Adoption of Standard ERP Solution in Health Care Sector: Is SAP ERP All-in-One Capable to Meet Specific Requirements?

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Abstract. The main objective of this experience report is to address all specific issues regarding standard SAP ERP implementation in a medical institution. Target Company is a state owned health care institution from Bosnia and Herzegovina. Report will treat selected issues which could trouble standard SAP ERP implementation trough predefined ERP implementation methodology for SAP ERP. This report presents observations/remarks based on experience of authors in particular SAP ERP implementation project in health care institution. Author's goal is to provide useful insight into "real life" standard ERP implementation and problems that arise. Also, it should provide useful information for all stakeholders involved in the process of ERP implementation in public health care sector.

Keywords: SAP ERP All-in-One, Health care information systems, Inventory management, Health care billing system

1 Introduction

This industry report provides insight into an implementation of SAP ERP solution in a major medical institution in Bosnia and Herzegovina, with several thousands of employees. The project was initiated by management of the hospital with purpose to eliminate the ineffectiveness of the current information system. Analysis of the current financial system and the list of new system requirements have been prepared by external consulting company. This was prerequisite for announcing a public tender for selection of ERP software solution integrator. After several months of tender procedure and assessment of the best vendor (price was eliminatory criteria, in accordance with the law), software integrator was selected. At the end, SAP All-in-One solution [1] was preferred one. In next few paragraphs are briefly provided some quick facts regarding the project.

As recommended by external consultants the main tasks of the project were:

- To centralize the information system (a centralized database);
- To increase data integrity and consistency;
- To focus on accounting and financial department processes;
- To improve drug warehouse management and billing system;
- To provide comprehensive and accurate reports for top management;

The project incorporated five SAP modules: FI (Finance), CO (Controlling), MM (Material management), SD (Sales and Distribution) and HR (Human resources). SAP integrator offered a team of seven SAP solution consultants, including one SAP system administrator. Additionally, two consultants (ABAP programmers) were teamed up for specific ABAP developments. During the implementation it becomes clear that this number of consultant would be inadequate regarding the project scope and specific demands in medical service industry.

2 Situation before SAP implementation

The hospital is an institution that devotes considerable resources in upgrading its primary domain and activities by investing in purchasing specialized diagnostic and medical equipment. However, when it comes to ICT it is totally different story. Almost fifteen years after the war (the war ended in 1995.) the institution did not invest any substantial amount of money in information system improvements. The first drawback occurred when it was realized that there is no network infrastructure between Clinics that is the basic assumption for SAP implementation.

Due to the law regulations, the hospital was obliged to have certain software solutions, mainly disintegrated applications aimed to specific business domain. This software landscape contained dozen applications developed by one or few men. There was no recognized company behind. All applications were technically isolated islands, mostly installed only on local machines with no server client architecture. All master and transactional data were stored only on that specific machine. Only network connected application was accounting (General ledger) application (terminals) which was implemented during the eighties. The final (consolidated) reports, made by manual data collecting from various applications, were presented to the steering committee. The process of preparing reports took at least five to ten days. Literally Excel sheets were travelling from department to department. The most tangible example of their legacy IT architecture can be explained through the billing system. Each PC machine had installed application for specific billing types (7 types/scenarios of billing); there were seven local machines responsible for each specific billing scenarios.

3 Implementation and its specific features

The implemented system was standard SAP ERP All-in-One. Since it was not specialized health care solution, additional industry-specific functionalities needed to be developed to fulfill basic needs. They were mostly related to the processes of Materials Management and Sales and Distribution.

In the next sections we will discuss main issues faced during SAP ERP implementation in those two modules: MM (Materials Management) and SD (Sales and Distribution).

3.1 Sales and Distribution functionality and drawbacks

By its standard functionalities SAP ERP SD handles sales and distribution activities. The main activities are the sales order handling, and the distribution of shipments to customers. Also the billing process, customer invoice, delivery, and risk management is handled from the SD module. The Sales and Distribution (SAP SD) consists of all master data, system configuration, and transactions to complete the Order. Billing process is very important for every Health Institution, so it was recognized that SD module is necessary to be installed in the hospital.

Particular attention was paid on the billing department that bills all medical and non-medical services provided by the institution. Billing department consists of 20 employees, who each month creates over 15 000 invoice documents (billing documents). But this number of invoices is not a problem for SAP SD module. The real problem was the complexity of the invoicing process. As the previous billing software was outdated, complex billing negatively affected process of collecting receivables, as billing department was constantly in two months delay with invoicing services provided to patient.

