ERP LN implementation in an industrial context at ID6 – Consultoria e Gestão

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Dissertação de Mestrado

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To my family and friends

Abstract

Enterprise Resource Planning systems can provide an integrated business solution and improve a company's ability to compete in the marketplace. Among many benefits, the integration of data and applications, the capability to replace old or fragmented systems, cost reduction, the adoption of best practices in organizational processes, and overall performance improvement are the most cited.

However, various difficulties can come across during the system's implementation. To justify the investment, critical success factors should be followed to assure a satisfying transition to the new system.

Sonafi, which produces aluminum die casting parts for the automotive industry, is constantly under tight delivery schedules, thus requiring integrated information to fulfill their clients' orders promptly. Although they are already using an ERP system - Baan IV - it is outdated, and now they will implement a new and improved version - LN Feature Pack 7.

ID6 was the company chosen to perform this implementation. To that end, a prototype was created, which first needed to be parameterized, and only then was possible to study how Sonafi's processes could be performed on the system. Even though an ERP system comprises many areas, the work performed on this project only concerns sales and warehouse management, since they are the most used processes.

Besides being a much more user-friendly software, ERP LN provides the user with enhanced tools to facilitate its work. Regarding the scope in question, many improvements were found. Added flexibility, less steps to perform the tasks, a specific process to complete consignment orders, and clear visibility of all information interactions leads the way to operation efficiency and faster deliveries.

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Acronyms

BP: Business Partner

BPR: Business Process Reengineering

CSCMP: Council of Supply Chain Management Professionals

CSF: Critical Success Factors

EI: Enterprise Integration

EDI: Electronic Data Interchange

ERP: Enterprise Resource Planning

ES: Enterprise Systems

FP7: Feature Pack 7

IS: Information System

MIEIG: Mestrado Integrado em Engenharia Industrial e Gestão

MRP: Material Resource Planning

MRP II: Manufacturing Resource Planning

OPIM: One Point Implementation Methodology

SC: Supply Chain

SCI: Supply Chain Integration

SCM: Supply Chain Management

VMI: Vendor Managed Inventory

Introduction

In this chapter I will begin with a presentation of the various entities involved in the development of this project, followed by the objective of this study, as well as an explanation of all the involved steps. Subsequently, I describe the methodology used to write this document.

1.1 Presentation of ID6 – Consultoria e Gestão, Lda

This Portuguese company was created in 2002 with the objective of developing, implementing and maintaining projects within the scope of Information Systems (IS). Its specialization is focused on industrial markets, particularly in adding value to the factory management and finite production planning, using ERP - Enterprise Resource Planning.

The main objective of this company is to provide services and solutions based on the clients' needs, acting as a trustworthy partner. The experience provided by the technical and managerial staff assures a commitment based on trust and quality (ID6, 2008b)

Nowadays, ID6 is the only reseller of Infor's products in the Portuguese market, namely the ERP LN line. This means it is the only with authorization to sell these products and look for new clients. It is also the only company since 2009, allowed to render services for the clients' users of Infor Baan IV and LN (ID6, 2008a).

Technology is constantly evolving, and so are the market needs. To help enterprises keep up with those changes, ID6 provides an auditing service to determine if the processes are up to date and if the supporting information system is adequately aligned.

A final report is then presented, providing a complete description of the service, including the methodology, the profiles of people who should get involved in the project, conditions, materials and time needed for meetings.

Besides its main business, that deals with the implementation and maintenance of Infor's Baan IV and LN, the company also offers other solutions to its clients, namely (ID6, 2008c):

- A new module developed in-house, called Human Factor Management;
- Find – Balanced Scorecard;
- S-FLAI – Shop-floor Application for Industry;
- APS – Advanced Planning System;

Among many clients of ID6, we would highlight: A. Silva Matos, City Council of Funchal, Adira, Soneres and Sonafi. Under the scope of this project, ID6 will provide services to the last company, Sonafi – Sociedade Nacional de Fundição Injectada, S.A.

As the offered products require a collective output, the employees of this firm comprise specialists from a wide range of areas – finances, programming, quality, logistics and manufacturing.

1.2 Presentation of Infor

ID6 is the only Portuguese reseller of Infor's services, which is one of the leading providers of business applications. It has offices in 125 countries, 70000 customers worldwide (Infor, 2011a), and it is classified as the tenth largest software company in the world with

approximately $2.1 billion in revenue. It was founded in 2002, as *Agilisys*, but during the last years it has grown by acquiring and merging with big companies like Infor Business Solutions (2004) and as SSA Global (2006). Most of its customers belong to the medium-sized discrete manufacturing in industrial equipment, high-tech electronics, automotive industry, metal and plastic fabrication, and aerospace sectors. Some of them are also in the business of process manufacturing, such as consumer goods, chemical, or food and beverage markets (Software, 2011).

Among the customers, we would underline American Airlines, Ferrari, the CERN, London Business School, Heinz Frozen Food Co., or Blockbuster. This company keeps a consistent 95% customer retention rate, one of the biggest percentages in the industry, being committed to a continuous growth through innovative solutions and global services (Software, 2011).

1.3 Purpose of this study

According to the study plan of the MIEIG lectured at Faculty of Engineering of University of Porto, the student is supposed to develop a project in a business environment. To this end, a partnership with ID6 was established.

Taking into account the work being executed at ID6, it was decided that the Sonafi's assignment would be the most adequate on-going project to involve the author of this dissertation, as this allowed the student to start with an ERP re-implementation from the beginning.

Sonafi has been working with Baan IV for more than 10 years, and this project aims at the ERP re-implementation by installing a different version called LN Feature Pack 7. This investment has not only the objective of updating the actual system to something more appropriate to the industry's requirements in these past years, but also to correct processes that are no longer performed properly.

To meet the rigorous demands of the automotive industry, along with Baan IV, an exclusive supplement to this market was implemented, which acts as an extension to the supply chain. Though, the newer version of the system integrates large developments on the Supply Chain Management (SCM), and subsequently Sonafi's investment in this field will decrease as it won't be necessary to add extra functionalities.

This re-implementation presents the opportunity to Sonafi for rethinking its *modus operandi* with the support of experienced consultants. Seeing as LN is more advanced, more intuitive and, especially, more user friendly than Baan, the end users are expected to execute the procedures with narrowed range for mistakes. All these features will also enable getting the work done efficiently by the system, hopefully accompanied by exponential decrease in the use of other methods or tools.

1.4 Project phases

In order to understand the software solutions presented in the project, it was necessary to review all manuals and supporting literature. This was the first step towards gathering the know-how to grasp the client's current system.

The next phase was based on the study of the client's working method, which meant getting to know their processes and how the previous system was being used. Therefore, meetings were scheduled in both Sonafi and ID6 premises, since a close cooperation is an important step on the path to success.

In Appendix A, there is an organizational chart referring the various parts involved on this project, namely the roles performed by the student. From the interaction between the consultants and Sonafi's Information Technology director, all relevant manufacturing and logistics processes were identified, and some possible improvements noted.

To assure the new ERP's version would work efficiently, it was first necessary to create a test company implemented with the basic parameters to put the system up and running. After that, the prototype began to take shape, with the introduction of data retrieved from the customer, as well as the discovery and validation of new sequences of processes for the required transactions. By then, it was perceived the changes of methodology that would have to be implemented.

All different phases and their duration are represented in Figure 1.

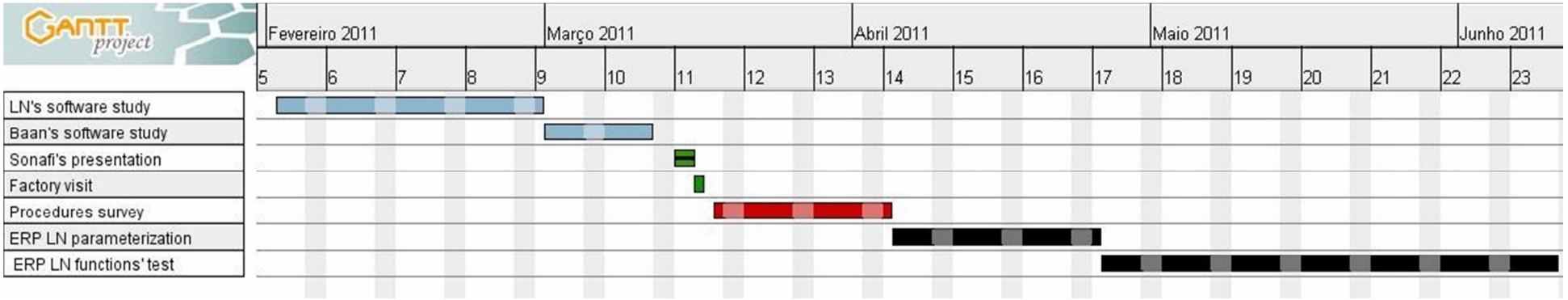


Figure 1 – Chronology of the dissertation

1.5 Development of the prototype

In order to understand the advantages and disadvantages of LN's implementation, particularly applied to this customer, a prototype with the main data of Sonafi was created at ID6. Since it was the first time LN's was being used in the company, this helped us learn the system's in-depth. We were able to better perceive its capabilities, and the problems that could arise from its application on the client's processes.

Occasionally, to articulate between the system and the client company's own methods, some customization is required, since, without it, the company would not be able to perform a step that it is essential and unalterable. At this stage, the prototype also helped discover if there were any operations or relevant issues that had not been considered in the standard version. If needed, we would have to develop a customization, in order to allow the company to complete an essential action or insert a specific informational field.

1.6 Structure

This introductory chapter features a presentation of the actors involved so that the reader could better understand the objectives of the work done, as well as the steps followed to get there. With a clear objective, it is easier to understand the problem in hands, as well as the way to solve it.

The next section presents the latest developments concerning SCM and ERP. Since the former is greatly affected by the latter, the link between them will be highlighted for an easier understanding of why ERP systems improve the company's performance. The chapter also provides information, backed by literature, regarding the main issues sprung from the system's implementation and the critical factors for its success.

Chapter 3 starts by explaining why there is a need to upgrade for a newer version of the system. Then, and within this project's work scope, processes currently supported by Baan IV, at Sonafi, are studied and the problems found in its use identified.

In chapter 4, the proposal for a solution is delineated. The methodology used for the implementation will be detailed, as will be the new processes and the improvements gained from the new system.

Chapter 5 concerns the prototype implementation, featuring the main sessions and particularities needed throughout the business process studied. Also, it is presented a synopsis of the gains resulting from the new system.

Finally, in chapter 6, conclusions are exposed. There is a discussion reflecting the problems and solutions found during the duration of this project, as well as the expected future work.

State of the art

On this section my purpose is to clarify concepts, definitions and relationships between the two main suites studied: the ERP system and SCM. Together they can decrease overall costs and improve customer service, by integrating information and processes. Yet, managers need to learn and understand some Critical Success Factors when implementing the ERP.

1.7 Supply Chain Management

According to the Council of Supply Chain Management Professionals, the management of the supply chain "encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners" (extracted from CSCMP, 2011).

The Supply Chain Council (SCC) presents a model representing the SCM, called the Supply Chain Operations Reference (SCOR®), which provides a framework capable of linking business processes, metrics, best practices and technology features, all in a unique structure (Figure 2). Using this model, communications among business partners are supported and possibilities to improve effectiveness of activities in the Supply Chain (SC) emerge (SCC, 2011).

Figure 2 – The SCOR model (SCC, 2010)

Fundamentally, SCM acts as an integrating function with the primary purpose of delivering the right products to the right places at the right times, while also bearing in mind that the goal is to obtain the highest profits (Siems, 2005).

This approach improves a company's agility level, eliminates non-adding value activities, and allows enhancing overall organizational competitiveness, which is fundamental in a world of fast changing market requirements. It also stresses the benefits for all the participants in the chain through cooperation and information sharing (Gunasekaran & Ngai, 2003).

The essence of SCM is the effective information and material flow throughout a network of customers and suppliers, since activities based on information exchange, such as inventory positions or order fulfillment, will transform how the products are supplied, sold and invoiced. But in order to activate the material flow, first it is necessary to generate the information flow. Thus, the supply chain material flow will only be as good as the information that drives it (Donavan, 2011).

1.8 A brief history of ERP systems

In the late 1960's and early 1970's, due to the economic expansion, a new tendency to use computers in manufacturing companies spread widely (Buker, 2011). At this time, the main focus was inventory and cost control, which led to product-focused manufacturing strategies (Jacobs & Jr., 2006). From here, the logical progression was to start planning, scheduling and ordering material based on production requirements, made possible by the software called Material Requirements Planning (MRP).

These systems provided integration between forecasting, master scheduling, procurement, and shop floor control. They were perceived as a fundamental part of production management and control, so thousands of companies began implementing MRP (Jacobs & Jr., 2006). But in the 1980's, the concept evolved to MRP II – Manufacturing Resource Planning – extending its capabilities to sales forecasts, quality control, cost reporting features and distribution activities (Inc., 2010), already working as a company operating system (Buker, 2011).

Finally, in the 1990's, these two backbone systems gave way to ERP, a software capable of integrating business activities across functional departments (silos). The recognition that organization output is a function of all company resources was the trigger to ERP introduction, allowing the substitution of multiple standalone systems in favor of a unified business system (ERP.Asia, 2010)

1.9 Enterprise Resource Planning

There are many studies on ERP since the 1990's, when the business world embraced the use of enterprise systems (ES). Their acceptance is quite comprehensive, as they allow a company's data to be integrated throughout the entire organization.

Imagine sustaining dozens of different computer systems and the redundant data they would provide. The maintenance costs of each legacy system, undoubtedly providing key data to support a particular business activity, would be colossal, since it would be necessary to rationalize and reformat data along with debugging and updating software code in order to transfer information between systems (Davenport, 1998).

Even worse than the expenditures it would be the lack of coordination in real time. The fragmentation of information leads to lower productivity and performance: if sales cannot communicate with production, then the product will not be delivered in time; or if marketing systems are incompatible with financial-reporting systems, then management does not have the detailed background history to make decisions based on knowledge (Davenport, 1998).

An ERP system offers a solution to this problem by controlling all areas of business in one centralized place (Thilmany, 2010), a database. From here, the information is distributed into modular applications that support all business functions and departments, even if they are located worldwide. Likewise, information entered in one place is automatically updated to all associated fields, regardless of the area where they come from (finances, logistics, human resources, etc.), and become available to everyone (Figure 3).

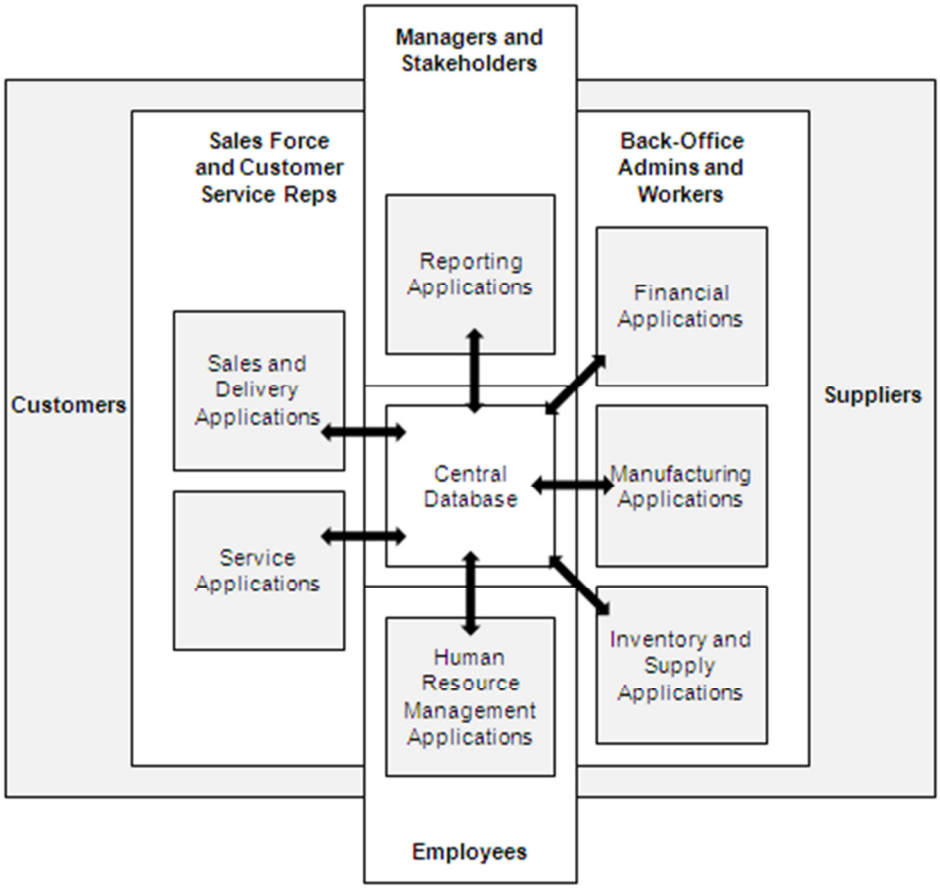


Figure 3 – Anatomy of an enterprise system (Putra, 2011)

Nowadays stakeholders' concerns extend well beyond product or service requirements and encompass topics such as employees' safety, sustainability, customer satisfaction or social responsibilities. Thus, the need to develop an integrated system arises due to the possibility that various management systems are pulling in different directions and the incremental concern with organizational performance (Asif *et al.*, 2010).

By tightly linking business processes, such as purchasing, manufacturing, sales, or accounting, to operational business transactions and financial records, these enterprise systems became a technology strategy (Hestermann & Woods, 2009) capable of helping executives understand and contemplate all factors in real time.

Ultimately, they focus on amending resource planning and delivering value-added products/services to customers (Chang, 2004). The key is to "present a holistic view of the business from a single information and information technology architecture" (Klaus *et al.*, 2002, p. 141).

However, despite the benefits, there are also major concerns with ERPs implementations. For most organizations, this practice occupies the majority of their software's portfolio and establishes the capacity to compete in a global market. Hence, it simultaneously provides the greatest potential benefits along with the greatest potential risks (Gable, 2005).

1.10 Critical success factors

Although the promises are worthwhile – improved productivity, competitive advantage and enhanced customer satisfaction (Somers & Nelson, 2002) – the risks in an ERP

implementation are also worthwhile mentioning, specially because they can become a landmark in a company's life.

An ERP Report conducted by the Panorama Consulting Group, via online polling and during a six month period (June to December of 2010) reveals worrisome results. The sample size consisted of 185 participants from 57 countries, and the survey reveals the following (Group, 2011):

- 61,1% of ERP implementations take longer than expected;
- In 74,1% of the cases the costs exceed the initial budget;
- 48% respondents perceive the benefits to be less than 50%.

Thus, there is evidence that supports the need to improve these numbers. To do so, certain factors are proposed to help the implementation commissioning and smooth operation. Due to the increasing number of failures in completing this task, research on Critical Success Factors (CSF) has proliferated.

