DOKUZ EYLÜL UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

PROJECT MANAGEMENT BASED PRODUCTION IMPROVEMENT: HOLD LIST MANAGEMENT BY USING ERP SYSTEM

by

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M.Sc THESIS EXAMINATION RESULT FORM

We have read this thesis entitled **"PROJECT MANAGEMENT BASED PRODUCTION IMPROVEMENT: HOLD LIST MANAGEMENT BY USING ERP SYSTEM"** completed by **Önder YALTIR** under supervision of **Asst. Prof. Mehmet ÇAKMAKÇI** and that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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ABSTRACT

The consumer electronics industry is one of the most competitive sectors in the world. To stay ahead of competitors, companies must constantly move into new markets emerging around the world. Meanwhile, to keep pace with consumer demand for exciting products at attractive prices, manufacturers must take full advantage of low-cost studies. The main difficulty for low cost studies is the lost time and manpower because of the problems which have not defined priorities.

The aim of this thesis is to implement an automatic hold list program to define the priorities of the problems. In the direction of this aim, a module has been created in SAP which is the one of the biggest Enterprises Resource Planning Program in the world and illustrated with a case study in the one of the biggest electronics company of Turkey.

Furthermore, the propositions about the future of the program are given.

Keywords: Enterprise resource planning, hold list, scheduling, implementation

PROJE YÖNETİMİ YAKLAŞIMIYLA ÜRETİMİN İYİLEŞTİRİLMESİ: ERP SİSTEMİ KULLANIMIYLA HOLD LİST YÖNETİMİ

ÖZ

Elektronik sektörü dünyanın en rekabetçi sektörlerinden biridir. Diğer firmalarla rekabet edebilmek için firmaların sürekli dünyada yeni pazarlar kazanması gerekmektedir. Bu arada uygun fiyatlı ilgi çekici ürünlere olan tüketici talebine ayak uydurmak için üreticiler düşük maliyet avantajına sahip olmalıdırlar. Düşük maliyet çalışmaları için ana zorluk kayıt edilmemiş olan ve öncelikleri belirlenmeyen problemlerden kaynaklanan zaman ve iş gücü kayıplarıdır.

Bu tezin amacı problem önceliklerinin belirlenmesi için otomatik bir hold list programının kurulmasıdır. Bu amaç yönünde dünyanın en büyük kurumsal kaynak planlama programlarından birinde bir modul oluşturulmuş ve Türkiye nin en büyük elektronik şirketlerinden birinde bir örnek çalışması ile açıklanmıştır.

Ayrıca gelecekte bu program ile ilgili neler yapılabileceği hakkında öneriler verilmiştir.

Anahtar sözcükler: Kurumsal kaynak planlama, Hold Listeleme, çizelgeleme, uygulama

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

The business environment is dramatically changing. Companies today face the challenge of increasing competition, expanding markets, and rising customer expectations. This increases the pressure on companies to lower total costs in the entire supplier chain, shorten throughput times, drastically reduce inventories, expand product choice, provide more reliable delivery dates and better customer service, improve quality, and efficiently coordinate global demand, supply and production.

In this sense, problem scheduling during product developing process is a critical activity in organizations to survive in the increasingly competitive global markets by reducing waste, cost, time and effort. For this reason, new methodologies in the problem scheduling methods are becoming higher importance for huge companies.

Enterprise resource planning (ERP) is a term derived from manufacturing resource planning (MRP II) that followed material requirements planning (MRP). ERP systems typically handle the manufacturing, logistics, distribution, inventory, shipping, invoicing, and accounting for a company. ERP software can aid in the control of many business activities, like sales, delivery, billing, production, inventory management, quality management, and human resources management. (http://en.wikipedia.org/wiki/Enterprise_resource_planning).

In this study, Hold list which is the one of the problem scheduling methods has been implemented in SAP, in order to make the control of the business activities explained above easier.

The aim of Hold List is to bring the required information at the right time to the person who is expected to choose between different problems in product developing

process. Hold list system starts with DI list (product specification) from marketing department and finish after defining the priority of the problems.

R&D department investigates almost 223.000 components in a year. Hold list includes 132.000 of these components because of their problems.

In order to determine the problems and find out the job schedule, all control stages were examined in SAP R/3 as ERP software used for process management in the firm. To reach an exact result, a module has been created in this software.

In the progress of study, SAP was used as a project management tool that will assist to show with output screens. At the end, organization changed its job schedules and by giving the right information, satisfied the customer.

1.2 Objectives of study

The objectives of study can be sequenced as below;

- To introduce and provide a framework for improvement of material requirements planning by using problem scheduling method.
- To describe the major concepts such as Project Management (PM), Enterprise Resource Planning (ERP) and Total Quality Management (TQM).
- To describe the major problem scheduling tools such as ERP, PM and hold list.
- To provide and understanding of how the hold list technique can be used in ERP software
- To implement the technique in an electronics industry
- To manage the projects by problem scheduling tool to use resources effectively and realize the tasks successfully.

1.3 Outline of thesis

The thesis was prepared as seven chapters. In the first chapter, study was summarized under introduction title and main objectives of study were mentioned.

In the second chapter literature was searched and presented some definitions about PM, ERP, and TQM.

In chapter three, project management concept was explained with some definitions, tools and methods.

In the following chapter, enterprise resource planning was introduced with its concepts, implementation ways, strategic factors, advantages, disadvantages and limitations.

In the fifth chapter total quality management definitions and key factors were investigated.

In the sixth chapter, the electronics company that the project implemented was told with an overview.

In the seventh chapter, an application was made in electronics industry. The main task of the project was presented that actualization of hold list program and implementation in the factory with SAP R/3.

Finally, the conclusion of the thesis was presented in the last chapter.

CHAPTER TWO
REVIEW OF LITERATURE

We draw upon the studies in the last 20 years about PM , TQM and ERP that have sufficient grounding but we couldn't find any article about the main subject in this article *hold list* which used in the industries for scheduling the problems in production. It is considered the research on PM, TQM and ERP.

Hold List in this article is used as a method that makes the schedule possible for problems in R&D department. To aim of this study is to create a scheduling method. When necessary of the creating we use PM, TQM and ERP approaches.

The main factor of hold list is the information flow management between the departments. Project management system is the best solution to implement an active information flow. The company in this research tried to develop its project management systems to create an automatic hold list program.

On the other hand, to get better feedback from the hold list, companies should consider TQM key components on their management structure. Continuous improvement is the basic principle for hold list management system. For all problem solution, departments should make improvement to prevent the repeating of the problems.

Due to the information above, PM and TQM has been investigated in this research.

From regular reading of Engineering Management Journal and other periodicals, it can be seen that there are any numerous of systems, methodologies, theories and fads which are all claimed to be the preferred method of managing a project (Probert 1997).

The professional field of project management today is diverse, multifaceted and contradictory in several respects. On the one hand is the explosive development of professional organizations, such as the Project Management Institute (PMI) and the International Project Management Association (IPMA). These associations are not only known as organizers of a number of conferences, but also as promoters of the standardization of project management and certification programs for project managers. We have here a field of professionals, virtually flourishing, which attracts an increasing amount of members, who, as it seems, require standards, techniques and certification programs for their professional development. The interest in project management showed by professionals is, of course, explained by a general increase in the way of organizing business activities in projects (Söderlund 2003).

Since the beginning of the 1990s writers have introduced terms such as "modern project management", "management-by-projects", projects (project management) culture and "beyond the Gantt chart" to distinguish contemporary and future forms of project management (PM) from traditional and past forms. For example, see Cleland (1994), Gareis (1992), Firth and Krut (1991), Chaffey (1997) and Maylor (2001). The common thread joining these terms together is a belief that the theory and practices of PM has fundamentally changed over the past decade. The chief concern of writers who describe these changes in the discipline is the need to ensure that PM remains a useful management tool for practitioners in today's business environments. Writers suggest that in order to stay relevant and useful the academic discipline of PM must be updated to reflect changes in practice. For example, in reporting on a study of the effectiveness of planned and emergent PM styles of leadership, Lewis *et al.* (2002) conclude that in the "tough, dynamic and demanding" world of new product development projects, traditional models proposing an either/or style of PM are no longer appropriate. Likewise, in outlining the inadequacies of traditional forms of PM in today's global markets, which are characterized as being "saturated, hyper-competitive and fast-moving", Maylor (2001) states that a new set of normative models of PM practice and performance are needed in place of the traditional models (Bryde 2003)

Perhaps the most economic definition of a project is coined by Juran, where he argues that a project is a problem scheduled for solution. This definition emphasizes the problem-solving nature of project business in general; once the problem or objective is defined then the most prominent solution or work plan is allocated according to predefined time constraints.

It has previously been suggested that an organization undertaking several projects should adopt a common project management approach for all projects in the program, regardless of the type of project, its size or type of resource used.

Oilsen almost 50 years ago suggested cost, time and quality as the success criteria bundled into the description. Wright reduces that list and taking the view of a customer, suggests only two parameters are of importance, time and budget. Many other writers Turner, Morris and Hough, Wateridge, deWit, McCoy, Pinto and Slevin, Saarinen and Ballantine all agree cost, time and quality should be used as success criteria, but not exclusively. Temporary criteria are available during the delivery stage to gauge whether the project is going to plan. These temporary criteria measurements can be considered to be measuring the progress to date, a type of measurement which is usually carried out as a method of control. For example Williams describes the use of short term measures during project build, using the earned value method which when less than actual costs indicates the project is going off track. deWit however points out that when costs are used as a control, they measure progress, which is not the same as success.

In this study we will try to create a scheduling program from the point of the Project management approach using the TQM techniques.

The relationship of the TQM practice is positively associated with operational performance measures and the implementation of the TQM practices marginally affects actual improvement of organizational performance (Jung & Wang 2004).

In last two decades, both the popular press and academic journals have published a plethora of accounts describing both successful and unsuccessful efforts at implementing TQM.