The process of invoicing can be divided into three stages, as shown in the graph:

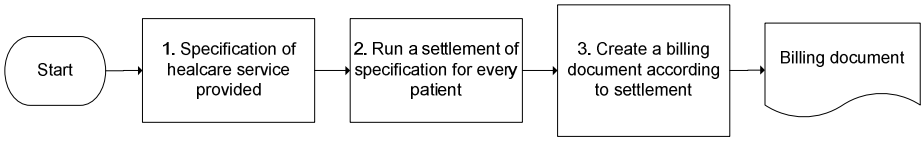

Fig. 1. Process of invoicing in the hospital

All of these processes shown in diagram above were conducted in separate programs (software), so in each operation point cleric was needed to re-enter data. Reliability of information over this life cycle was not guaranteed as it was manual process. In addition, billing of health services was carried out separately for different types / groups of patients, 7 types in total. All these types of calculation have a special logic calculation of health services, which was necessary to be realized and implemented through the implementation of the SAP SD module.

Issues and problems arose during SAP SD implementation:

a) The very first problem which was detected was that the standard SAP system does not contain functionalities which would properly cover the first process in billing system life cycle – creation of specifications of health services provided to a patient. Suggestion of SD consultants was not to cover this particular process with SAP system, and to leave it for the eventual second phase of project, which was a plan to implement full SAP Healthcare solution. This suggestion was not accepted on the steering committee, and decision was to make an additional development (ABAP programming) for this functionality. Decision was to make add-on for standard SAP SD module, which would cause lot of changes in core SD processes (sales orders creation and billing documents creation).

At first, decision seemed to be reasonable, but later it turned out to be one of the biggest mistakes made by SAP project manager. This generated other problems, such as dramatically increase in number of new users and SAP licenses need (for employees who would work on the data input for specification of health services), and billing. It was clear that the project cost was very close to violate the budget.

b) Another big issue raised – the process of specification orders of healthcare services and pricing calculation was not standardized. The procedures and rules of service price calculation differed from clinic to clinic, so there were over 10 "QS procedures" which greatly hampered the first phase of SAP project – creation of Blueprints. Blueprint phase, which was planned to last for maximum 1 month, was extended to a 80 days, due to unsynchronized billing processes and defined billing procedures in the hospital (once again – each clinic has its own procedure). Also, every single clinic has its own working practice, which made a real mess for system integrator. Although Blueprints phase represents the very first phase of the SAP project according to ASAP methodology, it was clear that the period of 4 months for full implementation and go live will be insufficient. All of this put enormous pressure on consultants.

c) The process of master data migration, and preparing for import on the test system, discovered a lot of irregularities of the previous billing system procedure. It was possible for the same patient to have four different codes (system ID) depending on the type of service for which he was billed.

At the end of the project, together with standard ones, the following non-standard functionalities were implemented (developed as add-on):

1. Creating of specification of healthcare services (two type and transactions – for ambulant and hospital use);
2. Creating of advance payment for hospital and ambulant use;
3. Automated process of creating sales order referenced on healthcare specification;
4. Automation of price calculation depending on patient status;
5. Development of many Z reports (add on development on standard SAP).

3.2 Material Management functionality and drawbacks

From the beginning of project it was clear that drug warehouse of the hospital will be the most demanding part of whole project. With annual turnover around 40 million EUR it was major consumer of hospital budget. New, efficient inventory management system was essential to the "profitability" of the drug warehouse.

SAP ERP All-in-One was chosen to replace the old legacy system that was in use in drug warehouse. This system was specifically designed and developed for the drug warehouse with features adjusted to their specific needs. The system was in use for over 12 years, so the process of enhancement lasted for same period. However, this system operated only in this organizational unit of the hospital. At the end of each month summary, reports (goods receipt, goods issue, goods transfer, inventory status etc.) were provided from system to accounting department, with no detailed analytics in itself.

SAP module which covers clinical drug warehouse processes is called SAP MM (Material management) module. In next few paragraphs are stated all the issues that standard SAP MM module faces during implementation phase.

a) Adequate inventory is generally defined as basic stock + safety stock. Too much inventory is a leading cause for unsatisfactory cash flow. Almost regularly, hospital drugstore had to boost more of its cash into the purchase of medicaments in order to meet its obligations, especially in the case of the wholesaler whose address is outside of Bosnia and Herzegovina. On the paper, SAP ERP All-in-One solution provides MRP function which covers safety stock. The idea is to alert responsible person when some group of materials or material is close to the minimum of inventory stock, and suggest the number of units that must be purchased in order to meet optimal stock. However, in practice, system provided alerts only when responsible employee wants to order particular material. Unfortunately, it was possible that material is already under the safety stock red line. This was frustration for both, SAP consultants, and hospital warehouse management.

b) Complete database of pharmacy inventory should be done according to the generic molecules, as it ensures standardization across health systems.

c) Still, even it wasn't defined as scope of project, it was unnecessary to fulfill all pharmacy standards regarding pharmacy business proposed by law. All generics & their particular brands, batch, used by the hospital should be maintained in a database with the appropriate commercial terms (commercial name, pharmacy agency approval number etc). At the first sight, the main challenge for the SAP integrator and consultants was implementation of ATC/DDD standardization for medicaments. The ATC/DDD system classifies all therapeutic drugs and presents a tool for drug utilization research in order to improve quality of drug use. In the ATC classification system, the drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties. Drugs are classified into 14 main groups / classes [2], [3]. However, this was just top of ice berg. Each of class contains hundreds of subgroups which include hundreds of groups itself. At the end, there was a need for thousands of predefined material groups

in SAP MM. Obviously it would be messy to work with it, so integrator decided to implement SAP Classification system for clinic drug warehouse.