Bullen and Rockart (1981, p. 7) defined CSF as the "limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization". Given that in a enterprise system those areas affect more than managers, opinions from all stakeholders groups should be considered (Finney & Corbett, 2007).

Foremost it is necessary to clarify that the implementation's struggle occurs not because ERP solutions are poorly designed, but because there is a general lack of knowledge on how this type of system should be carried out (Shehab *et al.*, 2010). Though at first, it may seem solely as an information technology (IT) project, ERP project success depends more of people than of software (Figure 4).

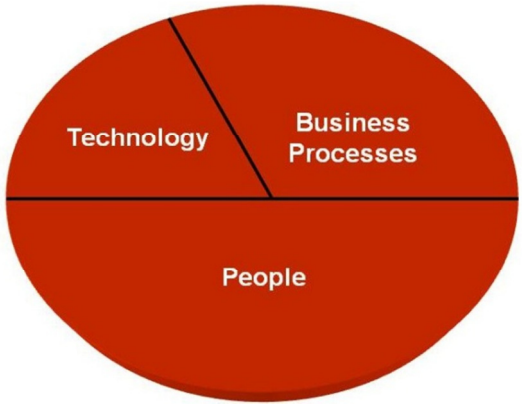


Figure 4 - Components in a business solution (Brett, 2010)

There are at least 26 CSF categories found in the literature (Finney & Corbett, 2007), but this study focuses only 6 factors: those most cited in the literature.

1. *Top management commitment and support*

Managers have an enriched role in this process, and it is their duty to monitor the progress of the project and, in addition, provide directions for the implementation teams (Somers & Nelson, 2002). Since they represent leadership, everyone will be expecting strategies, assurance, and even technical expertise from the top management level (Finney & Corbett, 2007).

The people at the top must have enough strength and authority over all stakeholders, in order to resolve political conflicts that lead to unproductive delays. When the need to make important decisions regarding restructuring business processes arises, if there is no one trying to reconcile all interests, the silos' officeholders will be expected to maximize their own welfare. Sarker and Lee (2002) empirically provided support for the need to have strong and committed leadership at the top management level.

2. *Change management*

ERP systems introduce vast changes in business processes, and consequently, in how people do their jobs. It is not easy to explain to someone who is used to performing the same type of work for years that now has to do it differently. It results in suspicion, resistance, confusion, and errors if the staff is not trained effectively.

To prevent opposition it is important to adopt measures right from the early stages (Somers & Nelson, 2002), and for this purpose a program should be placed in motion. The objectives are to build user acceptance and create a positive attitude, attained through knowledge about ERP's system need and benefits (Finney & Corbett, 2007). Also, it is necessary to recognize the impact that a program of such complexity would have on the entire business, from technology to tasks, including people, structure, and culture.

Sometimes the enterprise does not have the skills necessary to attain change management, so the solution would be to choose implementers with appropriate capacities or source individuals independently to create a team. The high priority should be placed in the end-users and initiatives such as creating project websites or newsletters regarding the project's progress, accomplishments and benefits are crucial to the success (Ganly, 2011).

3. *Business process reengineering and software configurations*

What is at stake cannot be taken lightly; we are talking about the ERP adoption taking a few months if all default settings are accepted, or years for those attempting to do major customizations (S. Chung & Snyder, 2000). Besides, the more time it takes, the more specifications change, which forces technicians to being constantly adapting and adjusting to new requirements (Ehie & Madsen, 2004).

Contrary to information systems, an enterprise system imposes its own logic on a company's strategy, organization, and culture. It is composed of best practices, and even when customized procedures may be a source of competitive advantage, the company is pressured to approximate the standard. As a result, companies in this situation will need to reassess their processes to fit the system (Davenport, 1998), applying Business Process Reengineering (BPR) to produce a complete description of how the business will operate after the changes (Finney & Corbett, 2007).

If a company alters one of the modules, it can interfere with internal integration, which has to be carefully avoided (S. Chung & Snyder, 2000). There is a need to strive for a balance between the modifications to support an existing way of working, hence an easier adoption, and too many alterations that may result in scope creep, budget overrun and loss of best practices incorporated in the software (Ganly, 2011).

Besides, the ERP software is in constant evolution, consequently resulting in upgrades over the years. If customizations are not used carefully, those upgrades will result in complex tasks. Indeed implementation must be flexible enough to allow modifications where the

procedures or politics demands it, but ensure they are not simply a matter of "we've always done it this way" (Ganly, 2011, p. 8).

4. *Training and job redesign*

Among the targeted user training programs, we can distinguish among the project team, end-users or IT staff. However, all programs should have an element of hands-on, as well as clarification of how positions in the company may need to be restructured along with compensation plans (Finney & Corbett, 2007). When the system is up and running, if training is not completed, users may not know how to use and maintain it.

An ERP system is greatly affected by human competence and knowledge, and it is optimized when those factors are maximized (Shehab *et al.*, 2010). Understanding how data flow through the system and how it is operated at each point are key points in the formation (Ehie & Madsen, 2004). Furthermore, training should not be devalued in the period following implementation because skills can always be enhanced.

The instinct to resist at first is natural, as people create an "inertia" associated with using the previous system. The objective of education is to break this feeling through clearly showing the benefits to the employees – the amount of information they have to handle everyday is going to decrease substantially once it is entered into the system (Rajagopal, 2001) – and creating a perceived usefulness in their job performance (B. Chung *et al.*, 2008).

5. *Project team*

The implementation team should be comprised of the organization's best and brightest individuals (Finney & Corbett, 2007), preferentially with experience in ERP implementations, who are motivated, enthusiastic, good team players (Ganly, 2011), and, as a whole, balance business and IT skills. Also, they should work in the project on a full-time basis.

Unfortunately, there is a big problem in putting together the appropriate team because management struggles fearfully to replace the jobs they occupied without affecting productivity (Shehab *et al.*, 2010). However, this is a critical factor, and, as such, it must be done. The costs associated with backfilling the positions can be built into the project's budget (Ganly, 2011), to minimize the inconvenient.

6. *Consultant selection and relationship*

Chang (2004, p. 5) found that "while there appear to be experts on individual modules, what seems to be lacking is an informed overview of the system, which enormously impacts on the ability to use the system efficiently and effectively. This is why many organizations use external consultants to assist with the implementation process".

Consultants can help in the setup, installation, and customization of the software thanks to their experience with the application, knowledge of modules and understanding in specific industries (Finney & Corbett, 2007). Such expertise is capable of providing requirements analysis, recommending a suitable solution, and managing the whole implementation.

Another function of the consulting firm is to develop a robust strategy for knowledge transfer to internal employees (Gable, 2005), since they will be the long term users of the new system and the dependency between the two parties has to decrease over time.

It has already been shown that when managed and executed properly, ERP projects can be very successful and beneficial to the organization. The enterprise leaders must be able to

recognize common roadblocks and proactively take actions against them, beginning with addressing CSF to mitigate some of the risks associated with implementation.

1.11 Supply Chain Integration

Customers are increasingly becoming more demanding, and to meet their requirements while attaining profitable growth, firms are focusing on improving SCM. But to achieve better levels of customer service, more than one worker's output, or one functional area is needed. Therefore, departments must collaborate willingly and be compliant (Ellinger, 2000).

This kind of voluntary interaction is a must in order to fulfill a mutually acceptable outcome for the organization, and only possible if manufacturing, purchasing and logistics work together to achieve internal integration (Pagell, 2002). There is also external integration, which concerns unifying with customers and suppliers. Together, they constitute the Supply Chain Integration (SCI).

Zhao *et al.* (2008, p. 368) characterized SCI as "the degree to which an organization strategically collaborates with its SC partners and manages intra and inter-organization processes to achieve effective and efficient flows of products, services, information, money and decisions, with the objective of providing maximum value to its customers". Ultimately we are only recalling that SCM requires coordination between all departments, all business processes, and all partners, and as was previously said, it needs impeccable information flow.

It is easy to understand that the absence of horizontal collaboration may result in promises that cannot be met, *e.g.* if sales promise to the client a particular delivery date, but if there is a lack of coordination with logistics, there is a great probability of failure (Ellinger, 2000). Other examples of internal integration, or lack of, are real-time searching of inventory level and operating data, periodic interdepartmental meetings, data shared among functions, use of cross-functional teams in projects, and use of ERP systems (Zhao *et al.*, 2009).

Ellinger (2000) proposes the use of an evaluation and rewarding system that values teamwork and cooperation as a way to create cross-functional collaboration. He also stresses the interconnection between integration and effective and efficient logistical service, since the former is able to coordinate areas involving multi-level participants (1996), develop a mutual understanding of responsibilities, promote solidarity, the sharing of ideas, information, and resources.

Even with incentives to discuss ideas, "SCM has always been a challenge of information integration" (Davenport & Brooks, 2004, p. 9) and "it is impossible to achieve an effective SC without IT" (Gunasekaran & Ngai, 2003, p. 270). Since SCM needs information flow to control the material flow, the ideal of allowing people to make decisions based on the latest and best updates from everyone else is only possible if real-time communication is achieved with well designed information systems (IS), like ERP systems.

As a result of using such IS, companies can now integrate similar functions spread over different areas and the unnecessary activities stand out, placing firms in the right path to meet customers' needs and quality products' standards. Indeed, IS can be used for routine data processing, which may lead to cost reductions, but can reach their full potential when used for SCI; in this case, it may lead the enterprise to differential and sustainable competitive advantage (Kim & Narasimhan, 2002).

Gunasekaran (2003) further adds that without IT an organization can become obsolete, excluding them from doing business with other enterprises. Even if presently everything

seems well and there is no apparent need for IT, it only demonstrates lack of strategic thinking.

When companies started using ERP systems, these were not focused on the SC, but instead on executing and integrating internally-oriented applications to support finances, accounting, manufacturing, order entry, and human resources. It was only when a certain degree of Enterprise Integration (EI) was reached, that concerns over the improvement of the supply and demand planning, plant scheduling, transportation, and warehouse management arose. At this point, additional functionalities were added to the ERP to support those concerns, whilst also offering a better modular integration (Davenport & Brooks, 2004).

So, it is fair to say that ERP systems have played a major role in developing SCM (Gunasekaran & Ngai, 2003), which should not come as a surprise since ERP allows the flow and processing of information necessary to support the SCM functions. Essentially, ES offer ways to decrease costs of internal supply chain operations because they provide a shared foundation of information (Davenport & Brooks, 2004).

Inasmuch as ERP provides the backbone in an organization to respond promptly to customers and suppliers, many firms have implemented these systems to contribute to SCM in technical areas such as standardization, transparency and globalization (Su & Yang, 2008). As a result, it is likely that the control over logistics increases with the data integration that the ERP allows (namely collecting, managing, and sharing it) (Rutner *et al.*, 2003), inside and outside of a corporation.

So far, the focus has been on internal integration, but SCI also concerns external integration, which means maintaining relationships with the business partners present in the supply chain. However, only when "integration has been achieved across the enterprise, it begins to seem possible to attack the larger issues of the extended SC" (Davenport & Brooks, 2004, p. 10).

In fact, there are some empirical studies supporting this statement. Braunscheidel and Suresh (2007) found a positive influence of internal integration on external integration, as well as Zhao and colleagues' study (2009, p. 20), who argued that "a company performing well in internal integration will more likely integrate with external partners".

Already in 2004, (Mentzer, p. 24) laid down a fundamental concept for SCM, which was the necessity of first coordinating functions within the company, and only then try to coordinate with companies within the SC. Even before that, Bowersox (1989) created a clear path for SCI, going from integration of internal logistics to external integration, through shared information and strategic linkage with suppliers and customers (Figure 5).

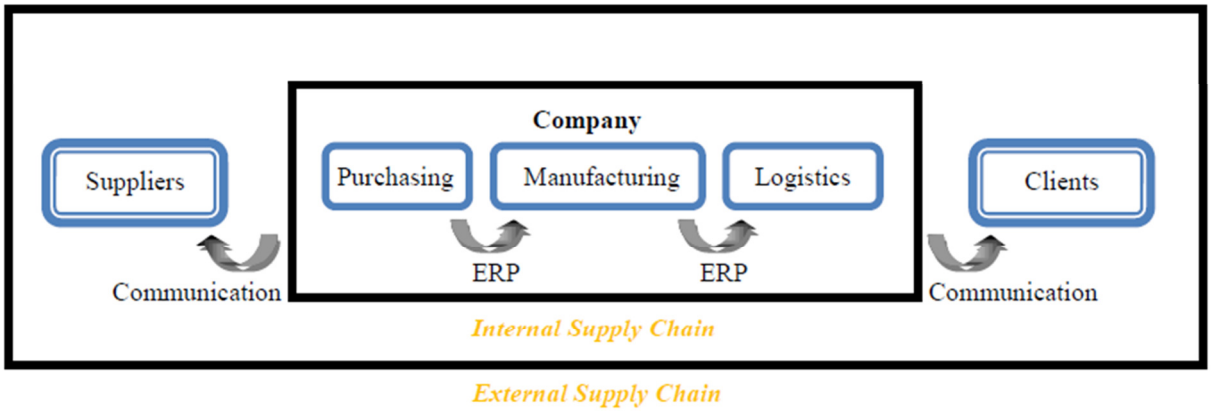


Figure 5 – Supply Chain Integration

Moreover, with internal integration, the capability of later on learning from external partners is magnified (Zhao *et al.*, 2009). And we must not forget the major role IT plays in SCI, as the positive relation established by Ward and Zhou (2006), between within-firm IT integration and among-firms IT integration. Also, Bendoly and Jacobs (2005) stated that ERP systems can be used to facilitate inter and intra-organization communication, establishing the foundation for external integration.

In practical terms, if the firm cannot perform real-time searching of inventory, for example, it will also not share real time data accurately with trading partners. Thus, an ERP system solves this problem, since it breaks functional silos among internal units, and synchronizes processes, facilitating operations with external partners. Furthermore, the data provided internally, helps the company identify critical issues regarding suppliers (Zhao *et al.*, 2009).

Learning is also another good measure to strengthen relationships, as Panayides (2004, p. 76) found in his study. Commitment to learning, intra-organizational knowledge sharing, shared vision and open-mindedness, was found to cultivate the "development of relational exchange as well as promoting the effectiveness of the logistics service". Those values will lead to a greater commitment towards the development of inter-firm relationships.

The SC offers substantial opportunity for inventory and working capital reductions, but beyond that, it also offers the possibility of closer relationships with business partners (BP) (Davenport & Brooks, 2004). Therefore, it is necessary to work towards this goal, where ERP systems connect not only to different functions within a firm, but also among partners, enabling the exchange of information such as order status, product schedules, and sales records, and integrates processes, production plans, and marketing promotions (Gunasekaran & Ngai, 2003).

In sum, the goal is to improve customer service. Intra and inter-organizational integration provide the coordinative expertise and information requisites necessary to achieve this.

Framing the problem

In this section, I reveal the company under study, along with the details concerning the ERP system in use at this moment. I theoretically explain why the company should upgrade the system, and demonstrate the daily problems it deals with. As a result, improvements to be achieved will be made clear in the next chapter.

1.12 Presentation of Sonafi

Sonafi – Sociedade Nacional de Fundição Injectada, S.A. was founded in 1948 and although it started as a producer of both hardware and aluminum die casting pieces, nowadays it specialized only in die casting components for the automotive industry.

This company was able to expand to international markets supplying a range of important customers, such as Renault, General Motors, Ford, Mercedes, Volkswagen, Porsche, among many others. The geographical diversity of markets demonstrates the competitive capability Sonafi acquired along the years (Sonafi, 2010).

The production in this factory never stops, and produces around 15 million parts for 16 different customers every year. The production of the aluminum pieces goes through five main stages: melting, die casting, trimming, surface, and machining.

ID6 implemented ERP Baan IV at Sonafi in the 1990's, and has been providing maintenance services ever since.

1.13 Upgrading

As any information system, ERP systems are in constant evolution in order to present the market products with substantial improvements. New versions on the market try to meet customers' requirements, as business processes change. Unfortunately for organizations, upgrades are made available quite regularly.

So, each time, companies face the choice of whether or not to migrate to the newest version of the system (Kremers & Dissel, 2000). However, there are times when this questioning is no longer an option, and IS migration is really required, due to changes on the business process and organizational objectives and strategies (Gunasekaran & Ngai, 2003).

Yet, software migration should not be taken lightly, given that it involves a major change resulting from the implementation of the newer version of an already installed ERP system (Kremers & Dissel, 2000). There are some opinions (Olson & Zhao, 2006) expressing that a major ERP upgrade should take place every three years so to keep the system running smoothly; others suggestions include assessing a system's capacity every five years (Stackpole, 2011).

Regardless of time, there are indicators telling us when it is time to upgrade. The persistence of ongoing problems caused by complex integrations and customizations is certainly a bad sign, as is also the lack of user interface enhancements and Web functionalities. These provide the company with solutions to meet evolving business requirements, such as allowing customers to send orders electronically (Stackpole, 2011).

Other reasons for change may be technical, for example the expiration of a support program, dissatisfaction with the current system or just trying to keep the system up-to-date. In his study, Kremers (2000, p. 55) reported "added functionality" as the most frequent reason for

migration. Olson and Zhao (2006) also state expansion of the enterprise and consolidation of systems as main reasons for change.

Among the added functionalities such as, internet procurement, employee self-service for human resources, business intelligence, and customer management may be highlighted. In addition, these functional areas can help with supply chain efficiency and operational excellence (Montgomery, 2004). Managers must understand that "ERP upgrades provide better opportunities to catch up with the current business development, improve their processes and build more efficient business models with new functions, new features and new processing styles" (Olson & Zhao, 2006, p. 131).

The motivation can no longer be solely about cost savings, but must also reflect the modular add-ons that bring business benefits (Beatty & Williams, 2006). IT executives are increasingly required to advocate the investment with a business case (Montgomery, 2004), which shows the increasing importance ERP upgrade is gaining. This process has to be seen as a natural step in the ERP software lifecycle, they are not avoidable, and it is the path to reach continuous improvement (Olson & Zhao, 2006).

Evidence of how much upgrades have been gaining relevance is the survey conducted by Delloite & Touche (2002), that asked 200 IT executives to name their companies' top priorities for the next 12 months. The results are shown in Figure 6.