Dean And Bowen suggest that TQM is a manufacturing program aimed at continuously improving and sustaining quality products and processes by capitalizing on the involvement of management, workforce, suppliers and customers, in order to meet or exceed customer expectations. A comparison of the practices of TQM discussed in six empirical studies (Saraph et al., 1989; Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Black and Porter, 1996; Samson and Terziovski, 1999) leads to the identification of nine practices that are commonly cited as part of a TQM program. These practices are cross-functional product design, process management, supplier quality management, customer involvement, information and feedback, committed leadership, strategic planning (Cua., McKone & Schroeder 2001).

One of the early research works of defining what elements constitute the TQM practice in measurement study was conducted by Saraph et al. (1989). Since then numerous versions of related studies were conducted by authors including Flynn et al. (1994), Black and Porter (1996), Choi and Eboch (1998), Samson and Terziovski (1998), and Kaynak (2003).

In the late 1970s and early 1980s, previously unchallenged American industries lost substantial market share in both US and world markets. To regain the competitive edge, companies began to adopt productivity improvement programs which had proven themselves particularly successful in Japan. One of these "improvement programs" was the total quality management (TQM) system (Kaynak 2002) .

CHAPTER THREE
PROBLEM SOLVING BASED PROJECT MANAGEMENT SYSTEM

3.1 PROJECT MANAGEMENT

The need for a strong emphasis on fast and effective information loops, within R&D as well as between production and customer, emerges from four trends in electronics industry (Petkova , Yuan , Ion & Sander 2004).

- Due to recent advances in (digital electronics and software) technology, increasingly complex products are put on the market.

- Technological innovations put a pressure on the time to market.

- Due to the increasing globalization, more and more R&D is divided over partners in different parts of the world, e.g. design, engineering, suppliers, production, assembly. This requires efficient information and communication systems.

- Customers expect very complex products to work according to their (customers') requirements, regardless of the product specifications.

All of the last developments explained above some companies start to use hold list system to schedule the problems in R&D works. This system is explained in detail at section seven.

Hold list system uses project management tools for managing the problems.

Project Management is the application of a collection of tools and techniques (such as the CPM and matrix organisation) to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints. Each task requires a particular mix of theses tools and techniques

structured to fit the task environment and life cycle (from conception to completion) of the task (Atkinson 1999).

In the literature, there has been quite some attention to the vital role of information flows in situations where a high degree of innovation forces manufacturers to speed up product creation processes to the limit.

Integration of heterogeneous operational data sources was becoming necessary to supply reliable data for decision support activities. These data sources had evolved independently, which resulted in much data duplication and inconsistency. The company had created operational data stores (ODS) that combined data from transactional systems. Corporate ODS, such as the financial system, had a broad scope that could be accessed across the company; whereas, departmental ODS, such as the client management system, was created for departmental use. They used DWG technology (i.e. star schema) to provide an integrated view of data for operational purposes. They assisted day-to-day business processes, but were not intended for decision support.

Data warehousing, which implements a shared data warehouse and/or subject-oriented data mart, has become a central process for decision support-oriented data management. From its beginning as a little-understood experimental concept only a few years ago, it has reached a stage where nobody questions its strategic value. Statistical indicators and surveys show that the number of companies that already own or are currently building the decision support platform is exploding; large enterprises are involved in at least one or more related projects. Databases tuned for operational and transactional use are, in general, not structured to satisfy information demand from managers. There is a growing utility gap between operational systems and decision support systems, making DWG increasingly essential to organizational decision-makers. Its vital role continues to expand as the market becomes more customer-centered and demands sophisticated business intelligence (Shin 2001).

Another important reason for conducting DWG at the company was to minimize procedural duplication and deliver information in a more consistent manner. The company's business units were organized into three different customer levels: individual, group and corporate. (Shin 2001) However, information requirements from the individual and the group customer business units overlapped. In the traditional nonintegrated database environment, therefore, duplicative efforts were difficult to avoid when retrieving the same piece of information. In fact, top management thought that substantial reduction of process overlap alone was enough justification for the multimillion dollar effort. Another potential benefit was that using a single data source could facilitate business process re-engineering at the company.

Besides, effective service data management and data delivery process could be achieved by expanding mere departmental and stovepipe knowledge into cross-functional and integrative business intelligence. This could enable the company to better compete by learning from the past, analyzing current situations, and predicting the future (Shin 2001).

The function of an information list is to bring the problem information at the right time to the person who need to research and development activities require two kinds of information like technical and statistical information (Petkova , Yuan , Ion & Sander 2004).

- Technical information enables product designers and developers to come up with technical solutions that transform ideas in real products. It also supports engineers to technically improve the product in case the product quality/reliability is below standard. For example, in case of customer complains, a root cause analysis is based on technical information. From this description, it follows that technical information is in particular relevant on the executive level.

- Statistical information which is required to collect quantitative information about the frequency of product failures. This type of information not only proves, for

example, whether a product family satisfies company requirements for product reliability, it is also essential for reliability prediction of new products. It follows that statistical information is in particular relevant on the tactic and strategic levels

Statistical information is necessary for, among others, the following reasons(Petkova , Yuan , Ion & Sander 2004):

- To determine the absolute levels of defects.

- To find out whether there are modules/components that fail relatively often.

- To assess the lifetime distribution of the time to first failure; this is, for example, relevant for warranty purposes.

- To determine whether the company is learning from the past, for example by checking whether there are any differences in product quality over different types of products, or over product generations.

From an information (flow) point of view the general approach of a problem is the following (Petkova , Yuan , Ion & Sander 2004):

1. Start with a preliminary definition of the problem and an overview of the decisions that might be relevant.

2. Determine who should be involved in the problem definition, problem analysis, data collection and problem solving process.

3. Determine what information is necessary and when it has to be available.

4. Check whether the necessary information is available (and correct) or can be collected in time.

5. Collect and analyse the data with the relevant decisions in mind.

6. Translate the results of the analysis in decisions (and actions).

In the last decade, the concept and technology of concurrent engineering (Laszlo 1999) has been extensively applied in the product development process. Complicated cross-functional problems arise, which can be attributed to communication and coordination problems between each functional department. Projectoriented project management has been applied in product development within an organisation structure.

Various organisational structures for project management described in published literature can be summarised as:

- Functional team structure.
- Lightweight team structure.
- Autonomous team structure.
- Heavyweight team structure.

A functional team structure is the most common structure in the product development process. The functional manager of each functional department is responsible for the business of that particular department. Complicated cross-functional problems of communication, coordination and decision-making occur in product development as the time requirement becomes more important.

The solution of the cross-functional problem usually involves the creation of a project-team independent of the functional departments in the organisation. The project-team members come from the related functional departments and represent the perspectives of their departments. A project manager (PM) is responsible for horizontal communication, coordination and decision-making. Recent research involving organisational development has addressed lightweight, autonomous, and heavyweight team structures [22].

In every discipline, as well as in systems and software engineering, the production or development of a product always starts with a problem and comes up with a solution .The process of problem solving consists of two parts in the planning phase the project is defined, structured, and detailed; during the realization phase the product is developed and installed (Hofer, 1996).

The systems approach characterizes the global approach to problem solving, a systems-oriented thinking, structuring, and acting, while the methods of systems development and project management stand for the techniques that are used during the process of problem solving.

The problem-solving process describes the transition from an initial state (the problem) to a desired end state (the solution).

Successful project management is the most important foundation for transforming the conception of the planning phase. Project management is composed of the following functions (Hofer, 1996).

1. Implementation of the project organization. The project organization decides who is responsible for which task and how many hours of a person's work time are spent on the project. Project committee, project leader, and project team are the main factors in a project organization.

2. Preparation of the project. The project leader has to provide the needed infrastructures (e .g., rooms, methods, tools, training of staff).

3. Leading of the project. During the realization of the project, the project leader must be in constant contact with the project committee for controlling purpose s and with the project team for organizing purposes.

4. Quality assurance. A review team should be installed for quality assurance. At the end of de fined states of the project, the results are checked and recommendations for

enhancements or for the further work are submitted to the project leader or the project team.

The primary aim in project management is to control the development process in such a way that the resulting product is delivered (Hofer, 1996).

1. On time
2. Within budget
3. Of acceptable quality and re liability
4. Meeting customer's requirements and expectations
5. Satisfying the specification

The project manager's goal is to guarantee that the software product can be developed with the planned resources staff, tools, working material to fulfill these conditions with an economically justifiable expenditure. The manager's main tasks are the planning, organizing, and technical and economical controlling of the project.

To illustrate the level of detail necessary, the program manager personally met with the more than 60 subcontractors and vendors on the program. Many were surprised that the program manager and his team would invest their time and energy before winning a contract to proceed. However, these same vendors and subcontractors responded positively when the program manager explained that this detailed information was required to make an effective strategic decision with regard to potential overall project cost savings. So, the program manager and his engineering design team studied every module, subsystem and component and reviewed the following information:
Requirements, trade studies, design policy, design analysis, configuration management, design reviews, built-in-test, production design, design for testing, computer-aided design, design to unit production cost, life cycle cost, standardization, and design of software.

Then, the project manager asked these vendors and subcontractors, ``What cost

savings ideas, quality improvement or design innovations have you considered?'' By drilling down into these specific details, a comprehensive cost model was developed with high confidence (Kang & Young 2000).

The most important organizational tasks of project management are as follows:

1. Arrangement of teams. Administration, form of organization, and members of the development team have to be chosen.

2. Definition of tasks, rights, and obligations. Each person involved in the project has to know what he or she has to do.

3. Definition of methods. Project standards, development tools, and methods must be defined and provided.

4. Regulation of communication. Dates for project meetings and guidelines for documentation are established.

During project management two different types of project organization can be distinguished: while the structure of the organization regulates the cooperation of all persons involved in the project, process organization prescribes phases, formalisms, and methods of the project. If projects of an organization are similar in size and scope, the organizational structure can be left unchanged for different projects. Process organization is always project specific and has to be adapted for each project (Hofer, 1996).

