

# **SAP as a Decision Support System: a Use - Case Evaluation over Different Types of Firms & Applications**

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## **1. Introduction**

The aim of this paper is to make evidence and to learn more about the implementation of a Decision Support System (DSS) into a modern company as a way to improve and empower the internal decision process with smart problem-solving. The needs of this kind of solution is more and more often required in the market, that is nowadays characterized by turbulent and extremely variables changes. A quick and smart response to these changes is strongly required in the firm, as a way to stay in the market and get a competitive advantage on competitors. At first we will provide a definition of what a DSS is and we will extend this definition also with the concept of Modern-DSS. Secondly, we will introduce SAP, one of the various solutions available on the market to implement a DSS. Then, we will exanimate three case-studies that in our opinion can help into understanding how and when a DSS is normally implemented into a firm. These case-studies reports a success, a failure and a customized solutions of a DSS implementation. Finally, we will discuss about the importance of the DSS system into a firm, especially regarding the help that a DSS can support to the decision process. Our findings are that in some cases a DSS could help making more quicker the decision process, but it's always important to don't rely only the DSS system and made a intensive use of human perception and experience gained from previous situations. A DSS still remain a computer-based system, and in certain situations the human mind it's impossible to replace.

## 2. What is a DSS?

After the end of World War Two, during while the first information systems started to develop and expand trough all world's leading nations, the idea of new supporting tools for decision making began emerging in the scientific community. Over the years new and military decision; later in the '80 the previous generation of decision support systems was overtaken thanks to Hardware and Software progresses introduced by major players and universities in USA; finally the data explosion and the Internet-Era lead to deeper improvements sophisticated computer technologies moved this idea trough three phases of its development: just after their advent, during the early '50, the purpose of such systems was aiming to low-complexity problem solving such as weather forecasting or other sensible issue as in their ability and pushed the propagation of such systems till to become the tools that are present in the market nowadays [6].

As in TopBits.com (2010):

*“DSS or Decision Support Systems are usually computer applications along with a human component that can shift through large amounts of data and pick between the many choices. A Decision Support System is a way to model data and make quality decisions based upon it. Making the right decision in business is usually based on the data quality and personal ability to sift through and analyze the data to find trends in which it is possible to create solutions and strategies”[11].*

From the previous definition we can derive that DSSs are an evolution of information systems that aim to address the problem of decision making trough the use of fast computing technologies. A DSS can be divided into [2]:

1. Inputs, a series of dataset that are going to analyzed;
2. Model, set of rules and criteria to simulate the real world;
3. Output, results of the DSS based on the combination of the input and the model;
4. User, the join of Knowledge, Experience and DSS output which allow the user to take a decision.

Through the use of decision support systems a wide number of benefits can be carried to the business of whom use them: faster, if not even real-time, data access, process and response, integration and multi decision support, easy to use and user friendly interfaces [8]. Looking trough the future new possibilities will be provided with joint of the existent DSS and the artificial

intelligence technologies. AI will support decision makers with most likely human behaviors improving the current state of the art of such systems. This process will lead in a short run to IDSS (Intelligent Decision Support Systems) that will be based on machine learning data mining and fuzzy logics to improve the outcomes [13].

### **3. SAP**

After presenting and defined decision-support systems we are going to introduce one of the solutions available on the market: SAP. SAP (System, Application and Product) is a German company originally founded by IBM that offers a package of software solutions and services company which aims to cover all managerial, productive and social skills of a company. Among the main proposals, present in SAP portfolio (<http://www.sap.com/solutions/index.epx>) it includes ERP solutions (Enterprise Resource Planning) with the aim of increasing efficiency through better internal control and financial management, logistics and human resources, CRM solutions (Customer Relationship Management) for the collection and processing of costumers data for the acquisition and customer retention, SCM solution (Supply Chain Management) in order to optimize the use of resources in the functional process and thus contribute to achieving better production results. Last but not least, the SAP package offers BI solution (Business Intelligence) for the data collection, processing and conversion to useful information in the organization management to read the surrounding environment with the aim of ensure timely and appropriate response. The latter represent the provision of SAP systems for what concern decision support systems.