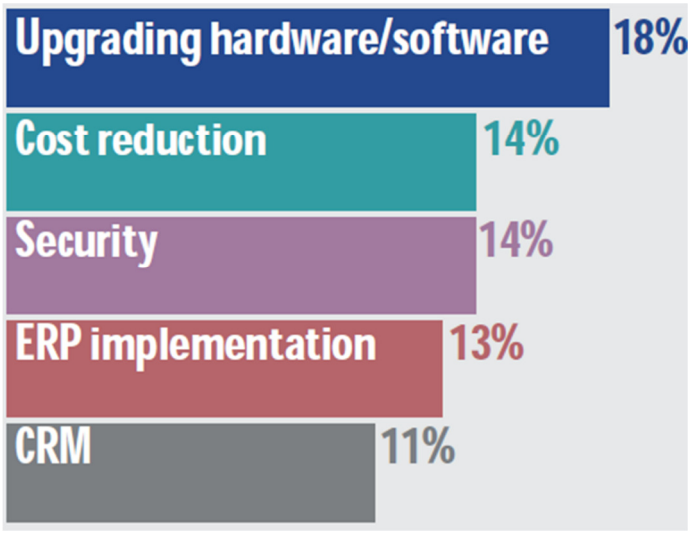


Figure 6 – IT priorities in 200 companies (Delloite&Touche, 2002)

Also in 2000, another study conducted by AMR Research concerning the cost of upgrades, concluded that it takes 50% of the original software license fee and 20% of the original implementation cost per user to finish the upgrade project. One reason for those high values can be testing, which consumes 24% of the time and effort (Cited in Swanton, 2004).

Despite many companies being faced with upgrades, little research has been made about the subject (Olson & Zhao, 2006). One can only reason that any upgrade is a significant investment that must deliver return (Swanton, 2004) and that it involves lower levels of risk and uncertainty than initial installations (because the organization is already familiar with what the system should do) (Olson & Zhao, 2006). But this is no reason to disregard the work that has to be done, so it should be regarded and treated like a new project (Beatty & Williams, 2006).

1.14 Upgrade at Sonafi

As a manufacturer of components for the automotive industry, Sonafi is under a lot of pressure to deliver products on time. Besides, this market is extremely demanding, with high level of competition, complex products, and a global supply chain. From time to time, Sonafi is faced with new challenges, such as the following (Infor, 2011b):

- Vehicles need to meet certain requirements and market standards, regarding safety, efficiency, emissions, usage of alternative fuels, and the recycling and recovery phases at the end of their useful lifecycle;
- Consumers expect vehicles ever more sophisticated; so, to meet this expectation, it is necessary to be able to handle product development cycles more quickly;
- The SC of components, tools, equipment, and services is global. The challenge is to manage effectively to reduce costs, protect intellectual property and maintain high quality products;
- It is necessary to integrate new materials, products and manufacturing technology in order to reduce costs, improve efficiency, and accelerate the time needed to place the product in the market;
- Procedures and facilities have to be well managed to give room for new products, processes and equipment with minimal obstruction.

Outwardly, a company providing goods for such a fast changing industry needs to be continuously updated and ready to make alterations to their products and create new ones. It is here where informational technology can help the organization, by enhancing the quality and making available important information to them, their clients, and their suppliers.

As stated, the most recent versions of the software offer opportunities without precedents for the improvement of internal processes and services provided to the clients. The IT role is of the upmost importance, enabling organizations to transform themselves quickly and take those innovations to the market (Infor, 2011b).

So, Infor, in partnership with ID6, presents to Sonafi a project that is able to meet the challenges discussed here, and supports their business excellence. ID6 and their professionals were chosen because of their vast knowledge on the current version installed, Infor ERP Baan IV, the new system, Infor ERP LN Feature Pack 7 (FP7), and the business developed by Sonafi.

1.15 Objectives

After carefully detailing the business processes implemented in the client's Baan IV, it is necessary to fully understand Sonafi's present way of operating. Opportunities for applying the best practices will be identified, as well as any operational requirements (customizations). All these steps are performed by consultants, with the close collaboration of the employees' know-how and experience, from all of existing departments. In the end, it is anticipated:

The visibility of all business operations – including supply and demand, subcontracting, sales orders, and products' stock. Manufactures need to visualize several different systems at the same time to obtain a clear picture of supply, demand, and profitability.

Improved operational efficiency – through cooperation between all departments the results can improve daily.

Quicker delivery of clients' orders – by enhancing manufacture, provision, and transport.

More than performing a migration of the data to the new system's version, it is necessary to review business processes and procedures performed by final users (Infor, 2011b), which constitutes a re-implementation. In the end, only the master data and the pending operations are going to be transferred to the new software.

1.16 Scope

Although an ERP system enables a company to integrate the data used throughout the entire organization (Davenport, 1998), which includes Finances, Human Resources, Manufacturing, Warehousing, Sales, among others. Due to the limited time available, the problem handled in this dissertation restricts itself to the following areas (on Figure 3): sales and delivery, inventory and supply.

This means that the study will only concern the processes between receiving the clients' purchase orders and the order delivery. Evidently, those transactions include activities beyond the modules used, for example, financial applications, because after shipping the goods it is necessary to send an invoice, which in time will be translated into cash-flows. On the other hand, selling a simple piece implies checking materials availability, warehouse movements, and several documents.

Figure 7 pictures the areas involved on this project. The reality is complex, and manufactures have been working with it for years, but ERP systems try to improve communications between the circles. On picture below, the dark purple and dark blue circles are the areas where the study was concentrated.

Figure 7 – Different areas influenced by an integrated system

These were the modules and functions chosen because there are the areas the author was more familiar with, due to his background studies, firstly, and secondly, because the greatest differences in live operation reside between Baan IV and ERP LN FP7.

1.17 Working on ERP Baan IV

With the purpose of allowing Sonafi to manage the supply chain, when the ERP was implemented, it was also necessary to add an extension, specifically designed for the automotive market and with particular focus on delivery deadlines, called Supply Chain Sales Schedule Control (SSC). This occurred because the standard software does not allow the creation of contracts with partners, with agreements about deliveries, prices, quantities, schedules, and other conditions (Baan, 1996). With this extra module the opportunity to sell and ship items based on a schedule was added.

Obviously, at that time Sonafi incurred additional costs to have this supplementary functionality. It also shows that if the module is not yet standard, there is certainly a lot of room for improvement.

In an initial phase of the project, there was an auditing phase to perform process identification in the client's facilities. This was one of the initial tasks where the author played an active role, participating in the discussion – concerned with reevaluating tasks, activities, and processes, related with general procedures and mainly with sales orders. From this auditing, an overall design for the referred business process was composed (Figure 8).

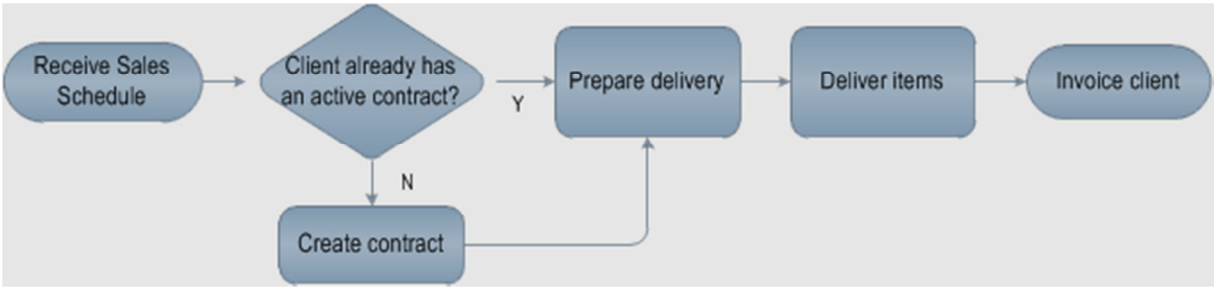


Figure 8 – Overall process map for "Sales Order Fulfillment"

In this dissertation, business process is defined as "a complete end-to-end set of activities that provide value, through the delivery of a product or service, to the customer of the process" (Sharp & McDermott, 2009, p. 14). From this definition, it can be concluded that the process crosses the organization and its functional boundaries. In the case described, an overall process map is used to clarify what is in and out of scope.

According to the Gartner Group (Kaila, 2007), there are eight styles for end-to-end order management: make to stock, make to order, configure to order, retail order, subscription to order, orchestrate to order, engineer to order, and relationship to order. Each one has its own degree of complexity and customer configuration, and using the appropriate style each can lead to strategic advantage. They all start with a key trigger, the main influence to the configuration and fulfillment of different order types, and have diverse key activities and key component linkages.

At Sonafi, the business process starts with an order, which is configured by the customer, and sent to the sales department. So, according to the classifications proposed by the Gartner Group, the type of end-to-end order management fits the make to order (Figure 9). What happens is that, after receiving the quote, a capable to promise activity results in a firm order and a manufacturing order issued. In the end the receipt will launch the collection process. Note that the specifications are fixed before the firm order is given.

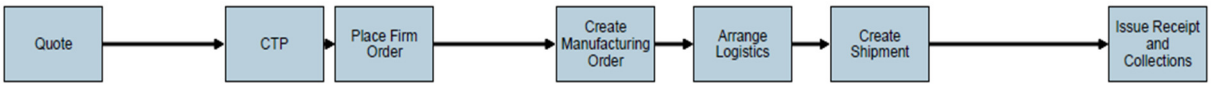


Figure 9 – Make to order (Kaila, 2007)

Going into more detail about the Sonafi sales process, the company uses sales schedule (SS), which support long term sales with frequent deliveries. This schedules are created for specific goods and are used in cases where full visibility and time phasing of material requirement information is necessary (Infor, 2008a). At Sonafi, the customer requirements are received by three means: fax, electronic data interchange (EDI), or e-mail. Being EDI the most common method of communication between the supplier and the customer, when the message enters on the ERP and is processed, it automatically creates a SS. If information about sales is received by one of the other two ways, it it necessary to create a SS manually.

Along with the SS, a contract information is necessary to create a planned delivery. Each contract is exclusive for one article, one client, and one delivery address. It also has a validity, and during this time the price is fixed. Basically, the contract shows us the selling price and where it is going to be delivered. However, it does not inform as to when the item will be delivered. This last information comes in only with the SS.

The next step, following having a planned delivery date and all the information needed from the contract, is to print a document with this data for the warehouse staff. This paper shows, for each day, what has to be packed and for which client; thus employees have the information necessary to prepare the order. After delivery, the only thing left to take of is the invoice, so as to receive payment for shipped products.

The flowchart with all the steps needed to perform the refered operation will be detailed further ahead, but following are some impressions resulting from the first auditing:

> *Notes from the meeting:*
>
> *The IT's director at Sonafi, present at the meeting, refered the existent resistence to change, as is expected in every ERP implementation. There is still a great dependency on scattered systems, such as Excel. Naturally, this is an obstacle to overcome with the proper training and clarification about the advantages that may arise with the new system.*
>
> *In a more technical note, users complain about the lack of system's flexibility. For example, once labels have been printed, the assigned information can not be changed. Because of that, employees use another system to manage labels, since the ERP does not allow last minute alterations. Moreover, though ERP is perfectly prepared to plan material requirements for production orders, it is not used for the purpose.*

At Sonafi, the only actions taken, regarding manufacturing, are the creation of production orders. But quantities are inserted either by experience or retrieved from other programs (Excel for example). Then, job sheets are printed (containing all the information requiered to carry out an operation) and manufacturing is carried out. The advantagens of using an ERP system, for a company in such a demanding market, are vastly diminuished without linking sales, stock management, and purchase necessities. If the client started using the software with this ambition, it could improve greatly his perfomance.

Another problem of adjustability is a concrete case related to subcontracting. The software only allows the entire manufacturing order to be produced out, but many times they only want to send some parts of it. That is, if the order is 100 pieces, they cannot subcontract only 50.

Moreover, complaints about the accuracy of information inserted in the system by employees, concerning operations, are many. Among these is the absence of reporting correctly (if at all) the manufacturing orders to the main warehouse, properly perform the reception of lots and packages, and accommodating all the accurate data into the advice notes.

Using Baan IV:

For the most part, these are the problems that stood out. Now, to aid the reader understand how Baan works, let us recall that the software is composed by modules (common, finances, projects…), and that each module can be decomposed in sub-modules (tables, common data…), that, in turn, present a group of three types of sessions (Figure 10):

- *Keep – allows changes in the data or creating of a new set of information;*
- *Consult – it only serves the purpose of displaying data;*
- *List – to print or view a defined aggregate of data.*

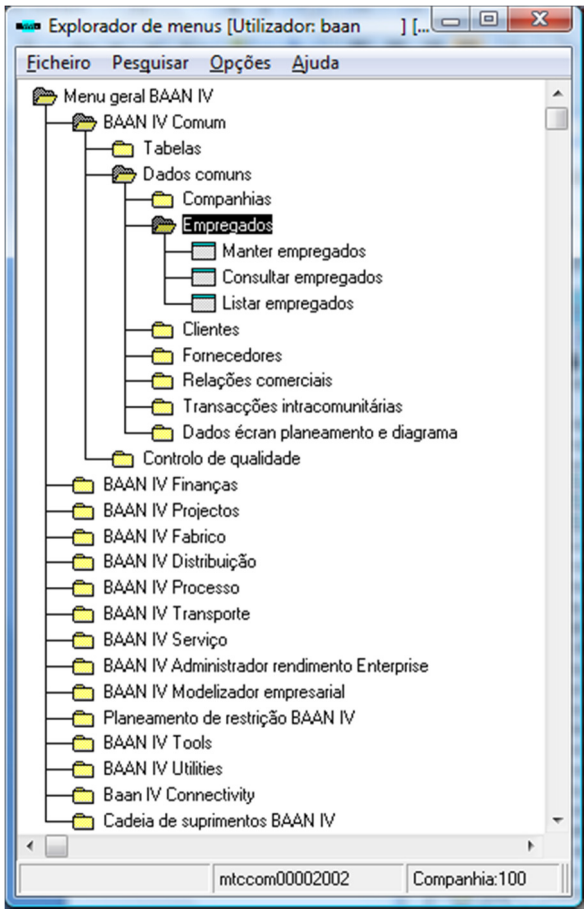


Figure 10 – Baan's IV menu

In the problem's context, when practicing actions such as creating a contract, the "keep" session is used, but to print the advice note, the "list" session is used. These are mere details, perceived only by those who use the software, and not critical for this study, as the purpose is not to create an instructions manual.

Accordingly, the next phase will not be the exhaustive demonstration of how users, by department, would navigate on the system to complete a sales order. Rather, a flowchart (Figure 11) shows the processes needed to be completed. Below, it is the information regarding the value of the steps.

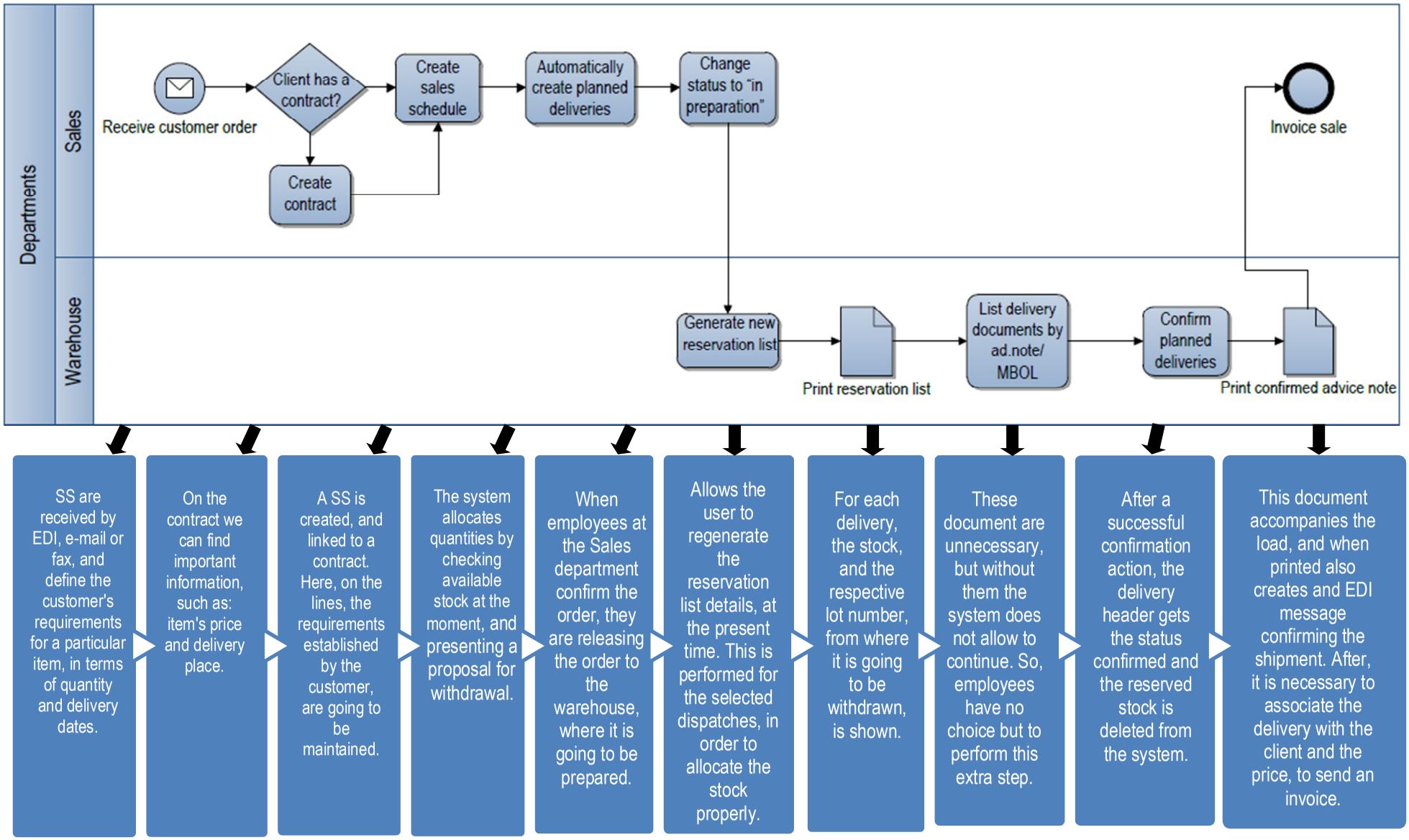


Figure 11 - Flowchart of the business process “Sales Order Fulfillment”, in ERP Baan IV

There is one exception to this process, which is the case of Vender Managed Inventory (VMI). When applied, clients only pay the products when these are used; the supplier is the financial owner until that point in time. This particular type of transaction is called consignment (Figure 12), and, for this purpose, a consigned (virtual) warehouse is created in the system.