CHAPTER FOUR
ENTERPRISE RESOURCE PLANNING

4.1 ERP Overview

Enterprise Resource Planning is an industry term for integrated, multi-module application software packages that are designed to serve and support multiple business functions. An ERP system can include software for manufacturing, order entry, accounts receivable and payable, general ledger, purchasing, warehousing, transportation and human resources. Evolving out of the manufacturing industry, ERP implies the use of packaged software rather than proprietary software written by or for one customer. ERP modules may be able to interface with an organization's own software with varying degrees of effort, and, depending on the software, ERP modules may be alterable via the vendor's proprietary tools as well as proprietary or standard programming languages. (ERP Overview, n.d.)

The focus of manufacturing systems in the 1960's was on Inventory control. Most of the software packages then (usually customized) were designed to handle inventory based on traditional inventory concepts. In the 1970's the focus shifted to MRP (Material Requirement Planning) systems that translated the Master Schedule built for the end items into time-phased net requirements for the sub-assemblies, components and raw materials planning and procurement.

In the 1980's the concept of MRP-II (Manufacturing Resources Planning) evolved which was an extension of MRP to shop floor and Distribution management activities. In the early 1990's, MRP-II was further extended to cover areas like Engineering, Finance, Human Resources, Projects Management etc i.e. the complete gamut of activities within any business enterprise. Hence, the term ERP (Enterprise Resource Planning) was coined. (ERP Overview, n.d.)

By becoming the integrated information solution across the entire organization, ERP systems allow companies to better understand their business. With ERP software, companies can standardize business processes and more easily enact best

practices. By creating more efficient processes, companies can concentrate their efforts on serving their customers and maximizing profit. (ERP Overview, n.d.)

The top five ERP vendors, SAP, Oracle Corporation, Peoplesoft, Inc., JD Edwards & Company, and Baan International, account for 64 percent of total ERP market revenue. These vendors continue to play a major role in shaping the landscape of new target markets, with expanded product functionality, and higher penetration rates. (ERP Overview, n.d.)

Industry analysts expect that every major manufacturing company will buy the software, which ranges in cost -- with maintenance and training -- from hundreds of thousands of dollars for a small company to millions for a large company. AMR Research of Boston says consolidation among the major players will continue and intensify. ERP vendors are expected to put more effort into e-commerce, CRM and SCM initiatives, with leaders redirecting between 50% and 75% of their R&D budget to these projects. (ERP Overview, n.d.)

According to Gartner research group, the rapid evolution of ERP has already lead to a new corporate must-have, ERP II, which is supposed to help businesses gain more competitive edge in the future. The major difference is that ERP II involves collaborative commerce, which enables business partners from multiple companies to exchange information posted on eCommerce exchanges. (ERP Overview, n.d.)

4.1.1 ERP Implementation

Over the past few years there has been increasing interest in project management as a vehicle for strategy implementation. This interest has resulted in significant advances in:

a) our understanding of how strategy can be more effectively implemented;

b) our notion of what 'project management' can, and should, stand for.

Dealing first with (a), it has been recognized for many years that implementation is frequently the graveyard of strategy.' But although implementation is touched on by core texts on strategic management (for example), implementation rarely gains the prominence which it deserves. Arguably strategic management should achieve its very own 'paradigm shift ' by moving *from* a 90:10 concern with strategy formulation relative to implementation *to* at least a 50:50 concern with each.

Turning next to (b) the role of project management, project management's core concern is to deliver a specific result in a particular time and at a particular cost. Traditional project management focuses on deliverables (or 'outputs'), on scheduling and co-ordinating tasks, and on mobilizing resources. Principally, traditional project management deals with 'hard' task based business issues, as opposed to 'softer', less tangible factors, except perhaps for defining the role of project manager and the project team (Grundy 1998).

Because of their wide scope of application within the firm, ERP software systems rely on some of the largest bodies of software ever written. Implementing such a large and complex software system in a company used to involve an army of analysts, programmers, and users. This was, at least, until the development of the internet allowed outside consultants to gain access to company computers in order to install standard updates. ERP implementation, without professional help, can be a very expensive project for bigger companies, especially transnational. Companies

specializing in ERP implementation, however, can expedite this process and can complete the task in less than six months with solid pilot testing.

Enterprise resource planning systems are often closely tied to supply chain management and logistics automation systems. Supply chain management software can extend the ERP system to include links with suppliers (http://en.wikipedia.org/wiki/Enterprise_resource_planning).

To implement ERP systems, companies often seek the help of an ERP vendor or of third-party consulting companies. Consulting in ERP involves two levels, namely business consulting and technical consulting. A business consultant studies an organization's current business processes and matches them to the corresponding processes in the ERP system, thus 'configuring' the ERP system to the organization's needs. Technical consulting often involves programming. Most ERP vendors allow modification of their software to suit the business needs of their customer.

Customizing an ERP package can be very expensive and complicated, because many ERP packages are not designed to support customization, so most businesses implement the best practices embedded in the acquired ERP system. Some ERP packages are very generic in their reports and inquiries, such that customization is expected in every implementation. It is important to recognize that for these packages, it makes more sense to buy third party reporting packages that interface well to particular ERP, than to reinvent what tens of thousands of other clients of that same ERP have needed to develop.

Today there are also web-based ERP systems. Companies would deploy web-based ERP because it requires no client side installation, and is cross-platform and maintained centrally. As long as you have an Internet connection, you can access web-based ERPs through typical web browsers

Implementing an ERP system is not an inexpensive or risk-free venture. In fact 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems.

Numerous authors have identified a variety of factors that can be considered to be critical to the success of an ERP implementation. The most prominent of these are described below (Umble, Haft, Ronald & Umble 2002).

Table 4.1 Critical factors of strategic goals

Clear understanding of strategic goals	ERP implementations require that key people throughout the organization create clear, compelling vision of how the company should operate in order to satisfy customers, empower employees, and facilitate suppliers for the next three to five years.
Commitment by top management	Successful implementations require strong leadership, commitment and participation by top management.
Excellent project management	Successful ERP implementation requires that the organization engage in excellent project management. This includes a clear definition of objectives, development of both a work plan and resource plan and careful tracking of project progress.
Organizational change management	The existing organizational structure and processes found in most companies are not compatible with structure, tools, and types of information provided by ERP systems.
A great implementation team	ERP implementations teams should be composed of top notch people who are chosen for these skills, past accomplishments, reputation and flexibility. These people should be entrusted with critical decision making responsibility.
Data Accuracy	Data accuracy is absolutely required for an ERP system to function properly. Because of the integrated nature of ERP, if someone enters the wrong data, the mistake can have a negative domino effect throughput the entire enterprise. Therefore educating users on the importance of data accuracy and correct data entry procedures should be a top priority in an ERP implementation.
Extensive education and training	Education/training is probably the most widely recognized critical success factor, because user understanding and buy-in is essential. ERP implementation requires a critical mass of knowledge to enable people to solve problems within the framework of the systems. If the employees do not understand how a system works, they will invent their own processes using those parts of the system they are able to manipulate

4.2 Advantages of ERP

In the absence of an ERP system, a manufacturer in need of what it has to offer, may find itself with many software applications that do not talk to each other and do not effectively interface. Tasks that need to interface with one another may involve: design engineering (how best to make the product); order tracking from acceptance through fulfillment; managing interdependencies of complex bill of materials; tracking the 3-way match between Purchase orders (what was ordered), Inventory receipts (what arrived), and Costing (what the vendor invoiced); and the Accounting for all of these tasks, tracking the Costs and Profits on a granular level.

Change how a product is made, in the engineering details, and that is how it will now be made. Effectively dates can be used to control when the switch over will occur from an old version to the next one, both the date that some ingredients go into effect, and date that some are discontinued. Part of the change can include labeling to identify version numbers.

There are concepts of Front office (how the company interacts with customers), which includes CRM or Customer relationship management; Back end (internal workings of the company to fulfill customer needs), which includes quality control, to make sure there are no problems not fixed, in the end products; Supply chain (interacting with suppliers and transportation infrastructure). All of these can be integrated through an ERP, although some systems have gaps in comprehensiveness and effectiveness. Without an ERP that integrates all these, it can be quite complicated for a manufacturer to manage.

4.3 Disadvantages of ERP

Many of the problems that organizations have with ERP systems are due to the inadequate level of investment in ongoing training for all personnel involved, including those implementing and testing changes, as well as a lack of corporate

policies protecting the integrity of the data held in the ERP systems and how it is used.

4.4 Limitations of ERP Include:

-Success depends on the skill and experience of the workforce, including training about how to make the system work correctly. Many companies cut costs by cutting training budgets. Privately owned small enterprises are often undercapitalized, meaning their ERP system is often operated by personnel with inadequate education in ERP in general, such as APICS foundations, and in the particular ERP vendor package being used.

- Personnel turnover; companies can employ new managers lacking education in the company's ERP system, proposing changes in business practices that are out of synchronization with the best utilization of the company's selected ERP.

- ERP systems can be very expensive to install.

- ERP vendors can charge sums of money for annual license renewal that is unrelated to the size of the company using the ERP or its profitability.

- Technical support personnel often give replies to callers that are inappropriate for the caller's corporate structure. Computer security concerns arise, for example when telling a non-programmer how to change a database on the fly, at a company that requires an audit trail of changes so as to meet some regulatory standards.

- ERPs are often seen as too rigid, and difficult to adapt to the specific workflow and business process of some companies - this is cited as one of the main causes of their failure.

- Systems can be difficult to use.

- The system can suffer from the "weakest link" problem - an inefficiency in one department or at one of the partners may affect other participants.