Born primarily as solutions for large enterprises, it provides a high level of personalization and flexibility thanks to its modular nature, which guarantees a state of independence from context, geographic location and business sector in order to be able to meet the complex needs of multinational organizations. A subsequent expansion has been implemented taking into consideration the needs of small and medium sized companies valued as increasingly relevant in today's economic environment. With regard of those companies, SAP provides a set of solutions dedicated to the needs that can be broken down into two categories: business management applications designed for greater operational efficiency by acquiring control and transparency necessary for growth, business intelligence software to support business decisions through detailed analysis of data from all the compartments of the company [10]. The two categories of systems should not be seen as mutually exclusive but as an integrated tool capable of greater benefit when used together.

Not only is the target user to which these systems are aiming is changing, even technology that they

are based on has evolved over time. Created as a stand-alone system it has changed in complex applications based on the client-server paradigm extending its functionality to all business sectors, and finally through the introduction, dissemination and consolidation of web applications it has moved up to become a real online systems gaining in terms of reduced costs for maintenance and installation, scalability and accessibility afforded by web standards and in terms of security and interface.

To ensure the success of a solution such as those provided by SAP is the set of phases defined by the analytical study of the organization and the context in which it operates, the creation of a business solution in accordance with business objectives expected with the introduction of a DSS, and finally the installation and testing. The softness of a decision support system in fact is often hidden behind the inappropriate evaluations of the reality that need to be represented/simulated through missing or improper use of rules and criteria that define such a system. The user, in most cases the customers of the SAP system, is incorporated since the early stages of the implementation, being the system highly customized to solve a variety of decision-making needs. The first step in the creation of a SAP solution is the project preparation that requires the creation of a development team to which will be assigned the task of implementing the system and negotiate with the client company to develop a successful product. Subsequently, in agreement with the organization, it will perform cost analysis, hardware selection and the evaluation risk management procedures. At the same phase will be identified the set of goals to be pursued and which will be agreed between the company and staff dedicated to that SAP project. The beginning of the implementation function intersects with changes in business organization that will be necessary after the introduction of the system. Training and preparation of user manuals are necessary steps in this stage of development. At the end of the development an on-site installation is follow by an exhaustive test phase in order to validate the functionalities implemented for the cross-checking with the expectations of the client. Finally the early stage of the starting procedures is directly followed by a support team prior to full release to the end-user.

The purposes for which it becomes necessary the introduction of a modern DSS within an organization are the multiple and highly customized possible solutions as the flexibility afforded by SAP over all its products. This, as it stand for other decision support systems, is both the strength and the critical point of the development of a SAP solution.

## 4. Cases of Study

In this chapter we are going to present three case-studies of implementation of a DSS into a modern firm. The first one will present an example of a successful implementation of SAP system, especially regarding the R/3 ERP package. The second case-study will present an example of an unsuccessful implementation of SAP system due to a wrong management of the customer relationship process. Finally, we will provide a third case-study that will differ from the first two because it presents a customized solution created inside the firm to improve DSS.

### 4.1 SAP implementation in Royal Mail Group, UK (Success)

Royal Mail Group Ltd. is the parent company of Royal Mail, Post Office and Parcelforce Worldwide. Royal Mail is the national postal service of the United Kingdom, providing delivering and logistics services on the national territory and all over the world. At the end of 1999 Royal Mail Group started an Enterprise System Programme (ESP) with the purpose to bring together all finance and Human Resources systems into a single common platform of operation [9]. The aim of the ESP was to manage Royal Mail Group as a single enterprise-wide system, using the latest web-based technologies, which exceeds all current demands and provides flexibility for the future of the company. Royal Mail Group selected SAP as the ideal solution for ESP because it offered a single instance of R/3 ERP and would ensure that all finance related systems would be “Euro-compliant” before 2002. Deloitte Consulting was the company that was selected because of its ability to provide a team of consultants able to form a joint project team with Royal Mail Group in order to carry out the task in the best and fast way possible. The objectives of the project were the followings [9]:

- Deploying innovative solutions in support of a holistic approach to strategic enterprise management which was consistent with Royal Mail Groups data management principles;
- Providing senior decision makers with the information, policies, processes and know how to make better informed, faster and more commercially minded decisions which add value to Royal Mail Group (DSS);
- Delivering the required statutory financial information and much of the financial information demanded by Postcomm (the UK authority for Postal Service);
- Providing a central repository of strategic data which was widely accessible and enables uniform but flexible decisions.