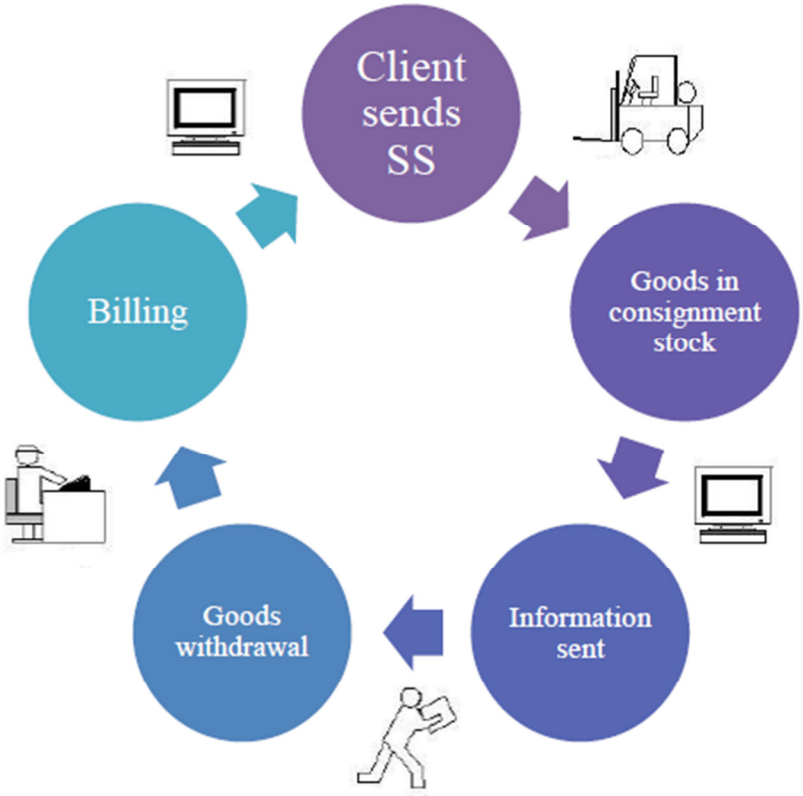


Figure 12 – Consignment diagram

There are other types of VMI where the supplier determines when the client needs the stock replenished, but not in this case. Here, it is still the customer who provides the sales schedule. The difference from a normal sale lies in the fact that when produced, the materials are transferred to a given location at Sonafi's own warehouse. Then, an EDI message is sent to the client warning that the order is ready.

However, Baan IV does not have features for these types of transactions. As such, the employees have to use annotations to recognize consignment. In the clients' delivery address, it is necessary to perform customizations, to distinguish this situation. Also, the contract has to include information regarding where the products will be transferred when ready.

Then, after the client uses the designated stock, it is necessary to create a sales order to adjust the stock on the system. That is, due to the sales schedule resulting in a warehouse transfer, and not in an issue, it is obligatory to create another order to signalize the exit of materials. That represents twice the work, comparing to a normal sales. Only now the goods have in fact changed property, and it is possible to invoice the client.

The proposed solution

The methodology followed to deploy the ERP LN FP7 at Sonafi will be presented in the following paragraphs. Also, the business process studied in the previous chapter is now adapted and improved; thus, the new flowchart will be described, along with the overall enhancements accomplished by this version.

1.18 OPIM

One Point Implementation Methodology was developed by Infor to help maximize profitability and minimize the risks associated with the implementation of such critical systems. It will be used as a foundation for Sonafi's project, aiding towards accomplishing the transition's goals.

The tactic applies to all aspects of the implementation, ranging from the definition of the business agreement and the different responsibilities throughout the project's life cycle, to managing risk or knowledge transfer. Looking at OPIM, the reader will understand the plan, the consecutive steps, the responsibilities, and the tools used to overcome obstacles (Infor, 2011b).

Although its concepts are flexible to all projects implemented by Infor, it was adapted to Sonafi's specific needs. In Appendix B there is a detailed plan, specifying the tasks needed to perform, by whom, and when. There is also a table showing the project team, the student's roles, as well as the deliverables expected from different activities. The final purpose will be the complete transfer of knowledge from the consultants to the client's team. In this way, they can grow to be the engine of the new system and business processes.

The five main phases on this methodology are: **initiate, design, build, deploy, and closure.** The **Initiate** stage (Table 1) regards the definition of necessary documents to assess initial risk, and delineates the project's proposal: including objectives, responsibilities, organizations, administration processes, goals, and deliverables.

This is a very bureaucratic step, where the two actors involved, Sonafi and ID6, had to reach an agreement. As so, the student was not implicated during this negotiation. Only when the time came to proceed with the installation of LN FP7 at ID6, was that the student started helping, since he had already read the literature available.

Table 1 – Project's general plan (Infor, 2011b)

Documents	Potential benefits
Objectives – what is expected from this project	Attain a realistic plan, with the available resources
Responsibilities – who is assigned to what	Teamwork and cooperation
Project plan – agreement between the two companies involved	Minimizes confusion and disconnected communication

After that, during the **Design** phase, the product is configured based on mutually agreed specifications to accommodate the business goals avowed (Table 2). The consultants had to meet with the Sonafi's Information Technology Director, the person responsible for this project on the client's side, in order to retrieve the necessary information to conceive the "To Be" processes. These constitute the match between the new product and the client's

operational specifications. Afterwards, since the consultants already had an idea of what the client needed from the ERP, they were able to predict if developments were going to be necessary in the future.

Table 2 – Necessary activities for the design phase (Infor, 2011b)

Activities	Potential benefits
Train consultants on Infor applications – the student read all the manuals available on the subject	Knowledge foundation for decision making
Design product with the client's team – meetings between the IT director and the consultants were scheduled	Product acquaintance and property
Design of "To Be" processes – based on the data collected during the meetings	Optimized business practices settled particularly for the client
Determine development needs – comparing what Sonafi is performing now and what they should be performing	Know from the beginning the customizations necessary to try and reduce them

In the third phase, **Build**, it is time to connect all products' pieces and test exhaustively, to help guarantee the successful activation of the new ERP (Table 3). Through simulation of business operations, pilot tests assist on clarifying operational flows and company's necessities; also, they evaluate alternative paths in the system usage and help comprehend the decision-making process.

Creating the prototype is one of the most important tasks, since each successive attempt allows the consultants to be aware of needed configurations and modifications to the processes. First we started with the ERP parameterization, just to be able to open the sessions, and only then we introduced the minimum data necessary to coordinate the sessions and start building a flow on the system. If any problems were to be found during this approach, the first step was to search the manuals for a solution. If that method failed, there would be a need to develop a customization, in order to solve the issue. At the end of this stage, the desired flowcharts were created, and this was the last task performed by the student after the five months assigned to this project.

Table 3 – Steps taken on the build phase (Infor, 2011b)

Activities	Potential benefits
Detail procedures – obtained by experimentation in the ERP LN	Helps guarantee the necessary discipline
Create initial users' formation documents – the processes' flowcharts	Users start acknowledging the solution and it is easier to update documents throughout the changes
Verify and polish future processes – the prototype is an iterative process	Project's risk is minimized
Approval of test plan created by the client	Protects the investment

Deployment encompasses the work of consultants and the project's team all together, throughout the transfer period, to help execute the transfer plan and carry out the transition to

the new system (Table 4). It is during this phase that final users are trained to perform their jobs with the changes implemented, new politics, and procedures previously developed. The training can embrace e-learning, computer guidance, individualized education and instructor guided coaching.

In most cases, the acceptance of end users raises when part of the training is administered by members of the project team, in this case, the IT director, because they are learning from people they already know and trust. In addition, members from this team expand credibility and acceptance, since they are seen as experts on the system, and increase the trust needed on themselves to run the new software, now that they are the owners.

Table 4 – Activities performed during deployment (Infor, 2011b)

Activities	Potential benefits
Implement the final pilot test results and internal processes	Daily tasks are detailed and comprehended
End users training	Competencies acquired to perform the designated function and risk of interrupting operations decreases

Last but not least, the project culminates in the **Closure**. Here, the activities are accomplished, the final assessments performed, and the recommendations transmitted, all favoring the foundations for ongoing support. To facilitate the system's pos-activation, the consultants continue addressing doubts that may arise on the following weeks, or even months, and also create a final assessment on the processes implemented, with the intention of realizing if supplementary actions are required.

Table 5 – Closure's steps (Infor, 2011b)

Activities	Potential benefits
Appoint basic training necessities and additional if needed	Measure end user efficiency and system performance
Identify open questions and business processes conflicts	Tunes politics and procedures
Recommend additional measures	Establishes a plan to answer further necessities

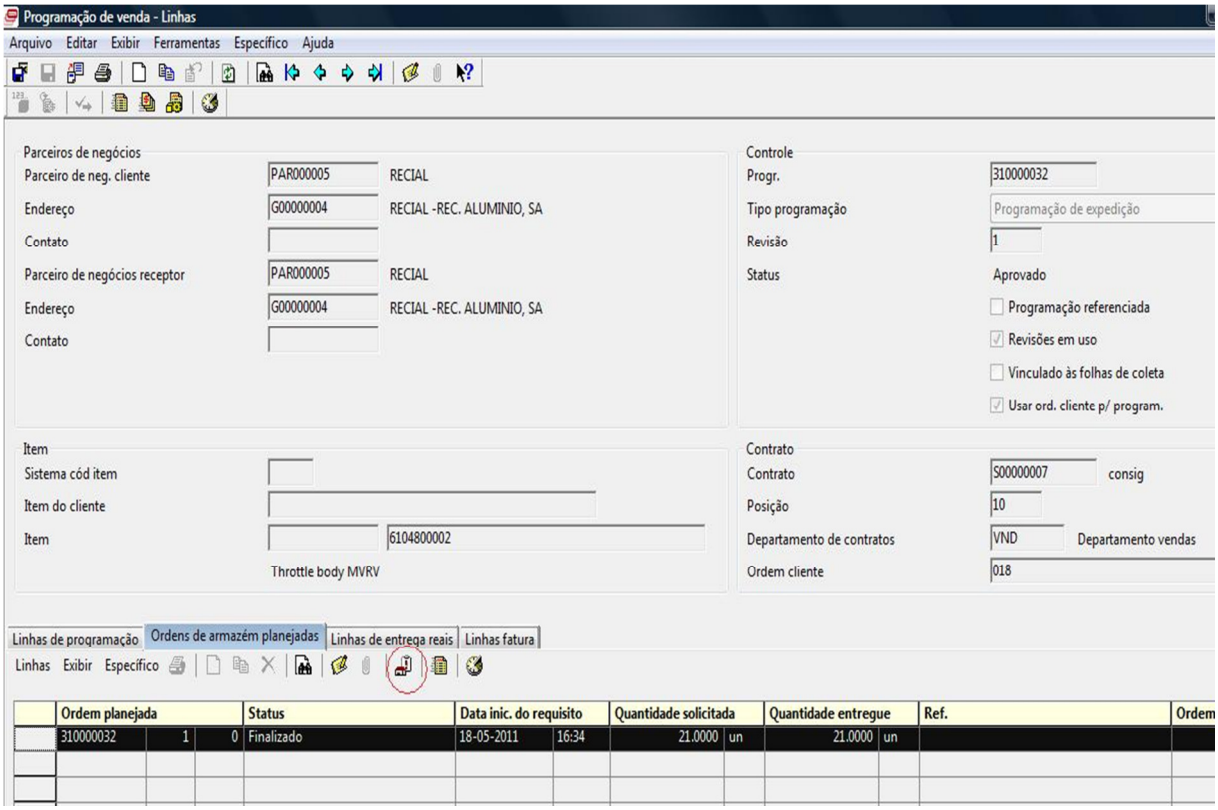
These are the constituent phases of OPIM that aim to facilitate the implementation and decrease potential problems and risks. The execution of the referred steps supports the work plan, and helps manage it.

1.19 The advantages of ERP LN FP7

Contrary to Baan, developed in the 1990's, LN is a recent software. Actually, it is even the latest release of Infor. As a result, great improvements are to be expected - with new and superior features added. In fact, many enhancements have been made to the order management and to the warehouse management. But let us first address some of the general functionalities:

- Improved business agility;
- Supply chain flexibility;

- Screens with consolidated information (Figure 13). It is much more intuitive than Baan IV, starting with the colors, but also the functionality of many new buttons and the necessary information available in tabs, instead of having to jump from screen to



screen;

- Processes that in Baan IV required several steps to be performed now can be quite simplified, by defining activities that are automatically completed when the previous step is executed. This allows the user to save time and narrows the margin for errors;

Figure 13 – Example of a screen with all the necessary information

- A status button showing the sequence of activities was added. It clarifies if these activities are carried out manually, if they are done automatically, or if there is yet something to be finished. For someone who is starting with the software, this function is extremely supportive, but even for those who are used to working in LN, it allows to always be aware of the steps already taken, as well as what steps comes next. In Figure 13, this button is illustrated by a red circle;
- Ease of use, for all the reasons mentioned earlier, and also due to the option to filter information by subjects, significantly reducing time losses due to seeking information;
- Integration with Microsoft office;
- Document attachment enabled;
- Service enhancements;
- Possibility of consulting the company's ERP information through the internet, using the Webtop;
- Significant developments in all modules;

- New modules – central invoicing, people, warehouse management, object data management, freight management, pricing control, customer relationship management.

It is already clear that the advantages for the user are many, but given that this study deals with order and warehouse management, it is now compulsory to establish in detail the functionality differences between Baan and LN on these subjects. Apart from the numerous changes not pertaining to the sales order fulfillment performed by Sonafi, such as selling customized items, cross-docking, or linking sales to freight management, there are still plenty of alterations.

Beginning with prices and discounts set up, and although on both software they can be introduced on the contract (only because an extra SC functionality is implemented in Baan, allowing the use of contracts at all), in LN the functionality is extended. It is possible to link a price book or a discount schedule to the contract, for example. The first option refers to an entity in which price information for items, such as base sales price, base purchase price, and unit price, can be stored and then used in the contract (Infor, 2010b). Among other entries, a particularly interesting one is the break type, which specifies how discounts behave as sales quantity change. The discount schedule takes this last option even further, with increased available criteria to choose from in the configuration.

However, before selling a product, we have to define that item on the software, and here there are many differences between the two systems. In Baan IV, items and the various types of item data are defined in the item control module on "Manufacturing". As the data answers to manufacturing, sales, purchase, and storage, it is then copied to the modules involved. But since there are other sessions where you can also define items, and there is no connection among the tables (where the data is stored for each session in the database), the same item code can be defined for different items.

In ERP LN, the general item data was moved to the basic item data on Common Data. All items are defined in the same session in order to prevent the same mistake of having more than one product for the same code. Simultaneously, module-specific details were moved to the items sessions in their respective sessions, to provide faster access to the desired item's data (Infor, 2010b).

If the item is manufactured, after introducing basic item data into the system, the cost of production must be calculated. To that end, cost price components are used, which break down the cost price into several types (labor, administration, machines, etc), along with the work center used, the tasks to be performed, the respective operation rate, the machines used in each task, their cycle time, and in general all of the different taxes applied. To combine these data, there is a session that automatically calculates the item's price. Overall, the information is the same in both software. However, in Baan it is much more disperse and confusing, which leads to additional steps.

Another change is in the designation for trade relations. In the old ES, trade relations are classified either as customers or as suppliers, however, in the new ES they are known as Business Partners (BP). Whether it is a customer or a supplier depends on the roles defined, that is, the first has to be classified as "sold-to", and the second as "buy-from". The BP role determines the types of transactions that you can carry out with them (Figure 14) (Infor, 2010b), but the screens are redesigned to render all roles. The usability has improved, with easy address creation, better display, possibility to view BP hierarchies, and the display of new tabs exhibiting activities, created notes, and contacts by BP (Infor, 2010d).

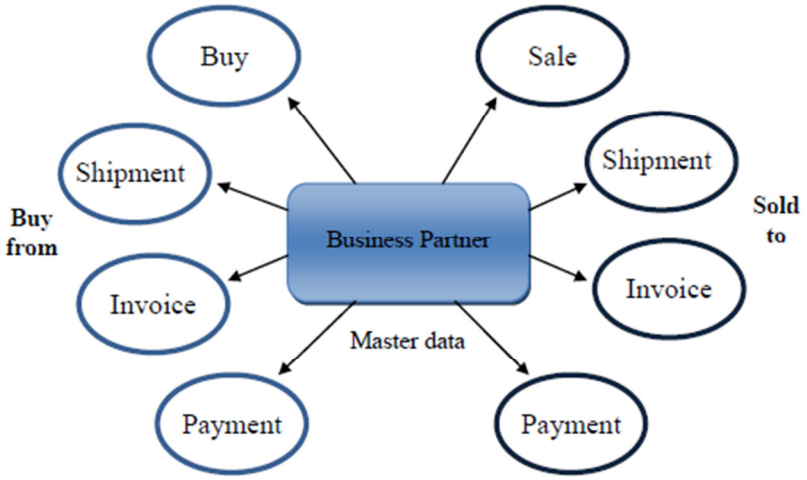


Figure 14 – Types of transactions with BP are defined by the profile (Pereira, 2010)

With regard to sales schedules, although in the regular version of Baan IV there is no SS functionality, with the extra feature implemented for SC control, this option was made possible. However, LN is completely prepared for this functionality and was even extended to utilize customer information in various processes - including conversion of external and internal codes, shipment building, delivery documents, and invoice creation. Furthermore, there is the possibility of creating a report that provides an overview of the ordered, delivered and to be delivered quantities for SS, and supports pay on use on warehouse transfers. Largely, functionality and usability were enhanced (Infor, 2010d).

After the clients' needs are known, it is necessary to prepare the orders. Nonetheless, as mentioned earlier, there is a new module used to manage warehouses. This is because in Baan only existed "locations", which are parts of the warehouse were the items are actually stored. As so, there are too many changes/new functionalities about the warehouse orders procedures to try and compare them. Thereby, this topic is going to be detailed later.

When the transaction is terminated, the client must be invoiced. In the old software, the invoicing was contained in each module, but now exists a singular module for this purpose. It is called the Sales invoicing and is located at central invoicing (Infor, 2010b).

Finally, a major enrichment was the support of VMI, and in the interest of this study, consignment. As was explained in Chapter 3, Baan IV does not have this functionality; therefore, users have to proceed with some artifices to recognize the process. Now there will be a new process to complete these kinds of transactions, to some degree different from normal sales. The flowchart with the necessary steps will be delineated later.

1.20 Working on ERP LN FP7

The main advantages of Infor LN, circumscribed to the scope of the work being performed, have already been highlighted. However, it is necessary to understand how these enhancements apply to the way the ERP works, as well as the pertinence of those features at Sonafi. So, the next step will be to explain how the solution has taken shape, and how the outcome affects the client's business processes.

When an ERP project starts, the first thing to do is create a company in the software. Each company is assigned a number, in Sonafi's case this number is 300, and it is where the consultants work -building basic information, so the sessions can be run, and inserting the

minimum necessary amount of particular data from the client, to understand how the processes interrelate.

Each module has a set of parameters that have to be filled, so that related sessions can be in operation. Most parameter data deals with inserting series to identify records, such as documents; but there are also other fields that determine the processes' results, or how specific information is going to be blocked with pre-determined data. For example, in Figure 15 is represented the "sales contract parameters", and checking or not the box inside the red circle determines whether contracts are mandatory in SS or not. Obviously, this is very important for consultants, because after apprehending Sonafi's processes they know that to create a SS first the client must have a contract, so, checking this box is a way of reducing end-user errors.