- Many of the integrated links need high accuracy in other applications to work effectively. A company can achieve minimum standards, and then over time "dirty data" will reduce the reliability of some applications.

- Once a system is established, switching costs are very high for any one of the partners (reducing flexibility and strategic control at the corporate level).

- The blurring of company boundaries can cause problems in accountability, lines of responsibility, and employee morale.

- Resistance in sharing sensitive internal information between departments can reduce the effectiveness of the software.

- There are frequent compatibility problems with the various legacy systems of the partners.

- The system may be over-engineered relative to the actual needs of the customer (http://en.wikipedia.org/wiki/Enterprise_resource_planning).

CHAPTER FIVE
MANAGING THE PROJECT WITH TQM

5.1 Managing the Project within TQM

TQM can be defined as a holistic management philosophy that strives for continuous improvement in all functions of an organization, and it can be achieved only if the total quality concept is utilized from the acquisition of resources to customer service after the sale (Kaynak 2002).

Total quality management-TQM has been a popular intervention all around the world, but particularly so in industrialized countries (Samson & Terziovski 1999).

Hold list management uses total quality management philosophy to decrease the problems and therefore the production delays. Continuous improvement is the same basic principle for hold list and TQM.

Whether under a TQM or similar banner, most manufacturing companies in Europe, the USA, Japan and Australia have tried working in some way on improving the following key components of TQM (Samson & Terziovski 1999).:

- Leadership
- Management of people
- Customer focus
- Use of information and analysis
- Process improvement
- Strategic planning

5.1.1 Leadership

This element is considered the major ‘driver’ of TQM which examines senior executives’ leadership and personal involvement in setting strategic directions and building and maintaining a leadership system that will facilitate high organizational

performance, individual development, and organizational learning. TQM advocates emphasize the activities of senior leadership much like transformational leadership theory (Samson & Terziovski 1999)..

Management has a complex leadership role when implementing TQM. It is impossible to improve any organization's operations without a well-trained workforce. It is management that provides the resources necessary for training employees in the use of new principles and tools, and creates a work environment conducive to employee involvement in the process of change. And top management must ensure that the necessary resources for quality-related training are available (Kaynak 2002).

Effective leadership is also critical to effecting organizational changes—especially in purchasing that improve interactions with supply chain members (Cooper & Ellram 1993) To promote mutually beneficial relations with suppliers, management can, and probably should, privilege quality and delivery performance over price when selecting suppliers and certifying suppliers for material quality (Trent & Monczka 1999). Managing supplier relationships strategically is essential to the success of organization–supplier relationships because these partnerships require both a high level of commitment and an exchange of proprietary and competitive information. (Cooper & Ellram 1993)

5.1.2 Management of People

The main issue addressed in this category is how well the human resource practices tie into and are aligned with the organization's strategic directions. Excellence in this category, according to Garvin comes down to a simple test: the voice of the people. Our survey questions focused on training, development, communication, safety, multi-skilling and employee flexibility, employee responsibility and measurement of employee satisfaction (Samson & Terziovski 1999).

The fundamental principle that the project manager must keep in mind at all times is that he is to control processes, not people; he needs to manage the people, they control processes. Tools, processes, methods and techniques may be neat and helpful, but they are inanimate Alienated, empty, and dehumanized people are not motivated to contribute. The proper approach for the project manager is to avoid becoming enamored with techniques and to use people, but rather to use techniques and love people (Laszlo 1999).

It is advantageous to select personnel who fit the team profile whenever possible and to optimize the synergy among the participants by matching complementary skills. Another consideration for the project manager to keep in mind in evaluating potential contributors is to select for attitude and to train for skills (Laszlo 1999).

5.1.3 Customer Focus

This element addresses how and how well the organization determines current and emerging customer requirements and expectations, provides effective customer relationship management, and determines customer satisfaction (Samson & Terziovski 1999). We also measured the extent to which customer related information is disseminated through the organization and the extent of customer complaint resolution. Customer focus is the underpinning principle in the TQM philosophy (Samson & Terziovski 1999).

The concept of customer focus can be applied to project management to ensure that the project deliverables will meet the expectations of the intended recipients. It is one of the prime responsibilities of the project manager to ascertain that the customer needs – both those that are stated and those that are merely implied are known. Moreover, it is vital that these needs are accurately reflected in the project plans and the stated objectives. This information must be communicated to all participants to enable them to focus on the ultimate goal – customer satisfaction. This approach will avoid the “Techie syndrome” which is to become so enamored with any or all

aspects of the project as to forget that the project outcomes are not an end in themselves but were meant to fulfill a certain need (Laszlo 1999).

The project manager needs to ensure that applicable metrics are established for project variables. In order to use the results-oriented approach to project management that has proven to be so successful over the years, these are to be related to goals and deliverables. Certain project metrics need to be correlated directly with the stated and implied needs of the customer to ensure that the project deliverables will provide customer satisfaction. Changes to customer needs during the project require careful management and need to be documented and communicated to incorporate their implications into the project metrics (Laszlo 1999).

5.1.4 Use of Information and Analysis

This element is concerned with the ‘‘scope, management, and use of data and information to maintain a customer focus, to drive quality excellence, and to improve performance’’. The TQM philosophy emphasizes Decision making based on fact involving analysis of information about customer needs, operational problems, and the success of improvement attempts. Many popular TQM techniques (e.g. cause-and-effect analysis, Pareto charts) are aimed at helping organizations to process information effectively. The TQM literature suggests that organizations that consistently collect and analyze information will be more successful than those that do not. However, empirical studies in the literature suggest that the sort of information and analysis advocated by the TQM philosophy can actually inhibit organizational performance. For example, Fredrickson (1984) found that although comprehensive decision making was positively related to organizational performance in the highly stable paint industry, it was negatively related to organizational performance in the highly unstable forest product industry (Samson & Terziovski 1999).

5.1.5 Process Improvement

This element of TQM is concerned with how the organization designs and introduces products and services, integrates production and delivery requirements and manages the performance of suppliers. The core idea behind this principle of TQM is that organizations are sets of interlinked processes, and that improvement of these processes is the foundation of performance improvement (Samson & Terziovski 1999).

Process management is sometimes mistakenly confused with project management. There are definite distinctions between the two methods, but it is possible to manage a project as one complex process, although managing a project as a collection of processes provides more opportunities and benefits for the project manager.

It is advantageous for the project manager to identify the key processes within the project to have the opportunity to manage each process and coordinate them to avoid the burden of managing the complexity of the entire project as a single entity. This approach also provides the ability to focus on each process, and thus benefit from such established techniques as process control, process capability studies, and process optimization. However, even if the project manager does not wish to identify the key processes within the project, the entire project can still be managed as a process. The outputs and inputs for the project need to be identified, and then the process needs to be stabilized by incorporating solutions to customer requirements as well as current and foreseeable potential problems. The key process indicators that will be used to monitor progress and evaluate the outcomes of the project need to be established – both process-based and customer-based measurements are required to ensure appropriate process control (Laszlo 1999).

5.1.6 Strategic Planning

This element focuses on the organizations strategic and business planning and deployment of plans, along with the organization's attention to customer and operational performance requirements. The emphasis is on customer driven quality and operational performance excellence as key strategic business issues that need to be an integral part of overall business planning. It is appropriate to distinguish between the TQM perspective of strategy and corporate strategy (Samson & Terziovski 1999).

The TQM perspective deals extensively with business unit strategy in the sense of 'how to compete for a set of customers.' On the other hand, corporate strategy deals with 'how to decide which customers to compete for.' The extent of a defined central purpose and mission in the organization was also a part of this construct.

This aspect of the Quality Award criteria can be easily applied to the basic principles of project management if the requirements are viewed at their basic level. Enthusiasm and interest of participants can be further increased if the project manager demonstrates the relevancy of the project by linking its success within the context of the organization as a whole. Motivation and support by contributors can be further increased by showing how lessons learned from others and from the past have been incorporated into the plans for the project. Preparation of the project team for any anticipated and possibly unknown risks will evoke not only the necessary vigilance but also an appreciation for the detailed planning made by the project manager.

Improvement plans must be put in place for the project to anticipate how correction of mistakes, prevention of recurrence of problems, and innovations are to be incorporated progressively into the project as the need arises (Laszlo 1999).

CHAPTER SIX
APPLICATION COMPANY: VESTEL ELECTRONICS

6.1 Vestel Electronics

The case which we studied was taken from an electronics company that is called as Vestel Electronics.

Television takes a great part in the life of the society. Consumers are demanding of more good quality and more technological televisions such as with card reader, usb port etc. These demands are reducing the lifecycle of televisions in the houses. As a developer and leading manufacturer of television, Vestel ensures that these expectations are fulfilled.

Vestel has been the leader in Turkey's consumer electronics sector since the foundation in 1984. In the following years, the Group expanded its operations into television components, personal computers, PC monitors and white goods.

After nearly a decade of rapid growth, the VESTEL Group suffered a brief period of decline under its previous owner in the early 1990s. This situation has rapidly reversed after acquisition by the new owners in 1994. The new owners has invested in new capital resources, experienced and entrepreneurial management team, and brought into VESTEL and a new focus on quality and customer satisfaction.

Between 1995 and 1997, the new owners invested more than US$ 40 million in expanding and modernizing the VESTEL Group's capacity and business organization. During the same period, the VESTEL Group raised it consolidated net sales and exports by 148% and 190% respectively in US$ terms, and its after tax earnings by more than 500%. The VESTEL Group's rapid recovery reflects its majority shareholders' commitment to unconditional customer satisfaction through new and improved products, a variety of product features, and competitive prices. It also reflects the far-sighted manufacturing strategies of its management team.