The SEM project started in April 2001 and it was carried out by a team of 30 project-members. The Business Planning and Simulation (SEM-BPS) strand was concerned with developing an integrated planning solution that allows to enable rapid submission and consolidation of business unit plans in the company. The Business Consolidation (SEM-BCS) strands aim was to develop a solution for legal and management consolidation and unification. Finally, the Business Warehouse (BW) strand was concerned with delivering the data mart to support the SEM applications and providing an analytical reporting engine for the users of R/3 system [9].

In conclusion, the major benefit of the project was improved organizational decision making, particularly in the use of planning, costing and revenue information. This includes the ability to manage regulatory compliance and provide improved performance in DSS. The data are now available to all decision makers, is highly transparent and of consistent quality. The project enabled the centralization and standardization of business standards across business units leading to operating cost reductions and upper quality performances.

#### **4.2 Waste Management: implementing SAP to improve performances (Failure)**

Waste Management (WM) is a waste recycling company operating mainly in North America, with minor influences in Canada and Puerto Rico, based in Houston (Texas). Founded in 1968 as a small company, it has immediately implemented a policy of expansion by acquiring most of the major waste recycling and recovery firms in the nation and subsequently in the '80s incorporating SCA (Service Corporation of America) to form the largest company of waste transport in the USA [3]. The exponential growth in range of WM, the increasing investments and market share value, the internal complexity of the organization, etc. have highlighted the need for a system that could respond more adequately to the increasingly complex needs of the company. To this end, WM relies on SAP to renew its systems with the aim of ensuring better performances, oriented mainly to the activities of pricing, billing and customer care. The intention was to understand the needs and expectations of its customers in order to suggest models for the system and to reduce operating costs while improving functionality streaming line. In addition the system should be able to identify areas of lower efficiency by providing better control in order to boost profits with effective and efficient use of resources. Finally, it should allow comprehensive and efficient management of information obtained from the analysis of the contexts both inside and outside the company.

The solution offered by SAP to WM, as it was possible to realize even in the short term (18 months after it began, like a normal SAP time-implementation), was inadequate to meet the requirements mentioned above. As it stand from the contract SAP system was intended to be an ad-hoc solution

to the market where the company operates [1]. Unlike painted by SAP the solution was not suitable for the American market, at the signing of the contract SAP presented a test-set that, without explicit that differently from the environment in which it WM operates, was related to the waste transport market with reference to an European economic environment and a cluster of small and medium sized enterprises. A second crucial step towards the solution failure was due to the creation of a dedicated staff for project development. The staff was found to be inadequately trained to work in the economic environment in which WM operates, never having worked with companies in North America and especially in the waste sector. Consequently, during the development phase, SAP has identified the inadequacy of his solution by the discovery of improper representation of the reality. At this point, a professional attitude would require a comparison with WM in order to seek a solution to resolve the issue. Contrary to this, SAP has worked silently to adjust the core system instead to consider the points of view of his client. WM was then left with a poorly designed solution for its needs. The expenditure of 100,000\$ stated by WM for the sustenance of the SAP project is, together with the lack of benefits derived by the application of it, the devastating effect of a wrong solution due to an incorrect planning and development of the system [12].

#### **4.3 Transforming GE Real Estate with Innovative Data-driven DSS (Customized DSS solution)**

GE Real Estate, a unit of GE Commercial Finance, is one of the world's leading commercial real estate investors and lenders. Beginning from 2000, computerized decision support has been a major strategy enabler. The company widespread its business among 20 different countries and has a portfolio valued more than USD \$48 billion. GE Real Estate's performance is attributed to the three pronged growth strategy that was implemented: manage the business through real estate cycles; establish a deeper presence in large, underserved countries, including Mexico and in Eastern Europe; and maximize opportunities in emerging markets, particularly India and China. GE Real Estate addressed this problem through the use of World Wide Web technologies aiming to the improvement of its own transaction processes implementing innovative and customized decision support capabilities. The company introduced and used computerized decision support system in the core of its business helping its risk management procedures [7].