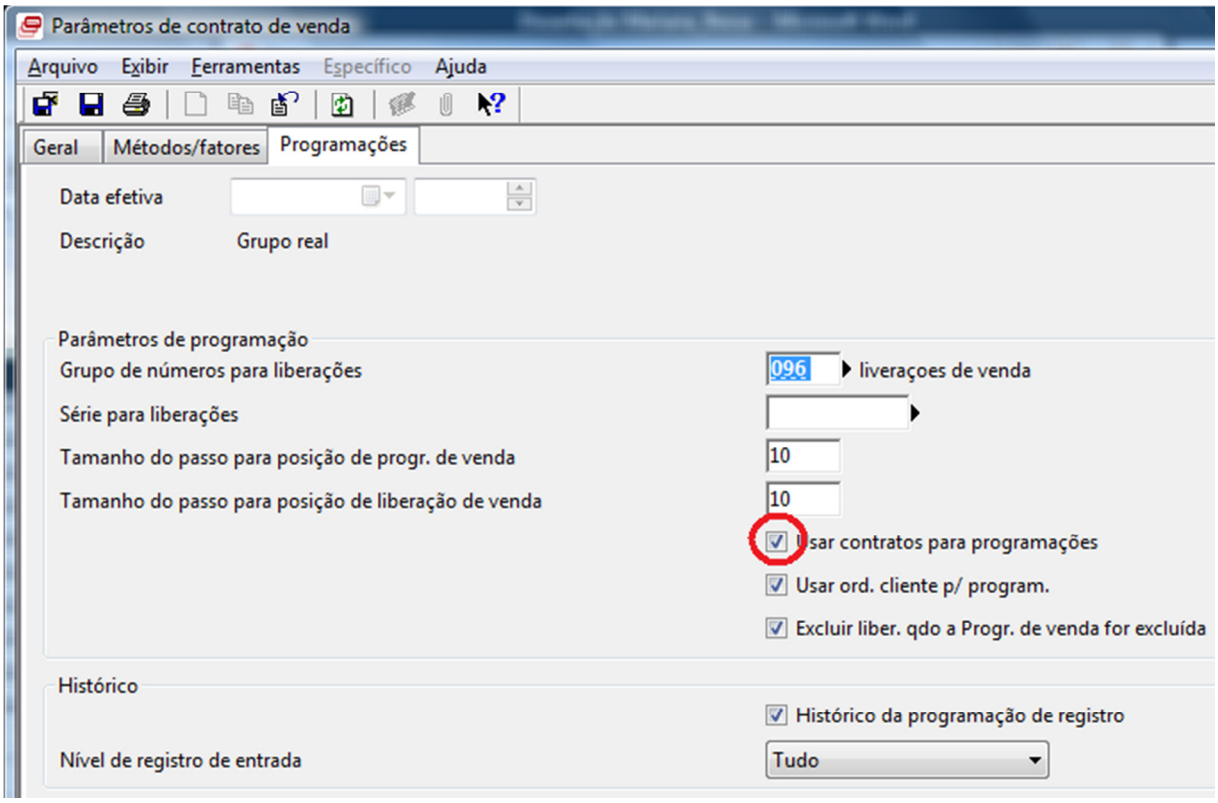


Figure 15 – Sales contract parameters

Like this example, there are many more, scattered throughout the other parameters' sessions. The consultants assigned to create the prototype, in this case the student himself, have to be familiarized with all options and study what differences they produce. Only then can they choose the appropriate ones for the client in question.

When Baan was presented, a clear distinction was made between sessions used for changing and inserting data, for consulting information, or for printing it. In LN, this concept does not exist anymore. Now, sessions are composed by a header (with general details about the session) and lines (where you insert particular information related with the object), and users can perform all those actions on the same place (Figure 16). Also, when you open the main modules, there are dashboards to give a quick insight into the status of a particular object. In this way, the user is not required to go into the menus to open related sessions, because they are already made visible through buttons (Infor, 2010c).

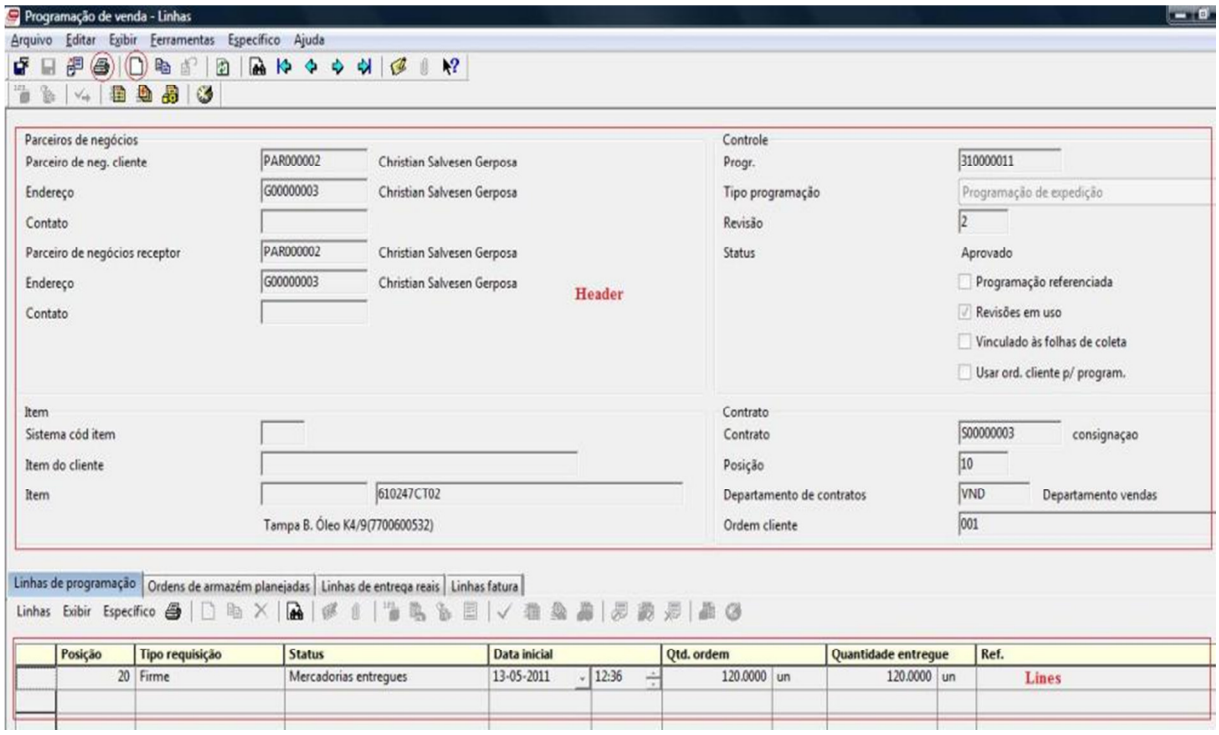


Figure 16 – Example of a session with a header and lines

Assuming that the suitable parameters, as well as basic information about items, prices, business partners, and warehouses, are entered, the consultants are now able to start testing. The first step is the creation of a sales contract, and one cannot define two contracts that are valid simultaneously for the same BP and the same item. In the header, all relevant information about the trading partner is stored, including the following:

- Sold-to, ship-to, invoice-to, and pay-by BP;
- Sales representative employees;
- Terms of delivery;
- Currency and tax information;
- Terms of payment, payment method, and late payment surcharge.

It is in the lines that relevant item information is kept. The items have their own codes for the company; however, using item code systems enables the translation to external codes, so communications with the client are thus facilitated (Infor, 2010c). On those lines, the agreed quantity is filled, as well as the price, related price books, discount percentages or amounts, and the tax code.

The sales contract is valid for normal sales orders and for SS, since there is no separate mark indicating that the item is dedicated to one of the two. All relevant logistic data must be filled in on the lines, having a direct influence on the SS, which has to be created manually after the contract activation.

On the SS header, the information is really similar to the one already introduced in the contract. The SS can have diverse statuses during the schedule's life cycle, among them are:

- Created - when not yet in use;
- Approved - it is ready to use;
- Processed - all lines have been delivered and invoiced;

- Terminated - no longer is valid.

In turn, the lines indicate the specific requirements, expressed in quantity and time, of the item specified in the header. But in order to actually process SS, is must be approved first. When this step is taken, a planned warehouse order is created, which decouples schedule updates from warehouse orders and serves as the interface between Sales, on one hand, and Warehousing and Invoicing, on the other hand (Infor, 2010a).

Directly from SS, or from the planned warehouse order, it is necessary to release the order to warehousing. When this is done, ERP LN creates a warehousing order with outbound order lines, to deal with activities related to the issue of goods from a warehouse and the preparation for shipment. Unfortunately, it is not always easy to see how schedule deliveries relate to SS. To eliminate this difficulty, Infor LN introduced a session, called "print sales schedules quantities overview", which summarizes the information about amounts ordered/delivered (Infor, 2010a).

Warehouse orders control the movement of inventory and account for it. These orders are also needed to centralize warehousing activities, such as register/approve actual issues and receipts, print documents, and track transactions (Infor, 2010b). The activities to be carried out for the outbound order line, in the warehouse order, are related to the type of inventory movement, and then linked to the order origin.

The activities chosen to handle the issue of goods and their shipment are:

- Generate outbound advice – a list advising the location and lot from which goods must be picked and possibly issued;
- Release outbound advice – releases the advice for the selected record, assigning a code to a group of warehousing order lines;
- Freeze/confirm Shipments/loads – after this confirmation, the goods are moved to the shipping dock and have physically left the warehouse;
- Print delivery notes – transport document providing information (delivery date, address, customer's name, contents, etc.) concerning the order to be delivered.

At this point, with the ordered items from the SS delivered, an invoice can be sent. To this end it is necessary to go back to the SS, where LN has filled the actual deliveries in the appropriate tab, and release the respective line to Invoicing, in the "release sales/schedules to invoicing" session. Afterwards, invoicing data can be processed.

All the steps here described are needed to fulfill a sales schedule, and now will be represented in the following flowchart (Figure 17):

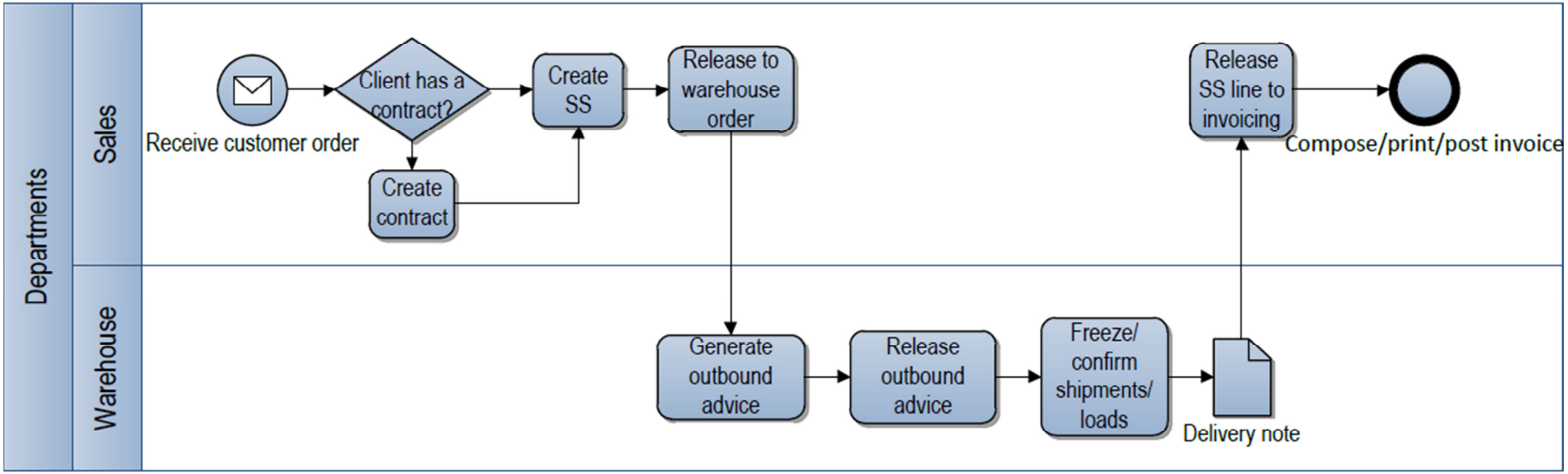


Figure 17 - Flowchart of the business process “Sales Order Fulfillment”, in ERP LN

In the previews chapter was mentioned the need to have a different process to complete the consignment orders, and also that LN has special features for all types of vendor managed inventory. Therefore, next we will study Sonafi's type of VMI, because, depending on that, how to proceed is considerably dissimilar.

According to Infor (2008b), there are three main parties in most VMI scenarios: the supplier, the contract manufacturer, and the customer. The first supplies components to the second, who then uses them to produce items for the customer. In Sonafi's case, there is only the supplier role (them), plus the customer role. They have to set up supplier role in LN.

For consignment, the principle is that the supplier is the owner of the goods until the costumer consumes them, the moment when ownership changes and payment is due (Table 6). In addition, the VMI warehouse has to be set as an administrative establishment for the party not responsible for warehouse management (Sonafi).

Table 6 – VMI scenario for Sonafi, according to LN (Infor, 2008b)

Scenario	Financial ownership	Warehouse management	Supply planning	Type
Financial ownership by supplier	Supplier	Customer	Customer	Consignment

Although a SS is also created, it is necessary to pay attention to the fact that we do not want to issue goods. In fact, we only want to transfer them from the warehouse where they stay after being manufactured to the place where they are going to stay waiting for the withdrawal from the customer (administrate warehouse). As so, the type of order, in SS details, has to be set as "warehouse transfer", and in the warehouse procedures it will be created an inbound line, to signalize the entrance of products in the referred warehouse.

In the supplier's ERP LN system, when the client withdraws the goods from the administrative warehouse, the consumption is recorded in the "inventory consumptions". This session is used to view and maintain consumption data, and shows the received quantities provided by the supplier and the subsequent consumptions by the customer.

The header of this session is automatically generated when the administrative warehouse is replenished. It contains the name of the customer, the name of the warehouse, and the received and consumed item quantities. But in reality, until now, there is no connection between quantities entered and the sales schedule. In order to link these two records, there are two steps are required:

- When entering the SS line, on the references tab, a number for the customer schedules number and for customer schedule position must be entered;
- When entering the inventory consumption line, the same numbers from the SS references must be inserted.

In this way the consumption record is linked to the appropriate schedule, and, when processed, besides decreasing the inventory levels of the administrative warehouse, LN also creates an invoice line in the SS. To release the transaction to invoicing, the action is the same as in a normal SS (Figure 18).

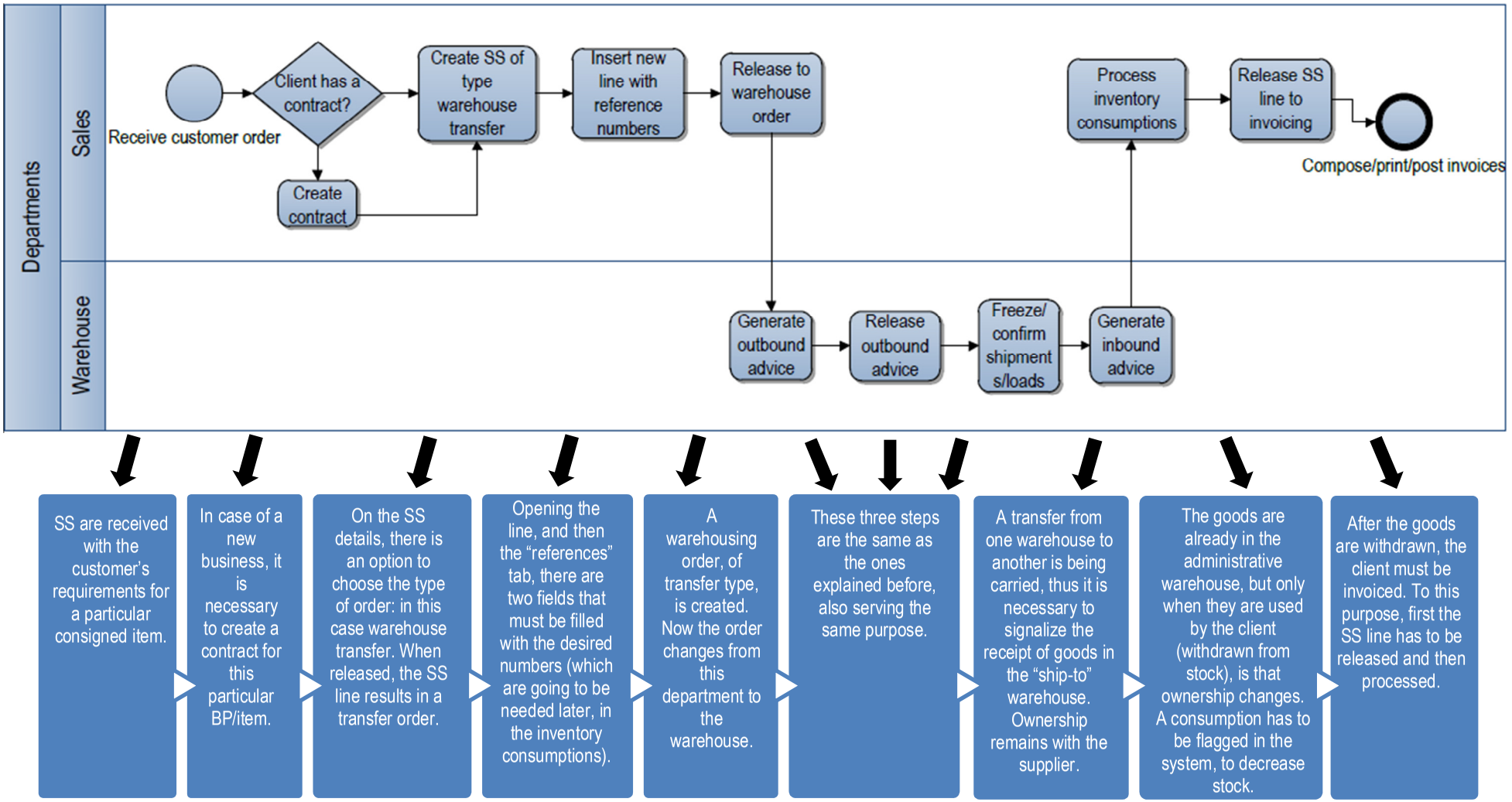


Figure 18 - Flowchart of the busines process "Sales Order Fulfillment", in ERP LN, for the consignment case

Prototype presentation

Part of the work I was assigned to, was to help with the creation of a prototype. In this chapter, the main sessions necessary to complete the processes referred in the proposed solution, will be shown, to aid the reader visualize all that has been said until now. Also, the prototype development will also contrast the two systems: Baan IV and LN FP7.