Today, VESTEL is comprised of seventeen companies operating in manufacturing, technology development, marketing, and distribution fields in the consumer electronics, digital technologies, and white goods. The Group's products include; flat TVs, plasma TVs, TFT-LCD (Liquid Crystal Display) TVs, conventional TVs, TV-DVD Combos, IDTVs, digital and analogue receivers, PC monitors, personal computers, no-frost and static refrigerators, air conditioners, and washing machines. VESTEL will also start manufacturing cooking appliances in 2007. The product groups are differentiated in order to provide customers a wide selection range.

VESTEL's research and design teams are the first in Turkey to develop proprietary product designs and VESTEL is the only developer of micro-controller software for use in its production processes. In order to follow up the new technologies, the Group established VESTEL USA in 1998, and acquired Cabot Communications in the UK, which develops and offers broadcast TV technology solutions.

Subsidiary companies of the Group located in various countries in Europe play an important role in penetrating the European market and expanding VESTEL's export markets.

VESTEL is the export leader of Turkey with revenues of over US$ 1.5 billion**.** This revenue stream combined with the Group's rapid growth in international markets has established VESTEL as one of the worldwide consumer electronics leaders. VESTEL sells its products in 110 countries including Europe, The CIS, Asia, and The Middle East, Africa, America, and Australia.

Television factory is the oldest and most professional company of VESTEL. This factory is the biggest exporter company of Turkey. Almost 10 million products are being produced in a year which is 80 percent exported.

CHAPTER SEVEN
APPLICATION

7.1 ERP Programs and SAP

Organizations have long sought the efficiency of an integrated software program automating all of the organization's core functions. ERP programs are designed to provide integrated operational software packages that tie together an organization's core business systems. ERP's ultimate promise is to reduce costs, increase productivity, and give management new operational insights. ERP systems are customized to an organization's needs. The systems collect, analyze and manipulate data providing managers with information to improve their internal processes.

Enterprise resource planning is the generic title given to business computer systems that integrate all of the major business functions of a manufacturing company. These functions include sales, engineering, purchasing, planning, inventory, production and accounting.

ERP systems provide benefits to manufacturing companies by integrating all areas of the business - streamlining business processes and providing accurate information for better decision making as well as tools for planning and controlling inventory and production. There are hundreds of ERP packages on the market today and the challenge is finding the right package for companies.

In the world, most firms manage their processes with ERP software which helps organizations in replacing the disparate legacy systems and in removing the inefficiencies arising from the use of disparate data and applications which access the standardized enterprise data. The most used are SAP, ORACLE, BAAN and People soft in large scale firms. SAP which is leader in standard business software sector, wins 50%-70% of the business in this market. About 6000 companies in 50 different countries and most successful firms in the world us SAP R/3. (Why ERP?, n.d.)

Vestel Electronics is the one of the companies which uses SAP as ERP software for business process management of the firm.

SAP (Systems, Applications, and Products in Data Processing) is the leading ERP (Enterprise Resource Planning) software package. SAP was the first to integrate a corporation's worldwide functions tightly into one application. Five former IBM programmers founded SAP AG in Germany, and released the first version of their software, SAP R/2, in 1979. Its domination of the market occurred during the 1980s, expanding first throughout Europe (early 1980s) and then North America (1988). SAP R/3, an advanced, client-server based version of the popular R/2 product, was released in 1992 and sparked a stunning takeover of America's largest businesses — 44% of US companies were using it within five years of its expansion. In 1999, SAP introduced its newest major product upgrade. (SAP, the Basic Series)

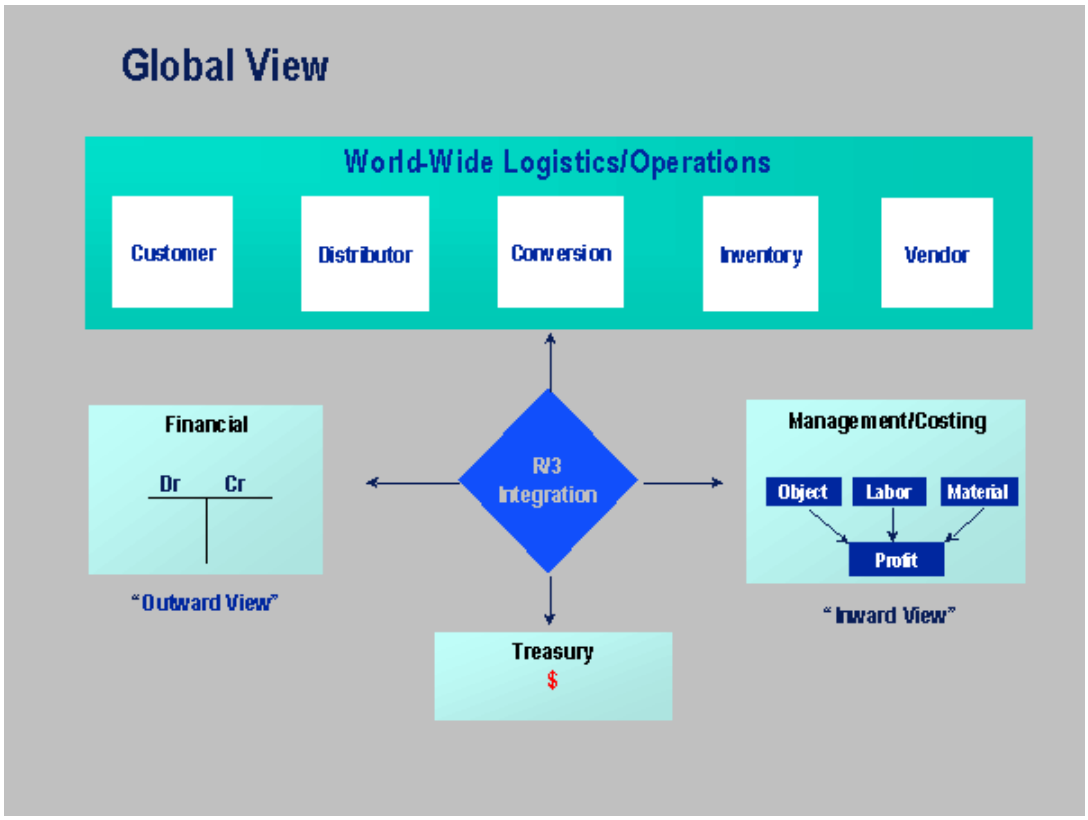


Figure 7.1 Global view of SAP (www.mysap.com)

SAP R/3 is comprehensive version of SAP that includes accounting, sales and distribution, human resources and computer integrated manufacturing offerings. It integrates the information throughout the company through single data entry, immediate access and common database. All the processes are integrated with same data. Data are updated in real time and changes are immediately effected and made available to everyone else using the system. SAP R/3 is entirely built around business processes. These processes cut across the functional areas and integrate the functions. The main aim is to improve the efficiency and productivity of the organization by eliminating duplication of information, eliminating multiple forecasts, multiple entries and the resulting errors (Why ERP? n.d.)

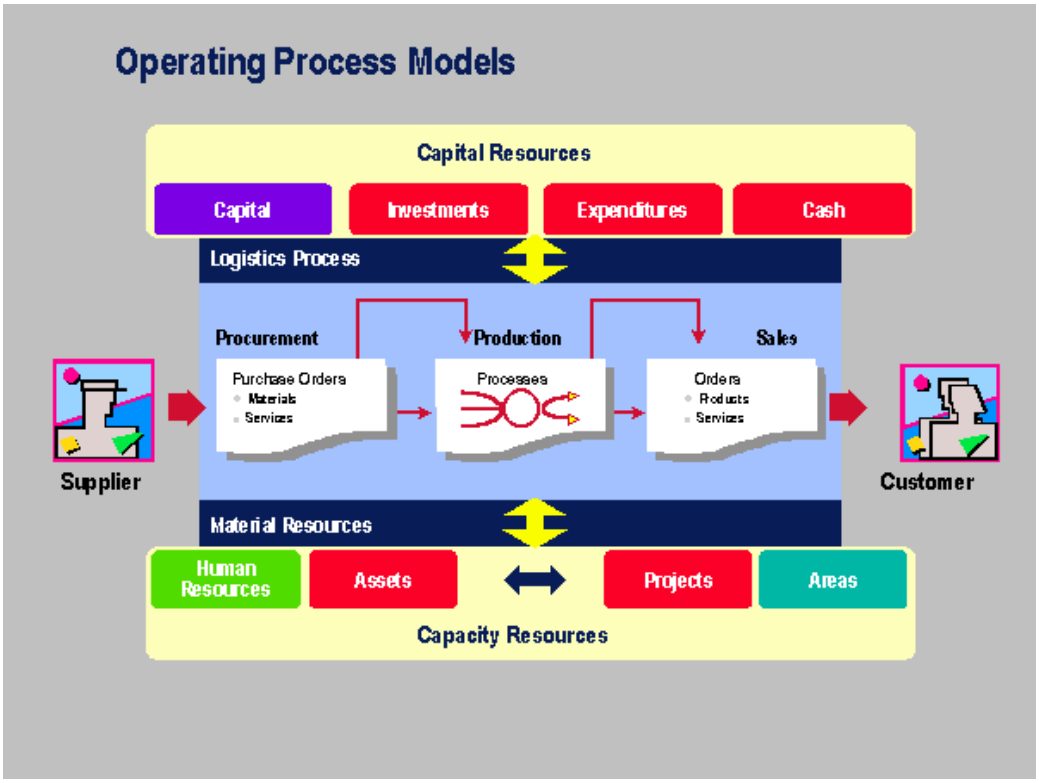


Figure 7.2 Operating process models of SAP (www.mysap.com)

Companies both large and small traditionally utilized multiple software applications from various vendors or developed their own applications in-house to process their critical business transactions. Prior to the proliferation of SAP, most companies supported a full staff of program developers who wrote their necessary business applications from scratch or developed highly complicated interfaces to

allow pre-packaged applications from several vendors to pass data back and forth as necessary to complete any full cycle business transaction. This process was extremely costly, time-consuming, and error prone. It also made it very difficult for business managers and executives to get a timely, comprehensive view of how their business was doing at any given time. SAP was the first and, to date, the most successful company to integrate nearly all business processes into one software solution for use in any business in any country in the world. Not only did SAP's applications reduce the need for complex and redundant in-house development, but it also created new business efficiencies by automating many tasks across a corporation and incorporating business' best practices into each updated version of its software.