As Chief Information Officer of GE Real Estate, Hank Zupnick's challenge was to use information technology to help drive global growth. When Zupnick joined the company in 2000, he and his staff began to investigate where and how technology, could help its real estate professionals to become more productive and drive investment decisions more effectively trough the use of fast computing

analysis of previous collected data. Another relevant application that Zupnick and his team wanted to address with the introduction of technology based decision support systems was to help the firm to have a better transaction management and risks supports. This need was considered as necessary due to incomplete or inaccurate information that were stored from the previous (manual) data collection procedures. Hank oversees a team of professionals located in North America, Europe and Asia, and continues to apply information technology strategically to help GE Real Estate to operate more efficiently, responsively and profitably.

Since his arrival at GE Real Estate, Hank has overseen the multimillion dollar investments in technological improvements. His team has implemented projects focused on different areas of the firms that, considering the whole as a unique system, have yielded quantifiable improvements throughout the core business of the company. By automating deal origination, approval and closing processes, the transaction cycle has been shortened dramatically and the company now responds faster to client requests. With other technology innovations, IT projects have made deal information more detailed and reliable, while the current status of each worldwide deal in progress is available from a Web portal. Decision support improvements have also strengthened GE Real Estate's controllership capabilities by implementing worldwide financial control systems. Perhaps most important, Zupnick initiated and led projects to create business intelligence databases that enable the company to more accurately assess marketplace conditions and manage portfolio risks.

In [7], Zupnick explained how the CFO at GE Real Estate offered to fund a business-wide data warehouse that would help them to grow and manage their global commercial real estate business, instead he chose to start with low-cost applications and built a data mart. GE Real Estate was pricing between 20,000 and 30,000 deals a year. Much of the information that GE Real Estate's managers relied on, were stored in spreadsheets or in hard-copy reports. Figuring out how GE's loans were performing in each particular market and what kind of risks should be factored into a \$30 million deal required employees to gather data manually from several sources. In conclusion, Zupnick state that: "Errors are unavoidable in a manual process, and they could be costly: Misunderstanding GE's loan-portfolio performance in Denver or Dublin could mean charging a customer too low an interest rate and exposing GE to too much risk. Charging too high a rate could prompt the customer to take a lower rate from another lender." And again: "We decided that a data warehouse and Web-based reporting system would be the ideal solution. But we also knew it could be very expensive and time-consuming to develop, and the process is full of uncertainties." GE's theory of technological evolution has entailed the automation of 600-plus individual transactional and servicing-related processes, which is more than a third of the company's processes.

The final outcome of this process was a highly customized solution developed in house with the

strong belief of the organization that no preexisting solution can match with their own. The much higher effort needed to provide this solution was totally overtaken by the advantages directly addressed by its usage. GE Real Estate was able to detecting its internal weaknesses and find different possibilities to promote them via the introduction of IT solutions for information storage, process and analysis.

## **5. Discussion**

In all of the three cases showed above we can easily find some common issues. The most important it's the need to boost company's performances implementing a modern decision support system that can help decisors to better respond to the critical aspects and decisions that they have to take. As we can see, not always a DSS system can be implemented in the best way, due to different reasons. The most important and common reason of the failure of a SAP implementation seems to be the lack of communication and the misunderstanding of customer's needs by the companies that provides the service [4][5]. Especially in the WM case-study [3], we can see what has been the consequence of the wrong implementation of the whole systems, that have leaded to a waste of time and moneys. On the other hand, it is not an easy task to understand every time the particular needs of a company, especially in SAP where there are more than 3000 possible customized-solutions and a lot of minor implementation details that needs to be implemented and integrated in the appropriate way. For that reason, is strongly recommended a strict collaboration between the company that provides the SAP implementation and the whole members of the firm, in the form as a project that needs to be coordinated and managed together by both the involved actors. Intensive learning sessions needs to be performed by the consulting agency in order to acknowledge firm's employees in the best way possible and in the scheduled times. Furthermore, during the whole process of implementation a very close collaboration and constant communication between the firm and the provider of the SAP solution is underlined, in order to respond quickly to new needs and solutions that are discovered while the process is implemented and address the project in the right way. As shown in the first case, a well understanding of customer needs and a strict collaboration have leaded to a successful implementation of SAP and to improved performances for Royal Mail Ltd. On the opposite, a misunderstanding of the real needs of the company and a bad coordination have leaded to the failure of the SAP implementation in WM and to a waste of money, time and resources.

