The case study supports a preference for strategy 3. This strategy seems to be the most promising approach to manage a global implementation project. It therefore can be argued that this strategy should be adapted as the preferred strategy for standard software companies when extending their customer base to *really* global reach (meaning that this software companies do not only want to technically internationalize and translate their software solutions, but adapt business practices and processes of the countries concerned). Following this strategy, they should attempt to create harmonized functions covering a multitude of countries right from the start.

However, from our experience in several companies it seems that in most cases this strategy is *not* followed for multiple local implementations. Strategy 2 is often either prescribed by management as the seemingly simplest procedure (especially in centralist-oriented organizations), or it is simply generated by the fact that one (pilot) country finances most of the first project. On the other hand, strategy 1 is often chosen if time pressure mandates a "quick hit" for an implementation success and the project budget permits this approach.

To our experience, though, global ERP projects which have passed the first steps of mere technical rollout nowadays seem to be in a phase of more adaptation and often "convert" to strategy 3 for their still pending rollout parts or for software upgrade tasks. Meanwhile, the bigger ERP software vendors have increased their capability to supply country-specific functionality, including business processes, right from the rack. Thus, they have internalized what they have learned in the course of the globalization of their software and customer base [1].

Cost aspects though may well not be the only reason for the overall profitability of strategy 3. *Porter* [11] has pointed out that, with the country it is placed in, each foreign subsidiary uses a unique set of processes and practices based on local influence factors, some of which are more efficient than processes in other countries. For a global company as a whole, this leads to a choice of successful business processes for specific tasks. Porter [11] argues that these local competitive advantages *cannot* be transferred to other countries. If these advantages are transformed into *knowledge* (about the best business practices, done by using project analysis and modeling techniques) though, we think that global companies *can* use these learning opportunities to gain competitive advantages.

A continued discussion of the effects of strategy 3 therefore should remain of high practical – and academic – interest. The increase in global supply chain projects and especially the expansion of the back office to the Internet makes any implementation project a potential global project – even for presently purely local oriented enterprises. As customers or suppliers from many countries around the globe should and will potentially be able to participate in *global e-commerce*, not only project teams will continue to face the need to think globally and locally simultaneously. Projects which are to introduce recently developed new generation Internet software such as *business-to-business portals*, *global trading networks* and *market places* are now in the same stage that global ERP projects were in a while ago. For these projects it becomes almost mandatory to look at the best strategy well in advance. E-commerce projects have a far higher immediate effect and visibility and might concern a far more global audience. In that case a global customer or supplier might not be interested to continue business if the business process of the country he happens to start a transaction in right now is not robust and harmonized enough to execute the transaction.

CONCLUSION

Our paper contributes in three ways to questions in international software management: It proposes a framework for analyzing procedures in global software projects, identifying three strategies of coping with global and local requirements. Moreover, it shows that case study material provides some evidence that strategy 3 is, in the end, most efficient for the global implementation of ERP software such as SAP R/3 – even though, not only to our experience, strategy 3 today is *not* the standard procedure of international ERP project management. Third, it addresses further questions about global software project management and thus can direct future research. Of special interest seems to be the question, in what respects such projects – using *knowledge management* methods – could contribute to the competitive edges of a company. This research still has to be completed.

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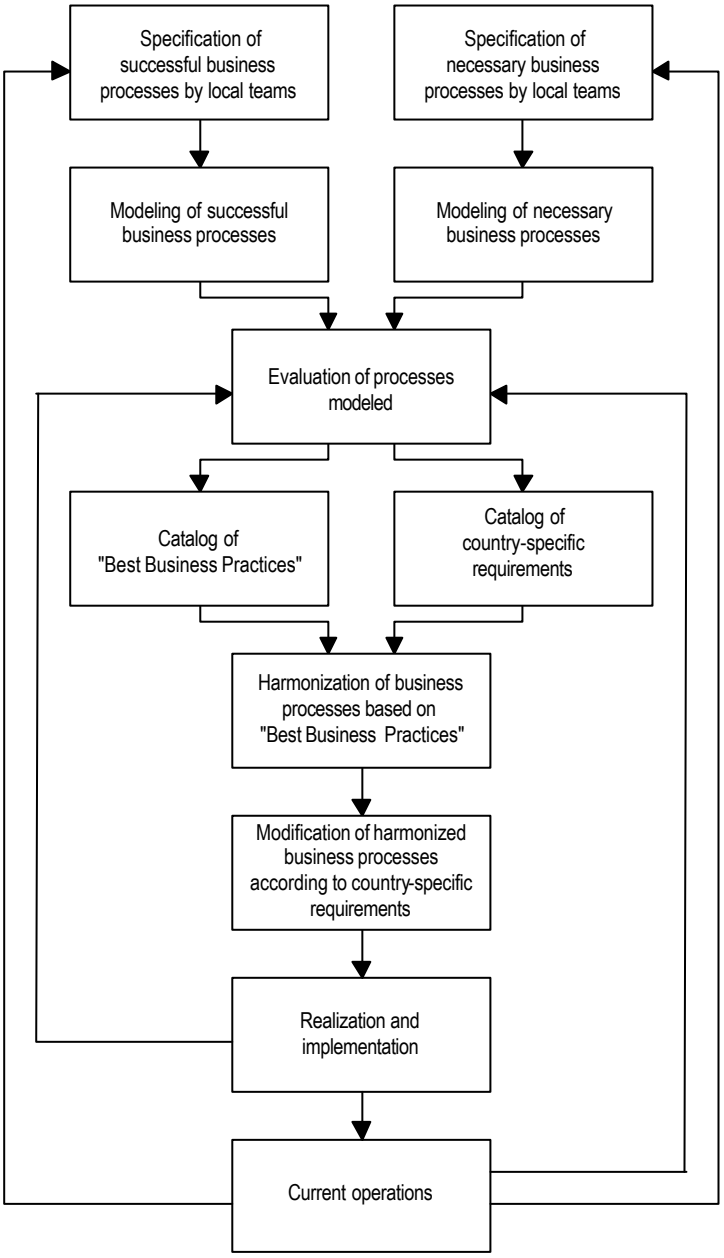

Fig. 1. Strategy 3 procedure.