Using SAP's products, companies can now integrate their accounting, sales, distribution, manufacturing, planning, purchasing, human resources, analysis and other transactions into one application. SAP applications thus provide an environment where "transactions are synchronized throughout the entire systems, meaning a sales-order entry triggers action's within each application that relates and is relevant to the transaction." (SAP, the Basic Series)

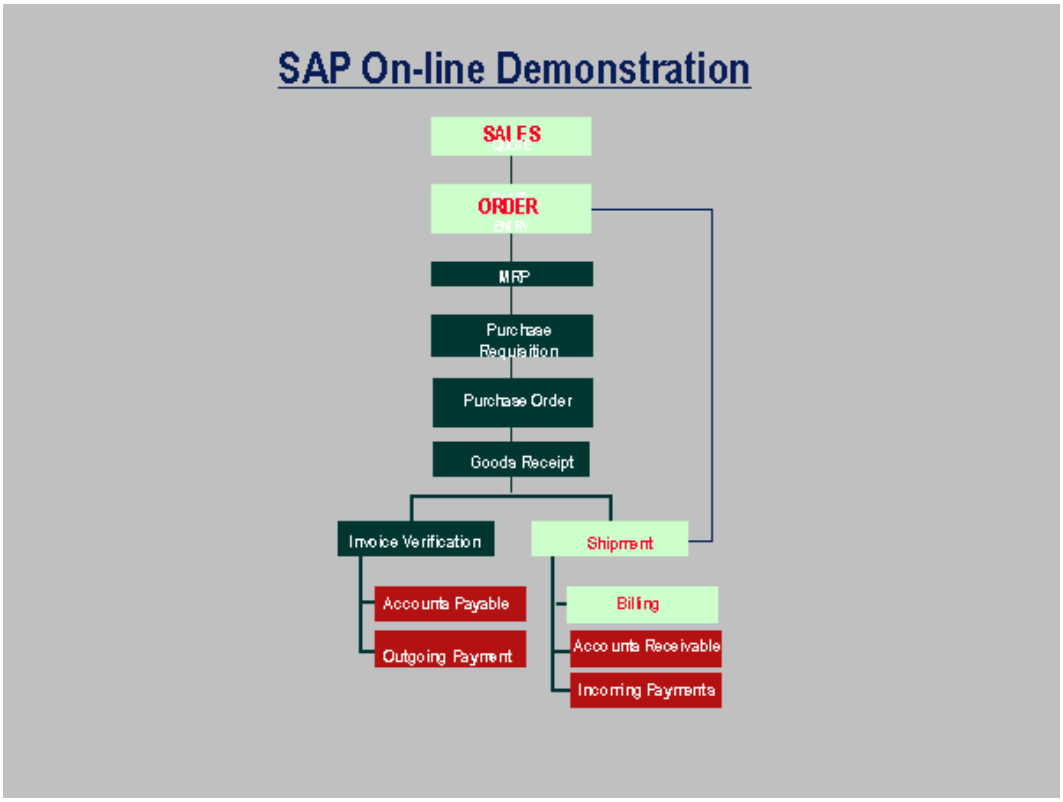


Figure 7.3 The demonstration of SAP (www.mysap.com)

The main capability of SAP R/3 is the management of resources. Resources include the employees, materials, supplies, buildings, infrastructure etc. SAP R/3 is able to adapt the changes required based on past trends and the future requirements. Another important future is the preparation of the system for global operations. The software is ideally suited to companies which either operate internationally or source or sell products in an international environment. SAP also takes care of the local accounting practices, regulations and tax requirements and the necessary currency conversions.

Figure 7.4 Staffing requirements of SAP projects (www.mysap.com)

The SAP R/3 system can be applied to all kinds of organizations. It offer functionality to a wide set of vertical markets such as automotive, chemical processes, consumer goods, finance and insurance, high technology, aerospace. Firms prefer it to be the best overall system in case it provides cross-functional integration and supports geographically dispersed operations. At the same time, SAP makes it easier for third parties software vendors to link directly to SAP R/3 through its business application programming interfaces.

7.2 SAP Usage in VESTEL

Vestel is integrating its accounting, sales, distribution, manufacturing, planning, purchasing, human resources, analysis and other transactions into one application by using SAP since 1994.

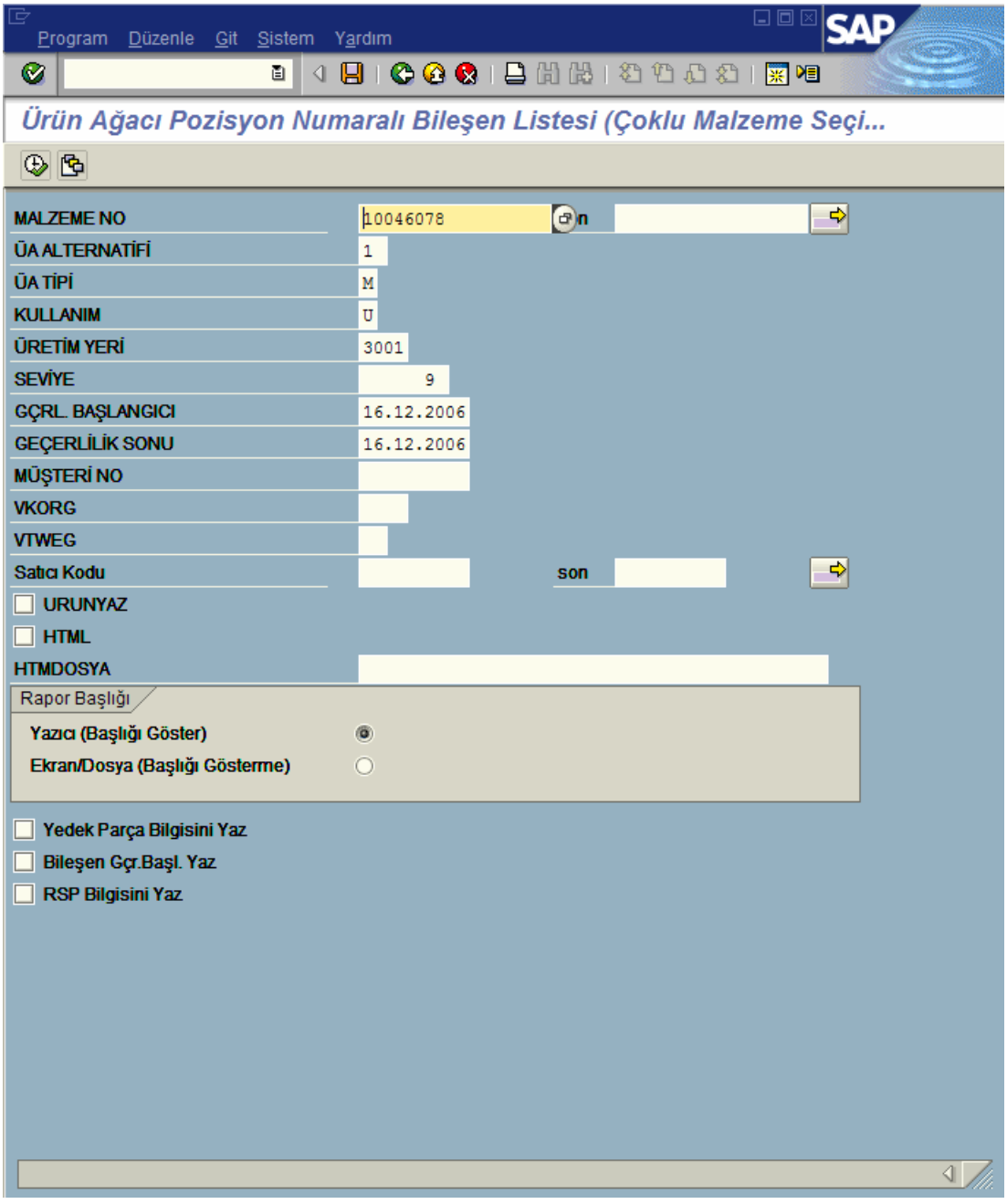
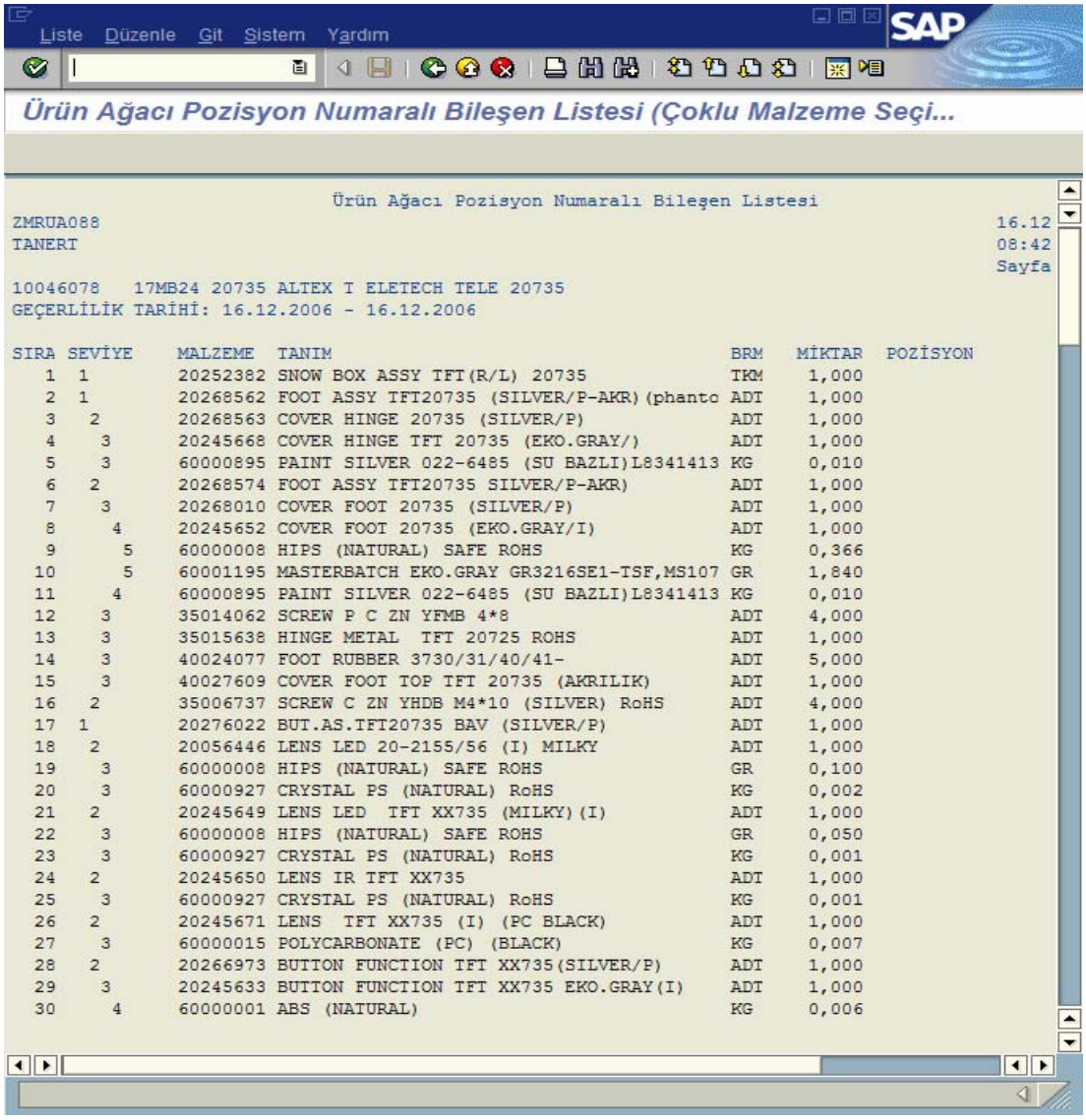