1.21 Getting started

"Prototyping is an iterative, experimental, evolutionary method of building a system" (extracted from Rogers, 2008), efficiently approaching the definition of requirements (Guimaraes & Saraph, 1991). Among the advantages, there are the following:

- Users requirements easier to determine;
- Possibility to meet the users expectations more closely;
- Usability of the system can be tested;
- Assists to identify any problems with the efficacy of earlier design, and requirements analysis;
- Easier for end users to learn/use;
- Fewer changes needed after implementation;
- Users know what to expect at implementation;
- Fewer changes needed after implementation.

In order to simulate operational flows and afterwards serve as demonstration, it was necessary to configure a company and the modules to be implemented. To begin building the software design, the flow followed is shown in Figure 19:

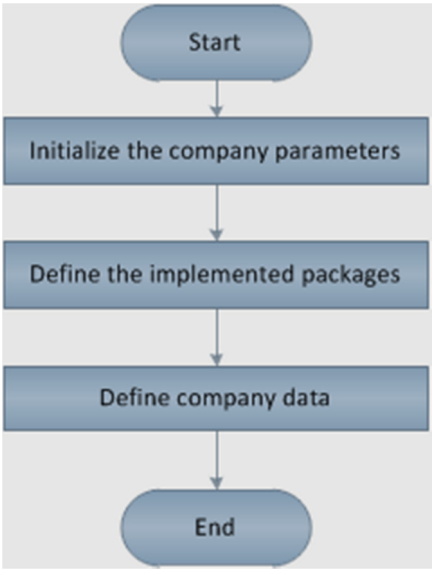


Figure 19 – Flow used to define a new company on the system

Regarding the company data, represented in this Figure, it will not be detailed, since there are too many aspects and sessions that need to be used. When discussing about this step, we are referring to basic item data, business partners' information, calendars, prices, and basically all the little elements necessary to put the company up and running.

For starters, the default menu of ERP LN, is represented in Figure 20. Those are modules incorporated in the system, inside which are the sessions used throughout the processes. In the context of this study, the two most important modules are "Vendas" and "Gestão de armazém" (Sales and Warehouse management, respectively):

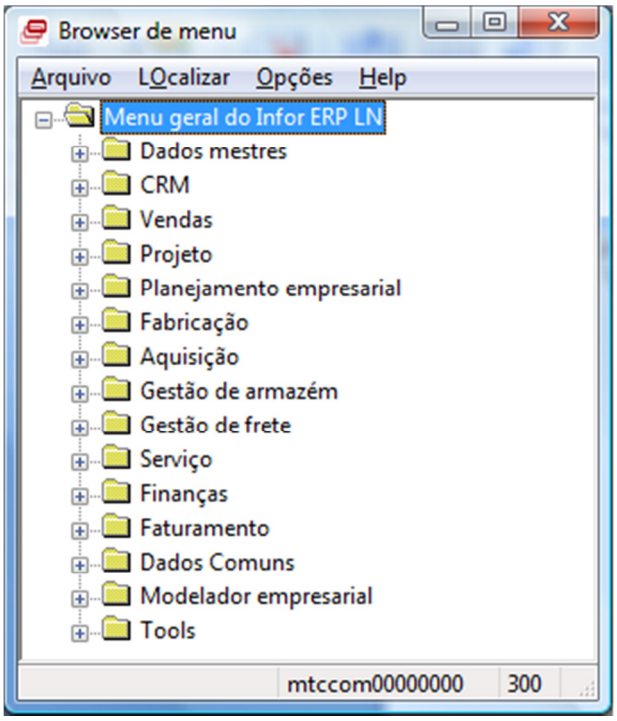


Figure 20 – ERP LN menu

As mentioned before, the purpose of this study is not to create a manual; however, there are some peculiar definitions that have to be laid out for the system to work. Seeing that discovering these settings is the main assignment of the author and that this will be crucial for future users' training, they will now be presented to the reader.

1.22 Actions to fulfill a SS

To create a contract, the user just has to go to the sales contract session, and after clicking on the icon with a blank page, insert the required information about the BP, dates, and the other data, as shown in Figure 21. On the line, he must choose the option "use shipping schedule" (represented by that orange circle), so that SS lines have the requirement type (used for scheduling) set as firm. In other words, demands will be handled as actual orders, which enables shipping.

Also, the warehouse order type can already be set on contract (green circle), so when the order is released (Figure 22) to warehousing, it automatically comes with the procedure to follow as default. Finally, the contract can be activated (red circle).

In order to have the procedure delineated when the warehouse order is created, it is necessary to define it. In the session "type of warehouse orders", depending on the inventory transaction type, a list of activities is offered, and from it we can choose whether to incorporate the activities or not, whether they are automatic, or if labels should be printed (Figure 23). Afterwards, the type of order should be linked to its origin (Figure 24), and then we are ready to navigate between Sales and Warehouse Management.

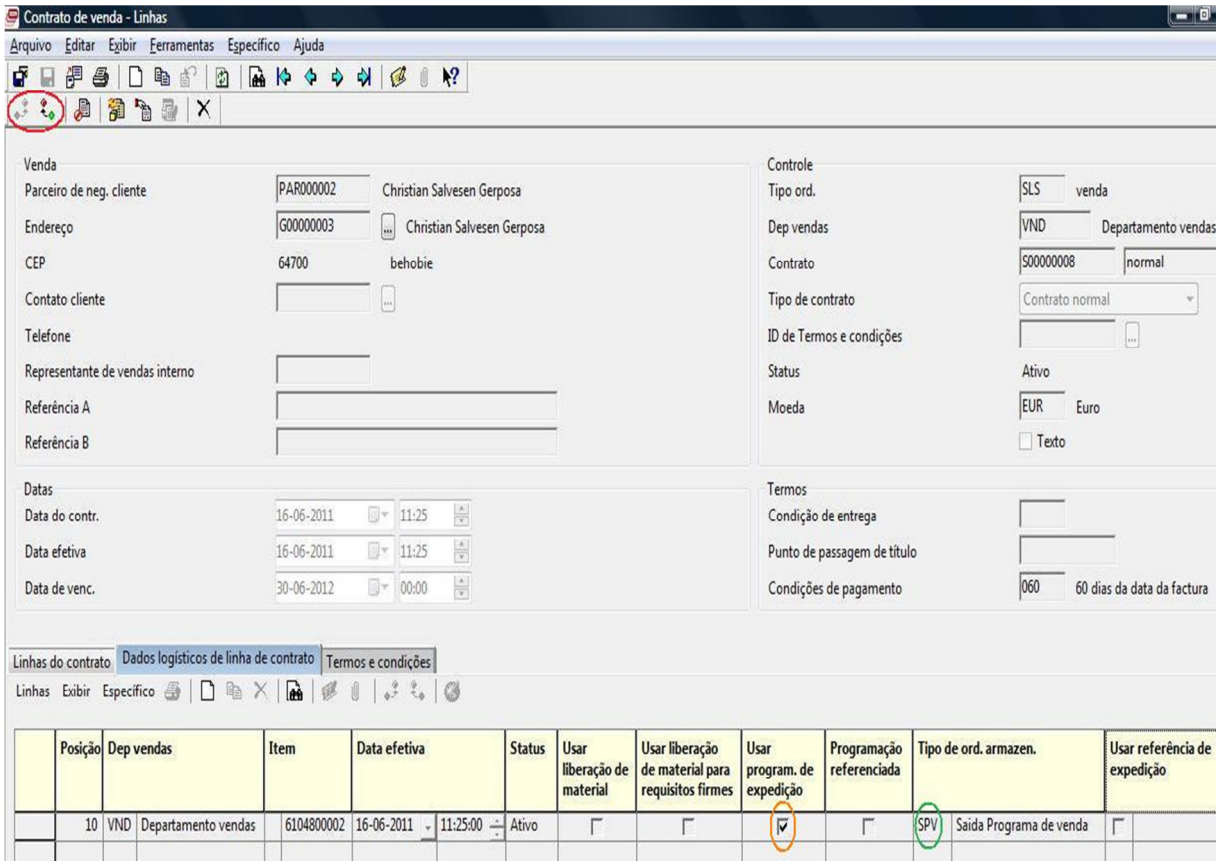


Figure 21 - Sales contract session

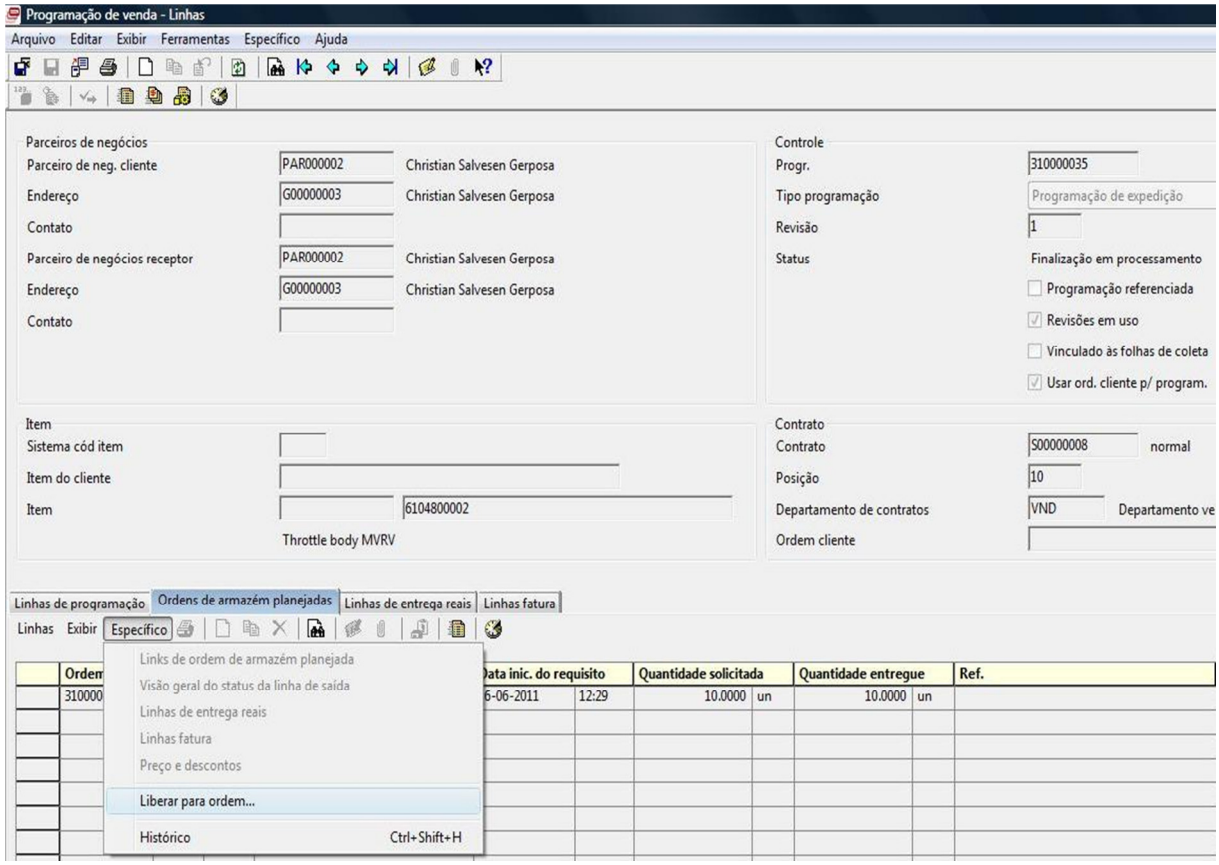


Figure 22 - Release SS to order

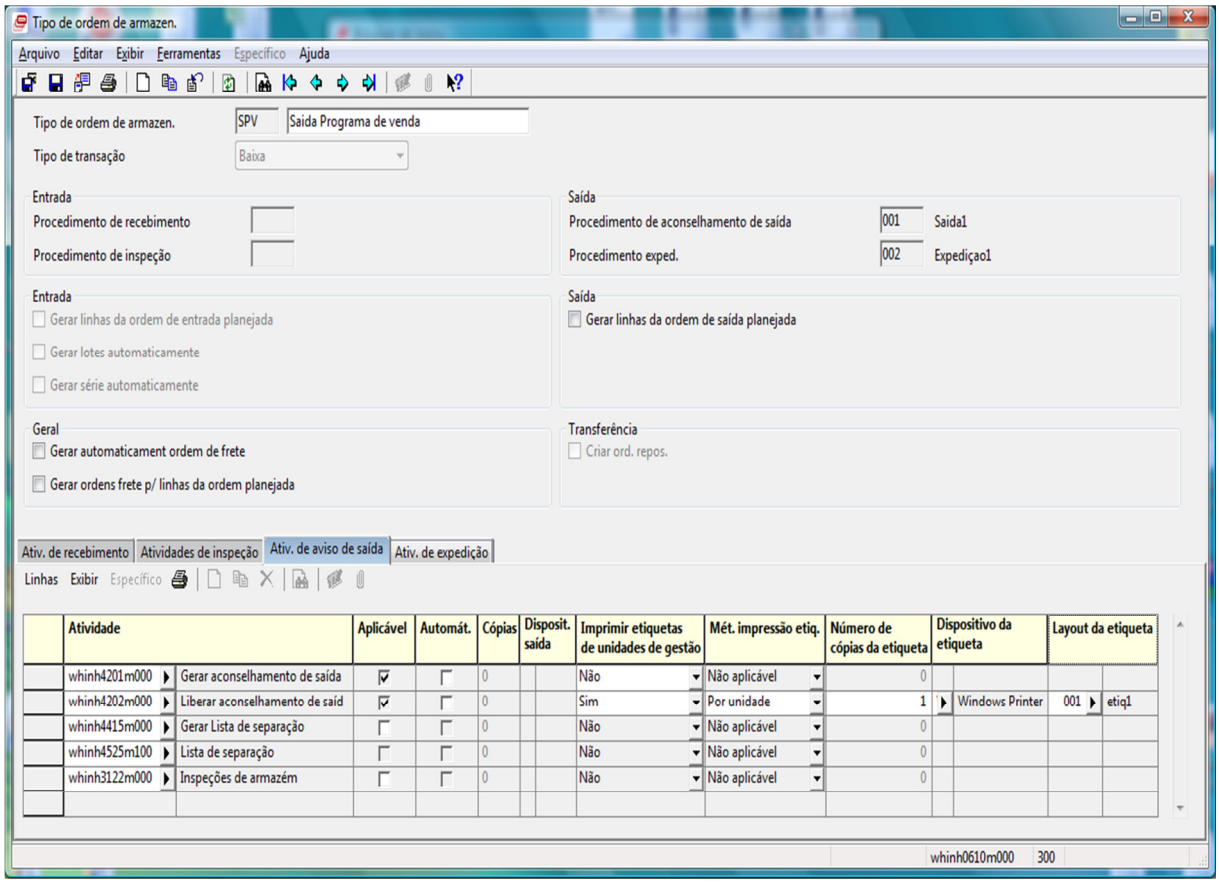


Figure 23 – Setting a type of warehouse order

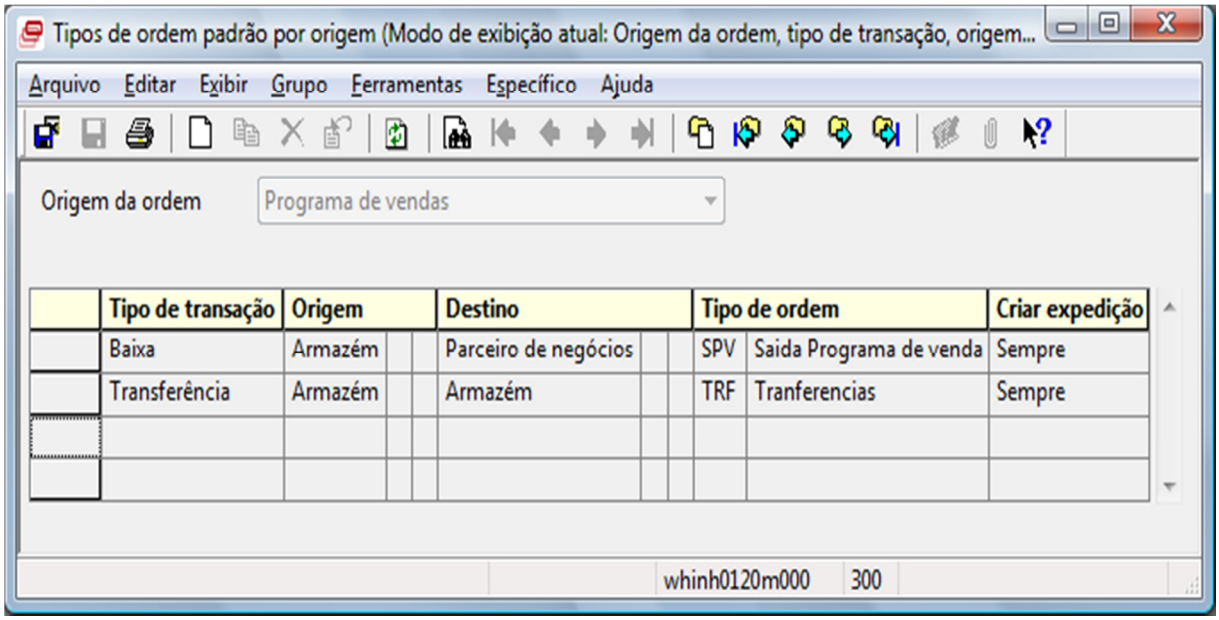


Figure 24 – Type of warehouse orders by origin

In Figure 25 is an example of a warehouse order. Inside the red circle are the buttons which allow you to carry out the activities, such as generate outbound advice and release it. On the tab of shipment lines (orange) other steps can be followed, and the green circle symbolizes the already chosen, on the contract, type of warehouse order.

Finally, the remaining step is to release the order to invoicing (Figure 26).