Anyway, when the implementation will be completely carried out and the system seems to work well, from our point of view is not recommended to completely rely on the new system for the following reasons. At first, a new system can never have the same experience of the people that are

working in the company since long time, so the solutions in decision making provided by the system itself should be revisited by the senior members of the company and evaluated in the proper manner before be taken in action. Although if well structured a DSS can almost replace the human perception, but the importance of revisiting the outcomes of the system in our opinion is a priority that cannot be under estimated and undertaken. Secondly, a system can works well, accomplish standards task and well-known routines and processes, so in that way it can be really useful allowing the members of the company to save a lot of time. In the third case [7] that we have presented, there is not the implementation of a SAP solution, but we can find a customized solution that the firm has developed itself to fit well its needs. We focused our attention to this case study to underline the possibility to do it “by your own” instead of buying a DSS solution from an external supplier. The result is that the DSS developed fits perfectly the needs of the firms and it works in the best way possible, empowering the decision support system of the firm as expected. On the other hand, there was a large expense of money and resources to build that system into the firm, which required an internal reorganization of the routines and of the internal structure. Even if GE is a large organization we are considering the fact that an implementation of a customized and in-house solution to drive decision via computational capabilities can be easier applied in context where few variables are involved (e.g. small and medium sized organizations), otherwise it would be more expensive and not convenient. This problem was address by GE by large investments in IT and team members recognizing the possibilities that such solution can bring into the organization. However, in the third case we can also focus our discussion on the importance of the investments in IT (Lucas *et al.* 1999). In GE, this kind of investments seems to have been crucial as the smart way to support the implementation of the new DSS system in the company. In our opinion this could be a good example of how an IT investment can give value to a company in terms of infrastructures and development of best practices to support the change into the firm.

## **6. Conclusions**

After a deep evaluation of the three case-studies and of the use and implementation of SAP as a DSS, our findings are the followings. A DSS has to be seen from the organization as a way to improve its performances through decision making processes and data management. This, if properly implemented, will lead the firm to wider possibilities to face the future based on previous collected knowledge. The computational possibilities achieved by IT technology nowadays allow the firm to carry out all the most routine zed task without the help of the human decision. In view of this assumptions, the top management could better focus its work on the strategically and

managerial aspects of the firm. From our personal prospective we strongly believe that the key-role players in this context are the communication between the firm and the supplier of the DSS solution. The focus has to be putted on that since the initial phase of planning of the entire system. The supplier need to understand perfectly the environment and the key-points of the solution, in order to provide the best service possible and to fit all the requests of the firm. Also a constant process of communication and addressing based on the possible changes of the scope of the solution, it's crucial for the supplier. Finally, it is also required an intensive training phase for the firm's employees in order to ensure the best and the most correct use of the system implemented. On the other hand, the top management of the firm must invest in the collection of data coming from different layers of the organization and promote the integration of the new system into the firm. We are also strongly convinced that the top management should promote the innovation carried by the new system and to ensure that it will be well understood by all the members of the firm. This will establish a sense of value given by its use that if properly perceived by the members of the organization will surely lead to a positive renewal. If no suitable DSS solutions can be finded on the market, a firm can also consider to build a customized DSS solutions that fits perfectly its needs. This process will be possible only if in the firm there's a very good knowledge in IT capabilities and clear definitions of the goals that have to be achieved by the introduction of such a system.

Although all these advices could be considered as a set of principles to make the decision process easier, we also would like to underline the importance of the human perception and experience. In fact, we cannot just rely on the system suggestion but we also should every time take into account the human prospective and view of the solutions of the problem. Every crucial decision addressed by a DSS has to be weighted considering the good knowledge that only the experience gained over the time can be established.

In conclusion, we can affirm that the implementation of a DSS could be a big deal for the firm and lead it to a competitive advantage only if the whole process will be very well planned and executed from the early phases joining both the technological and human factors. Further research could be done about the implementation of Artificial Intelligence into decision support systems, in order to improve the decision process and to minimize the human contribution.

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