Figure 7.5 BOM list code entering in SAP

In the above figure, one of the sample activities for SAP usage in Vestel is presented. By means of this activity a code can be entered to get a BOM list of a product. The sample BOM list is as below;



Ürün Ağacı Pozisyon Numaralı Bileşen Listesi

ZMRUA088 16.12
TANERT 08:42
Sayfa

10046078 17MB24 20735 ALTEX T ELETECH TELE 20735
GEÇERLİLİK TARİHİ: 16.12.2006 - 16.12.2006

SIRA	SEVİYE	MALZEME	TANIM	BRM	MİKTAR	POZİSYON
1	1	20252382	SNOW BOX ASSY TFT(R/L) 20735	TKM	1,000	
2	1	20268562	FOOT ASSY TFT20735 (SILVER/P-AKR)(phanto	ADT	1,000	
3	2	20268563	COVER HINGE 20735 (SILVER/P)	ADT	1,000	
4	3	20245668	COVER HINGE TFT 20735 (EKO.GRAY/)	ADT	1,000	
5	3	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,010	
6	2	20268574	FOOT ASSY TFT20735 SILVER/P-AKR)	ADT	1,000	
7	3	20268010	COVER FOOT 20735 (SILVER/P)	ADT	1,000	
8	4	20245652	COVER FOOT 20735 (EKO.GRAY/I)	ADT	1,000	
9	5	60000008	HIPS (NATURAL) SAFE ROHS	KG	0,366	
10	5	60001195	MASTERBATCH EKO.GRAY GR3216SE1-TSF,MS107	GR	1,840	
11	4	60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,010	
12	3	35014062	SCREW P C ZN YFMB 4*8	ADT	4,000	
13	3	35015638	HINGE METAL TFT 20725 ROHS	ADT	1,000	
14	3	40024077	FOOT RUBBER 3730/31/40/41-	ADT	5,000	
15	3	40027609	COVER FOOT TOP TFT 20735 (AKRILIK)	ADT	1,000	
16	2	35006737	SCREW C ZN YHDB M4*10 (SILVER) RoHS	ADT	4,000	
17	1	20276022	BUT.AS.TFT20735 BAV (SILVER/P)	ADT	1,000	
18	2	20056446	LENS LED 20-2155/56 (I) MILKY	ADT	1,000	
19	3	60000008	HIPS (NATURAL) SAFE ROHS	GR	0,100	
20	3	60000927	CRYSTAL PS (NATURAL) RoHS	KG	0,002	
21	2	20245649	LENS LED TFT XX735 (MILKY)(I)	ADT	1,000	
22	3	60000008	HIPS (NATURAL) SAFE ROHS	GR	0,050	
23	3	60000927	CRYSTAL PS (NATURAL) RoHS	KG	0,001	
24	2	20245650	LENS IR TFT XX735	ADT	1,000	
25	3	60000927	CRYSTAL PS (NATURAL) RoHS	KG	0,001	
26	2	20245671	LENS TFT XX735 (I) (PC BLACK)	ADT	1,000	
27	3	60000015	POLYCARBONATE (PC) (BLACK)	KG	0,007	
28	2	20266973	BUTTON FUNCTION TFT XX735(SILVER/P)	ADT	1,000	
29	3	20245633	BUTTON FUNCTION TFT XX735 EKO.GRAY(I)	ADT	1,000	
30	4	60000001	ABS (NATURAL)	KG	0,006	

Figure 7.6 Sample BOM list

7.3 Identifying the problem

During product developing process in Vestel, R&D engineers run into a lot of problems. The main function of research and development department is to solve all problems until production stages. After production stages application engineering department solves the line problems.

There are a lot of departments to prepare all details for production line during product realization process in Vestel. These departments make their work schedules as to information from R&D department. The problems during research and development stage of a product affect all work schedules.

It is very essential that to follow and record all problems in this period to define the priorities of the products for production line. Unrecorded or unscheduled problems caused to loss manpower in all departments. It also affects the deadlines of the products negatively.

To prevent the matters explained above, Vestel created manual hold list system so many years ago. But trends in the market to more complicate, various and bigger production capacity are causing insufficiency of the current manual hold list program. Due to dramatically increasing rate of the product numbers and becoming more difficulty of the management in the hold list, it is felt to need for the automatic hold list in ERP system which is installed before.

The aim of this study is to update the manual hold list to an automatic program integrating with SAP.

This automatic hold list program is used for a lot of purposes as below;

- To collect all the problems about the products
- To inform the priorities of the problems to related personnel
- Notify the delivery time of the product to sales person

The related departments with these projects arrange their job schedule and purchasing and provision departments order the components to supplier. This method prevents to delays or misunderstandings and over store costs. The details of hold list will be explained in section 7.5.

In order to get this program project processes in Vestel has been investigated with below sections.

7.4 Project Process in Vestel

Until 1999 CRT (Cathode Ray Tube) televisions were the dominate television product in the market. After that plasma and LCD televisions start to be appeared in the shelves.

In the age of CRT television almost everything was standard and clear. The problems in production were nearly nonexistent and the schedules used to be achieved as agreed with the customer. The problems became to be faced with new technologies in working system of television.

VESTEL Company was the first company who starts to produce plasma or LCD televisions in Turkey. New technologies come with new production problems on the electronics industry. Transition period in the last 2 years can be observed easily by *figure 1* and *figure 2.*

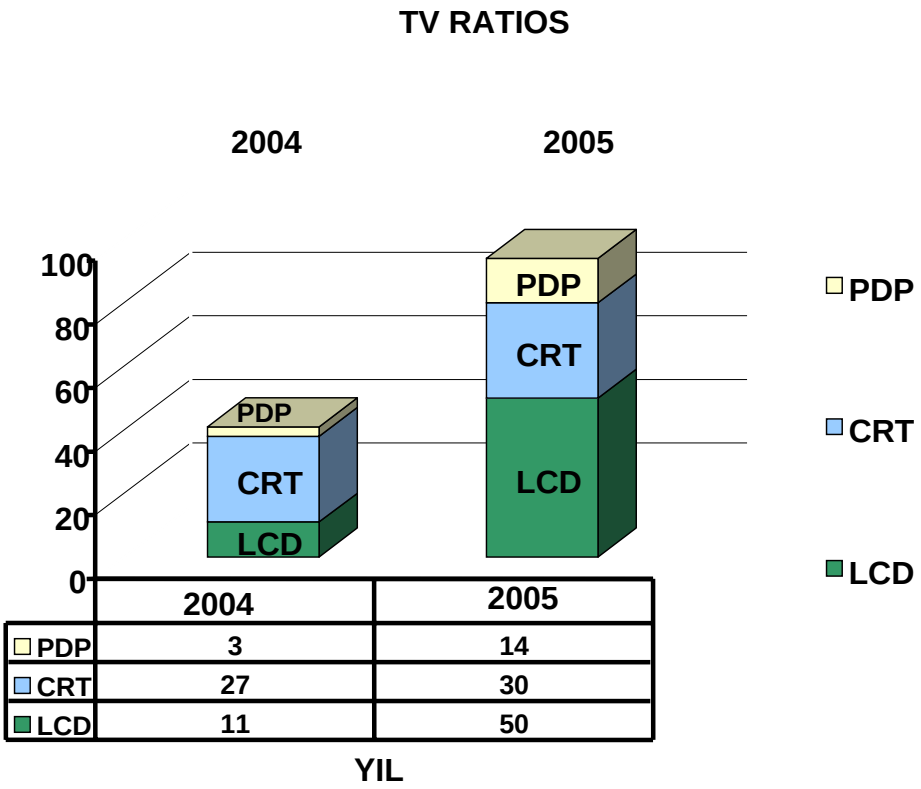


Figure 7.7 Production quantities in the last 2 years.