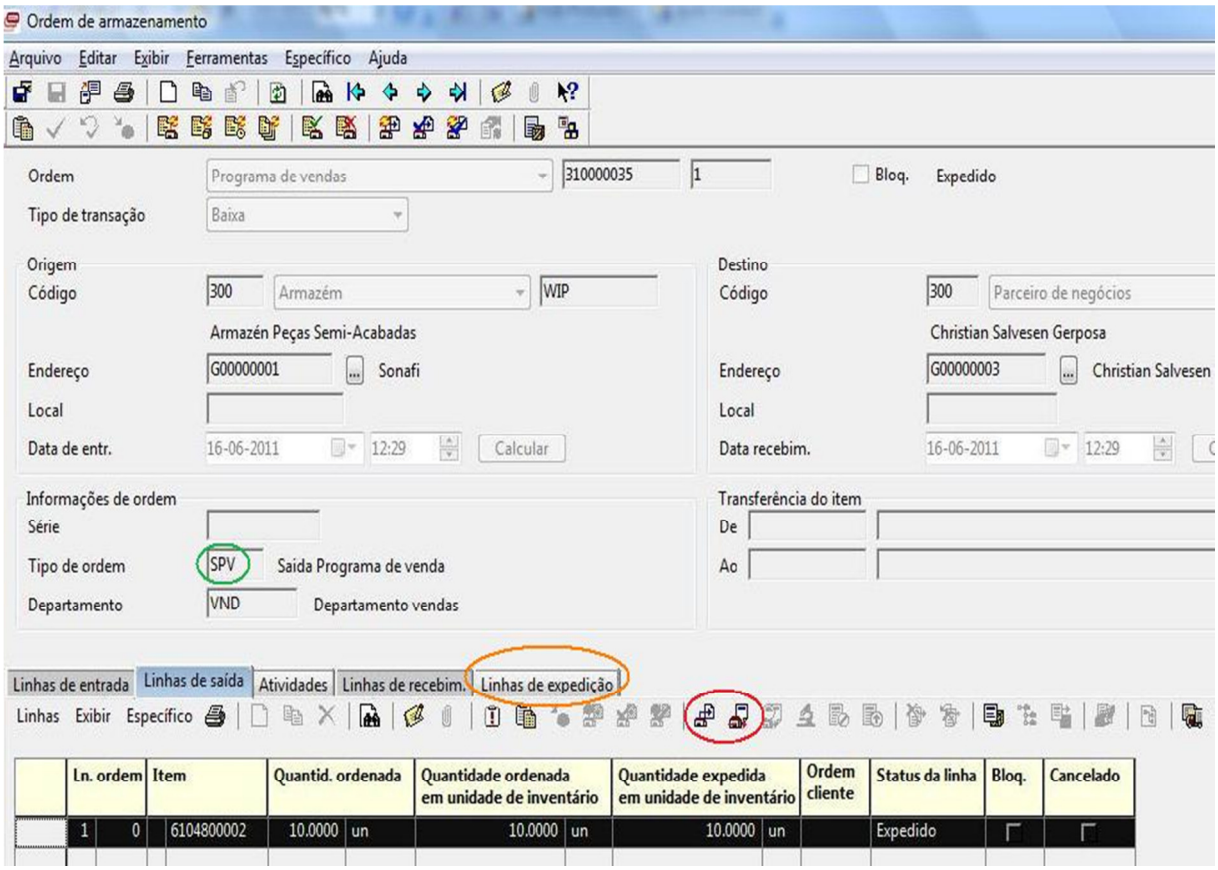


Figure 25 – Going through a warehouse order

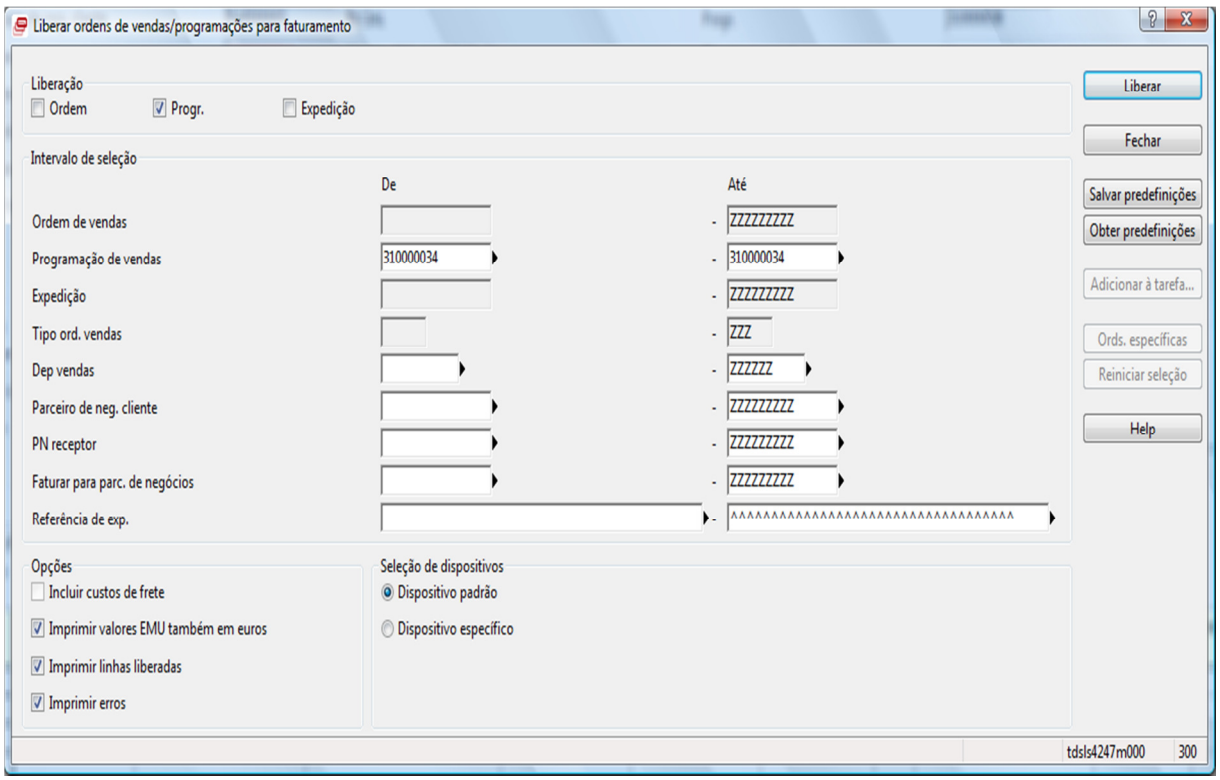


Figure 26 – Release SS line to invoicing

1.23 Actions to fulfill a SS – consignment case

Although LN allows the management of VMI scenarios, it is not as easy as setting up (or working with) a normal SS. This is mainly due to the fact that it is necessary to link a terms and conditions agreement to the contract, to hold all agreements reached between BP.

To create an agreement, we have to go to the common data module. There are many options on this agreement, which can lead to very different results – as there are diverse types of VMI. For Sonafi, the crucial setting are represented in Figure 27.

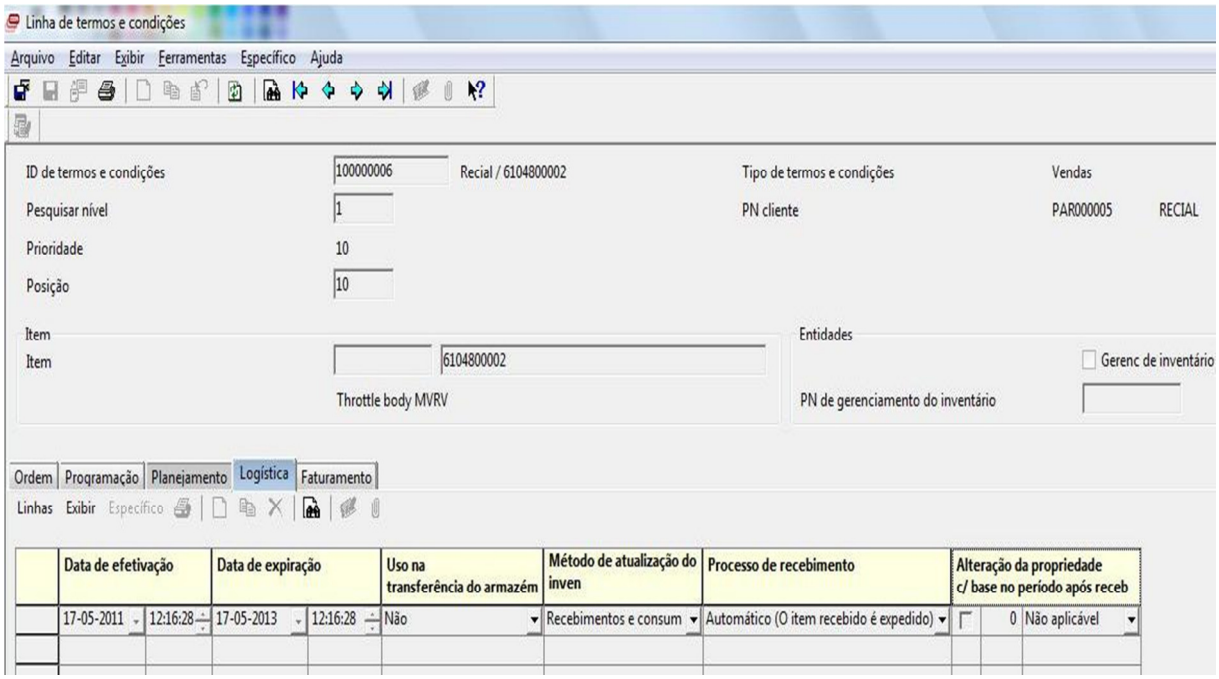


Figure 27 – Logistics terms and conditions agreement

The reason why the option on the "use on the warehouse transfer" has to be set as "no" is because the goods are first going to change location, inside Sonafi, and are still going to remain their property. So, it cannot be considered a consumption. Automatically, this sets the SS line attached to this agreement as "pay on use", instead of "pay on receipt". In turn, the method of inventory update defines how the administrative warehouse updates the inventory levels.

The field regarding the receiving processes determines how receipts/consumptions are registered in the administrative warehouse. With the option selected in the Figure 27, receipts are performed automatically and are based on the shipped quantities of transfer orders. The last option, "time-based ownership change after receipt", is not applicable in this case, since we do not want the goods' ownership changing from the supplier to the customer a fixed period after the goods being received.

After having a particular terms and conditions agreement created for one item, between the supplier and the client, there is a field in the contract to enter the respective identification that has to be filled.

Another difference between the two types of orders, is that, when creating the SS, the user has to be extremely careful not to forget to go to the SS details and change the type of order to "warehouse transfer" (Figure 28). Besides, he also has to open the line (double-click on the line), and enter reference numbers (Figure 29), which are going to be afterwards used in the inventory consumption session to link the goods' withdrawn to the SS (Figure 30).

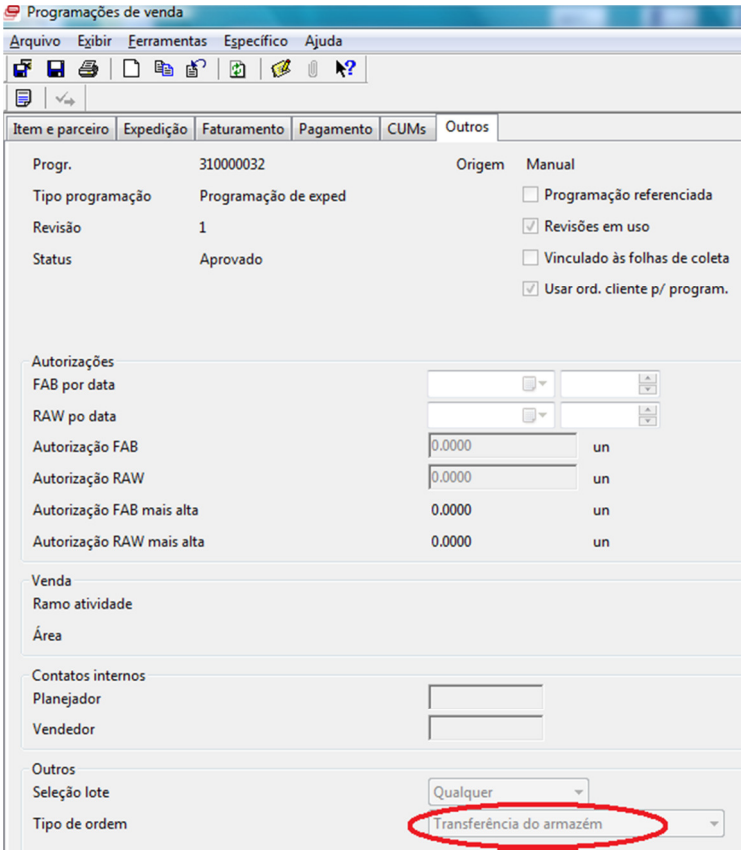


Figure 28 – Setting the type of order to warehouse transfer

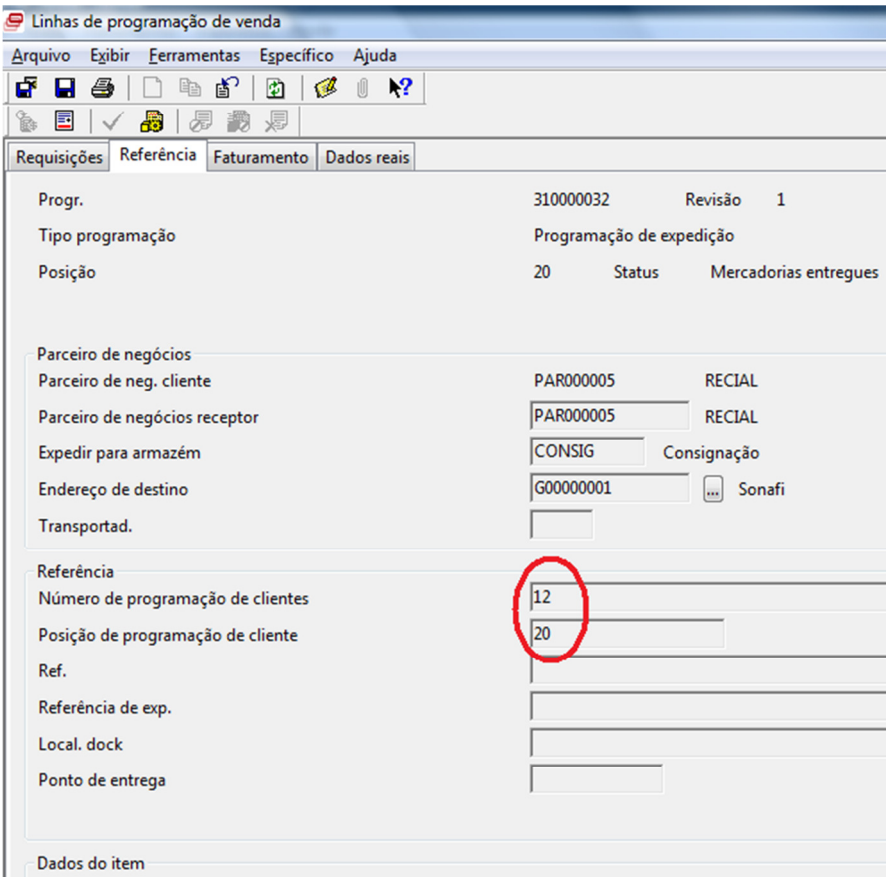


Figure 29 – Entering the reference numbers to be used on the inventory consumption session

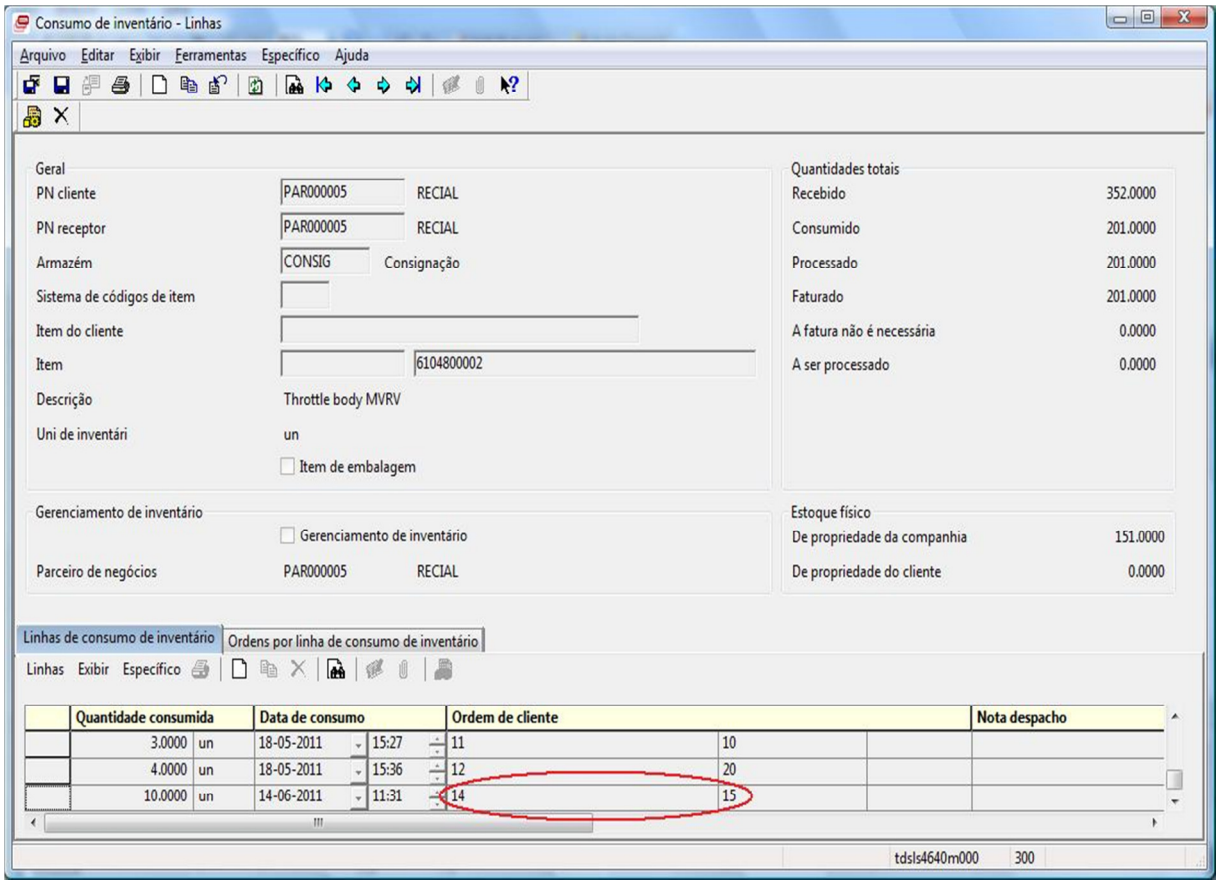


Figure 30 – Inventory consumption session

Signaling the withdrawal of goods only happens after managing the warehouse transfer, but, since handling a warehouse transfer is quite similar (besides the different steps have already been explained in the previous chapter) to handling a warehouse transfer, it is not necessary to show it again.

The only particular aspect about consignment that has not already been focused is how to set an administrative warehouse. In order to achieve this, when creating this particular warehouse, on the "warehouses" session, the only difference resides on the tab about "relations", because it is not Sonafi that carries out warehouse management (Figure 31). Also, parameterization is set to define that the warehouse is not owned by the company.