Classification system in SAP for clinical drug warehouse was, at the beginning, seen as blueprint of ATC/DDD classification. However, things got complicated. First of all classification system in SAP does not only depend on the definition of the ATC/DDD, but also on costing procedures and reporting (which was wanted to get as reports from classification).

Also, assuming that SAP classification needs to meet all, by law, proposed legislation, SAP integrator defined set of characteristics for each material. After few kick off meetings integrator came up with those classification characteristics; presentation/package (box, pills, mg etc.), aggregate state**,** product hierarchy grouping (ATC/DDD) and profit centers. All of these should be set as characteristics of the material classification. After months of preparing all materials (over 30 000 records) for import in the system with all necessary classification characteristics, it was clear that so many characteristics will be tough to maintain. Performance of drugstore as whole was seriously jeopardized by time needed to complete entire process of maintaining material master data. At the end, this SAP classification system was refused by drugstore of the hospital.

d) Lack of batch management and shelf life – The main and very important point of any drug warehouse is batch management. All pharmacy products are managed by batch and shelf life. Those are critical factors for managing the inventory efficiently. Standard SAP ERP provides fields (after activation) for those attributes of material, but, once again, it did not work properly in practice. Standard SAP ERP does not provide ad hoc integration of bar code reader technology, so the only option was to extend project scope and develop specific solution for bar code technology. Also, integrator needed to build up good receipt transaction in SAP (MIGO transaction) in order to support goods receipt process supported by code readers. This particular development additionally boosted up the project costs.

Another issue is shelf life of materials. Proposition from hospital drug warehouse management was to create such inventory management system where medicaments with closest expire date would be suggested for goods issue. However, it was not feature of standard SAP ERP All-in-One. It was only possible to create new report where all medicaments would be listed by expire date criteria. However, it wasn't satisfactory for clinical drug management because their employees needed plenty of time to operate with particular report.

e) Standardization hierarchy for equipment (medical as well as non- medical) – Complete database of non-pharmacy inventory like equipment, linen, stationary, sundry items etc. was imported in SAP. Also, database of the approved suppliers for each item is maintained with relevant commercial terms & specifications. However, as with ATC/DDD standardization, proposed solution for standardization of equipment (class/subclass/group) was impracticable for every day usage.

f) Goods issue of material is not linked to specification of healthcare services for patient (SAP SD module) – One of the major issues for SAP integrator was implementation of fully automated goods issue process. Better to say, attempt of

implementation. At the beginning idea was to blueprint real life scenario. In other words, medicament should be issued when given to patient. However, in reality, because of infrastructure lack (no network available) and cause of license issue (SAP license is expensive), process delayed at average for 7 days. So medicament is issued to patient from department drug storage location, but transaction is written on hard copy paper. After 7 days, when the list of medicaments issued is usually over 50 pages long, list is provided to employees in central hospital drugstore, where it is imported in SAP. This is painful process for those employees who import those lists every week in SAP. Also, dozens of mistake were made each week due to manual data import in SAP system.

4 Conclusion

At the end, we can conclude that implementation of standard SAP system in health care environment results in specific issues and problems during the implementation of SAP ERP SD and MM modules. The main drawbacks explained for SD and MM module are:

- Standard SAP SD module does not fit health care institution billing needs - too much development needed, which is not good for maintenance and support;
- SAP ERP SD is not intended to cope with patient master date (huge load of data);
- Standard material group in MM is not sufficient to describe ATC/DDD standardization;
- SAP material classification is too complicated when it respects all attributes needed for maintaining drug material master data.

This leads to the general conclusions regarding implementation of standard SAP system in health care institution:

- Standard SAP ERP system does not support specific Healthcare processes, so a lot of custom development (i.e. “Z” programs) must be made to fulfill customer requirements. It is risky decision, because it boosts system maintenance cost;
- SAP All-in-One is not capable to meet all the health care institution requirements in a proper way without SAP Healthcare solution, i.e. SAP ERP is tailored to fit standard business processes addressed in most of business domains. However, only SAP Healthcare industry specific solution addresses all specific requirements for healthcare institution.

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