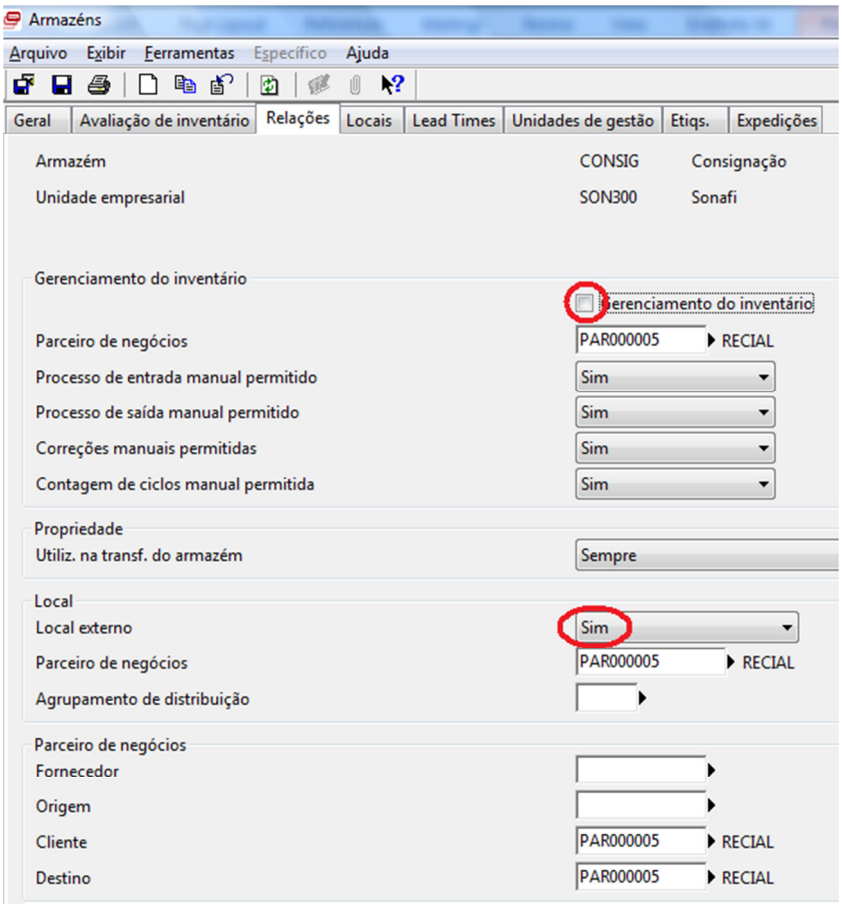


Figure 31 – Setting an administrative warehouse

1.24 Customizations

"A key issue in ERP implementation is how to find a match between the ERP system and an organization's business processes by appropriately customizing both the system and the organization" (Luo & Strong, 2001, p. 322). It is not by chance that this is one of the most important CSF, and brings a big input on time and money spent. Although ERP systems are a packaged software solution, rather than customized systems, it may be necessary to perform some changes.

According to Davenport (1998), choosing the modules to be installed, the ones most appropriate to the business, is already a configuration. Bigger customizations can go from large programmatic changes, which mold the system to the way the company works, to simple additions or removals of specific fields on documents, such as sales orders, purchase orders, or invoices. Also, it is possible to create a new interface, to allow this system to interact with other systems, by altering the source code of the ERP.

"As we move from module customization to code customization, the costs and risks increase; the benefits, however, may or may not increase" (Luo & Strong, 2001, p. 325). If managers do not want to go the extra mile to use BPR to fit processes to the system, and instead choose the opposite, they have to bear in mind that changes may affect not only the initial implementation, but also future maintenance and upgrades.

Therefore, an enterprise has to balance between the suitability of standard versions, performing no changes to increase the functional fit, and needed customizations, because there is still a gap on functionality after reengineering business processes. Fewer

customizations lead to increased vendor/consultants independency in the future, less risk, and smaller investments, however, the more alterations performed, the greater the flexibility in adapting the system to organizational needs. All this trade-off should be weighed and decided during the design and building implementations phases, because it is at this time that consultants are creating the "To Be" processes and performing the pilot tests (Figure 32).

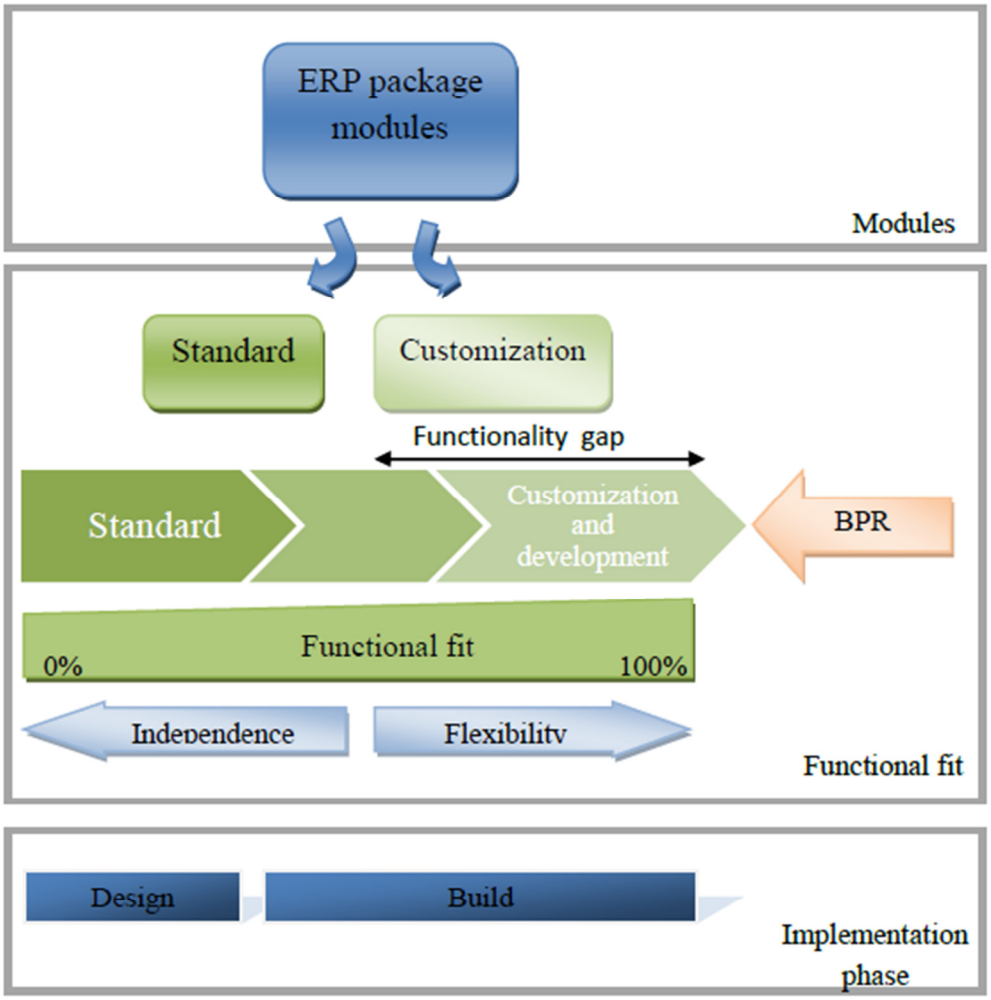


Figure 32 – Trade-off between standard versions and customizations performed (CompelConsultancy, 2011)

In spite of already having the prototype well advanced, until this point there is no indication that Sonafi's ERP may need big customizations. The business processes performed at this company do not escape largely from manufacturing industry practices, hence, the only changes that may be necessary are alterations on documents.

1.25 Results evaluation

Throughout Chapters 3 and 4, the problems apprehended from the meetings with the client's project director were already discussed, as well as the many advantages and changes brought by the new ERP version.

However, there is not yet a concrete, summarized, comparison between the two systems. Table 7 outlines the practical implications and improvements to be achieved upon system migration.

Table 7 – Summary of improvements with the new ERP LN FP7

Problems in Baan	Solutions with LN
Documents that have to be printed but are not necessary	Only the delivery note, an obligatory document to accompany the shipment, is printed
There is no unique procedure to complete consignment, so it is necessary to create a SS plus a sales order to perform consignment	There is a specific, appropriate, process for this case, and it can all be performed on the same SS
It is not possible to reprint a label, if the information is changed	Flexibility was added on the session to print labels
The software only allows the entire manufacturing order to be subcontracted	Multiple order statuses are used to control production. This mechanism allows you to determine what subcontracting orders can be generated at a specific stage in the production
Material requirements planning is not performed: sales, purchases, and manufacturing are not linked	The module "Enterprise planning" adds and improves functionality, with master planning and detailed order planning performed more simply. It only depends on managers to start using the functionalities already present on the software
Lack of accurate information inserted in the system by employees	With the right training and clarification, users can learn how to work the system correctly
In general the processes are confusing and information is difficult to find	This version is much more user-friendly, with many functionalities (dashboards, header and lines all in the same session, filters…) to make navigation easier
Reluctancy to change from Excel to the ERP	Besides having integration with Microsoft Office, which can create a bridge between the change, since user will have training, there is a new opportunity to make them realize the advantages

Comparing with the objectives proposed on chapter 3 – visibility of business operations, improved operation efficiency, and deliver clients' orders faster – they can only be measured after the project is finished, that is, after the new version is installed, all training conducted, and having the system up and running for a some weeks. Nonetheless, until this point we can conclude that the enhancements proposed have all the potential to provide the mentioned improvements, especially if the company starts using Enterprise Planning, to have a complete vision on the SC.

Even so, if they continue to do the same, they will be able to do it better, as shown in Table 7. The processes presented in this document fairly distinguish "who does what", so each user knows his function. However, at the same time, presented with an overall insight on the process, the user also knows what the other departments need.

Conclusions

In this dissertation, we have discussed how an ERP implementation represents a great risk of failure, either by exceeding time or/and budget. The main reasons given for this problem are the lack of top management commitment, the absence of change management, and excessive software customization. Some of the other causes mentioned are poor training, the project team, and not using consultants. The challenge is analyze all obstacles to the project and grab the vast potential improvements ERP has to offer.

ERP solutions are appropriate when a company is seeking the benefits of EI and best practices in its information system. After accomplishing an effective information flow across all departments, enterprises are on the right path to achieve unification with business partners, in order to improve customer service.

Sonafi already has an ERP system installed, Baan IV, however, as an automotive component supplier, this company knows that his clients' requirements change fast, and they have to be prepared. Moreover, if they fail the delivery dates, they lose the clients. So, they decided it was time to upgrade their system, in order to assure the use of the most modern practices.

To achieve the maximum benefits possible from the implementation of the ERP LN FP7, an implementation methodology was followed. OPIM has five stages, but during a period of five months when the author was at ID6, only the first three were conceived – initiate, design, and build.

Although the implementation was not completed, throughout the time the dissertation endured, the intricacy of the project was clear. The reality is complicated in companies where there are different opinions and more than one person in charge. Consultants had to face contrary interests, and overcome politics to push the project's initiation, seen as the support from the client's management was not clear from the beginning.

Regarding the other critical success factors to succeed in an ERP implementation, some will depend on training, but it is safe to say that excessive customization will not be an obstacle. Sales Order Fulfillment was the business process chosen to start the prototype because it is the more complex procedure they currently perform with the ERP system. Comparing the two types, normal SS and consignment, although they have some differences between them, both can not only be adapted from Baan to the LN, but even improved.

One other objective of this project was to assure that the business processes could be performed without the use of an extension, such as the one added to the supply chain on Baan IV. This goal was achieved completely, seen as the standard version of LN is prepared for all types of sales orders performed by Sonafi.

For someone who had never even seen how an ERP works, but rather possessed only theoretical knowledge on what it should do, it was challenging to study not only one system, but two. This study also allowed the author to have a clear picture of the discrepancies, not already being used to navigate on one of them. Also, the author is confident that now that she knows the functions, the buttons, and the sessions of the ERP, it will be much quicker and easier to install other business processes.

From the developments performed until this point – parameterizations completed, test data inserted, and the most important business process studied – the enhancements are clear. Besides an evident ease of use, which goes in favor for the users who are against changing from other applications to the ERP system, steps to accomplish the sale are reduced, with no

unnecessary documents printed and more flexibility allowed by LN. For sure, these improvements will have to be greatly highlighted during future training, in order to balance the change introduced, and, above all, to install a sense of necessity. Everybody needs to understand that their work is not at risk. On the contrary: it would be facilitated.

One other change that could largely improve efficiency would be the use of a master plan, in order to link the entire company. With this introduction, the use of complementary programs would be drastically reduced, if not abolished. All information concerning the SC would be integrated, all departments would share information, operations would be completed faster, and, finally, customers would receive their products in a shorter time. This is the main objective of an ES such as an ERP, and currently is not being utilized.

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Appendix A: Organizational Chart

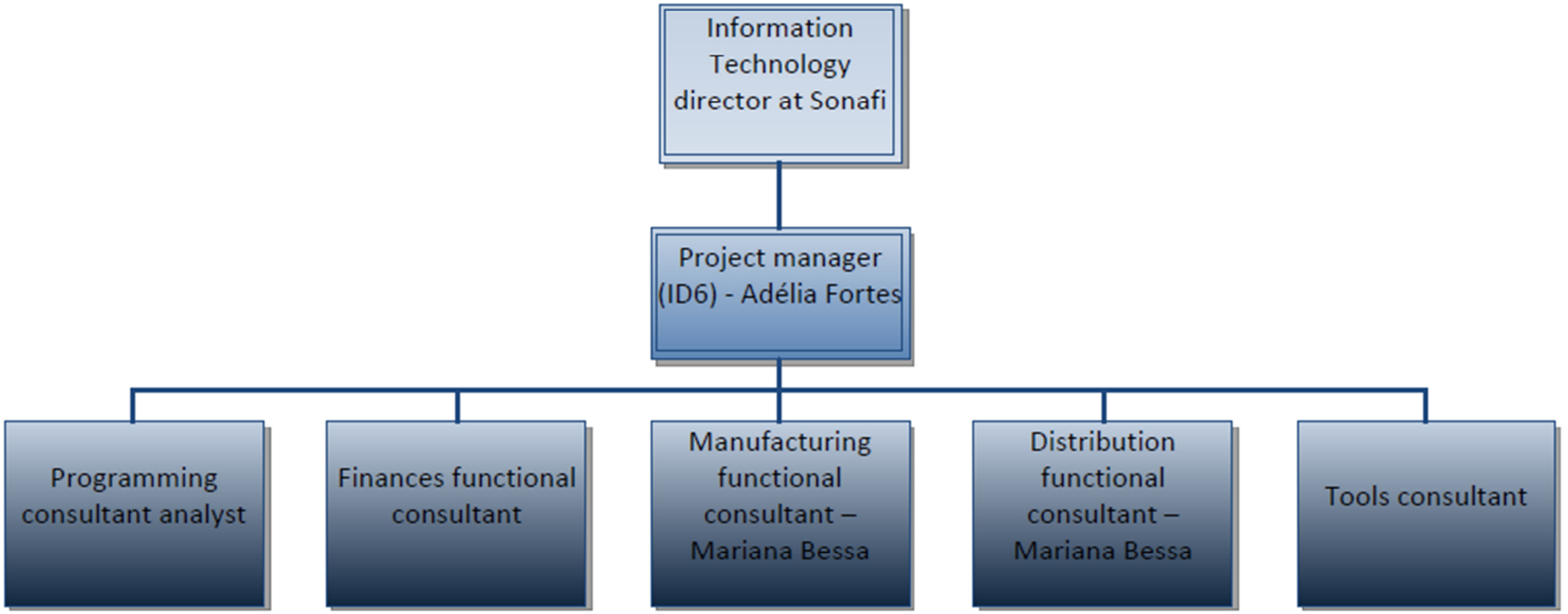

Figure 33 – Sonafi's project organizational chart

Appendix B: Detailed plan

		04-Abr	11-Abr	18-Abr	25-Abr	02-Mai	09-Mai	16-Mai	23-Mai	30-Mai	06-Jun	13-Jun	20-Jun	27-Jun	04-Jul	11-Jul	29-Ago	05-Set	12-Set	19-Set	26-Set	03-Out	10-Out	17-Out	24-Out
Supervisora do projecto - Adélia Fortes		1,0	1,0	1,0	1,0	2,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0								2,0		
Consultor Funcional Manufactura - Mariana Bessa		2,0	1,0	1,0	2,0		1,0	1,0	1,0	1,0		1,0		1,0											
Consultor Funcional Distribuição - Mariana Bessa		2,0	4,0	4,0	4,0	4,0	4,0	2,0	2,0	4,0	3,0	4,0	1,0	3,0	3,0										
0. Project Start	Resp																								
Organização do Projecto - plano de trabalho detalhado	Infor																								
Acompanhamento	Infor																								
Parametrizar ERP LN na ID6	ID6																								
Instalar acesso remoto ao FP7 da Sonafi	ID6																								
1. Project start finished																									
Recolha de dadosFinanças	ID6																								
Recolha detalhada de dados - Armazéns	ID6																								
Recolha detalhada de dados - Fabrico	ID6																								
Recolha detalhada de dados -Manutenção e Qualidade	ID6																								
Recolha detalhada de dados - Order to Cash	ID6																								
Recolha detalhada de dados- Order to Pay	ID6																								
Recolha detalhada de dados - EDI	ID6																								
Escrever e validar o relatório da recolha detalhada de dados	ID6																								
Determinar e especificar necessidades de desenvolvimento e interfaces a desenvolver	ID6																								
Formação aos utilizadores chave	ID6																								
Elaboração, apresentação e aceitação do modelo	ID6																								
2. Design finished																									
Carregar dados de teste	ID6																								
Eelaborar orçamento de personalizações : fichas caixa, vale trabalho, OC, OV, FAT, GR Nor	ID6																								
3. Simulation finished																									
Atualizar Infor ERP LN com as weeklys solutions	ID6																								
Executar protótipo	ID6																								
Tarefas de ajustes e remodelagem	ID6																								
Aceitar protótipo	ID6																								
Definir acessos e menus dos utilizadores + finalização DEM	ID6																								
4. Deploy I finished																									

Figure 34 – Planned tasks and respective dates for ERP LN implementation at Sonafi

The yellow color indicates work in which the author participated, under the care of her supervisor. The other colors represent work performed by other consultants.

Table 8 – Project activities and responsible team members

					Type of activities								
		Company	Name	Initials	Project management	Facilities	Design	Validation	Development	Documentation	Users training	Data load	Start-up and support
Administration Team	Client's project director	Sonafi											
	Infor project's manager	Infor											
Execution	Supervisor	Infor	Adélia Fortes	AF									
	Finances functional consultant	ID6											
	Manufacturing functional consultant	ID6	Mariana Bessa	MB									
	Distribuition functional consultant	ID6	Mariana Bessa	MB									
	Tools technology consultant	ID6											
	Analyst programmer consultant	ID6											

Deliverables
Project plan
Project progress report
Application installation report
Process and requirement analysis
Process DEMs
Customization analysis
Customization testing
Training documentation
Basic and master data definition
Operational data definition

Figure 35 – Deliverables expected from activities