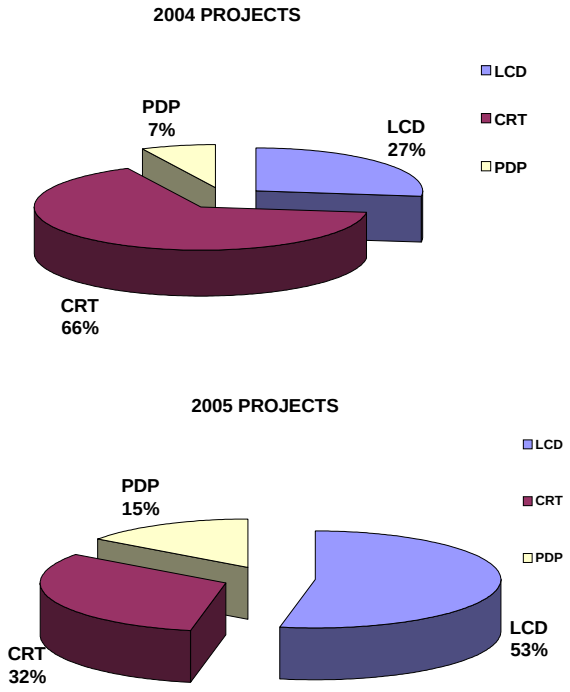


Figure 7.8 Production rates in the last 2 years

VESTEL Television Company is composed of eight main departments;

- Marketing
- R&D
- Application Engineering
- Quality Assurance
- Production Planning
- Purchasing
- Production
- Quality Control

The mainly work flow chart of products is shown on figure 3. As shown on this diagram customer gives the order and product details to Marketing department. R&D starts to work after get the technical details. All parts of product and molds for plastic

injection are designed by R&D. After R&D finish all tests about product transfers the product to application engineering department for preparing to the mass production. Quality Assurance department make preproduction and give mass production permission after check all products. During mass production quality control department check the products by random test methods and purchasing department supply the required raw materials or components.

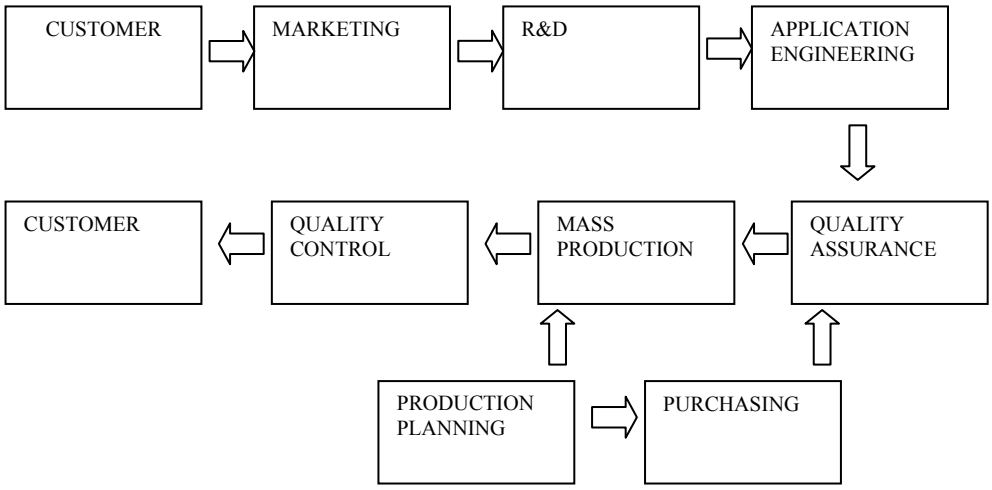


Figure 7.9 Work flow chart of LCD TV production

7.4.1 R&D Department

The phrase research and development (also R and D or R&D) has a special commercial significance apart from its conventional coupling of scientific research and technological development. As this process is usually associated with innovation as well, the synonym (R+D+I) can also be applicable.

In general, R&D activities are conducted by specialized units or centers belonging to companies, universities and state agencies. In the context of commerce, "research and development" normally refers to future-oriented, longer-term activities in science or technology, using similar techniques to scientific research without predetermined outcomes and with broad forecasts of commercial yield. (http://en.wikipedia.org/wiki/Research_and_development)

VESTEL Electronics' research and development team is specialized in:

- Electronics Design and of Display Devices including TVs, PC Monitors, Plasma Displays and LCD Displays (software and hardware)
- Industrial and mechanical designs of VESTEL-branded and OEM (Original Equipment Manufacturer) products
- Testing the products as the Europe standards. VESTEL has established an in-house EMC (Electromagnetic Compatibility) laboratory for CE testing and the research and development team works closely with authorized certification laboratories to assure that new products meet or exceed all required international standards. VESTEL Electronics has been operating with ISO 9001 certification since 1993. The company also has ISO 14000 certification since 1998.

Panel is the main factor for an LCD TV. Eighty percent of the cost for a television is the panel. For every new panel Research and development (R&D) department makes adaptation works by creating new components or software.

Day by day panel market trend is changing to big sizes. So it can meet new sizes every year. Planning department should forecast the new panel blends and sizes. Marketing department gets these forecasts and try to sell the product with these panels to customer.

R&D has six main divisions as below (See *figure **11**)*;

- Industrial Design
- Mechanical Design
- Hardware
- Software
- Test and reliability
- Artwork

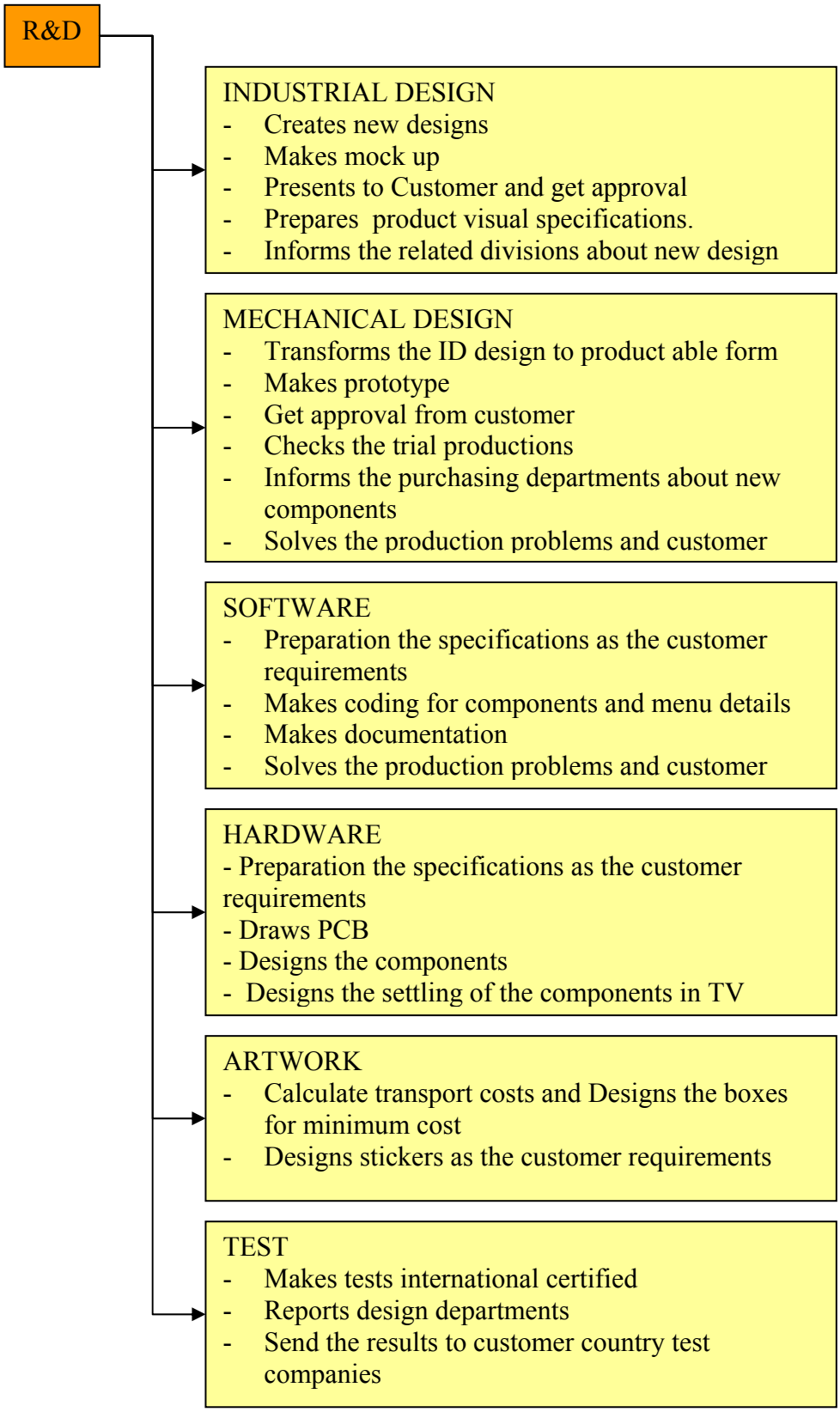


Figure 7.10 The main points of R&D divisions in the Vestel Company

LCD televisions are designed in R&D department of VESTEL Company to be produced in mass production. R&D department has five divisions to create new products and components. Each division has own manager and engineers, (See figure11*).*

R&D department divisions get a meeting for evaluation of the new product specifications. As the result of the meeting, marketing department can meet with the customer to change some specifications or R&D starts to works.

Each division from R&D prepares the schedule and informs all related personal such as marketing, planning, purchasing etc…

All of the works in R&D department can be sequenced with the below diagram.

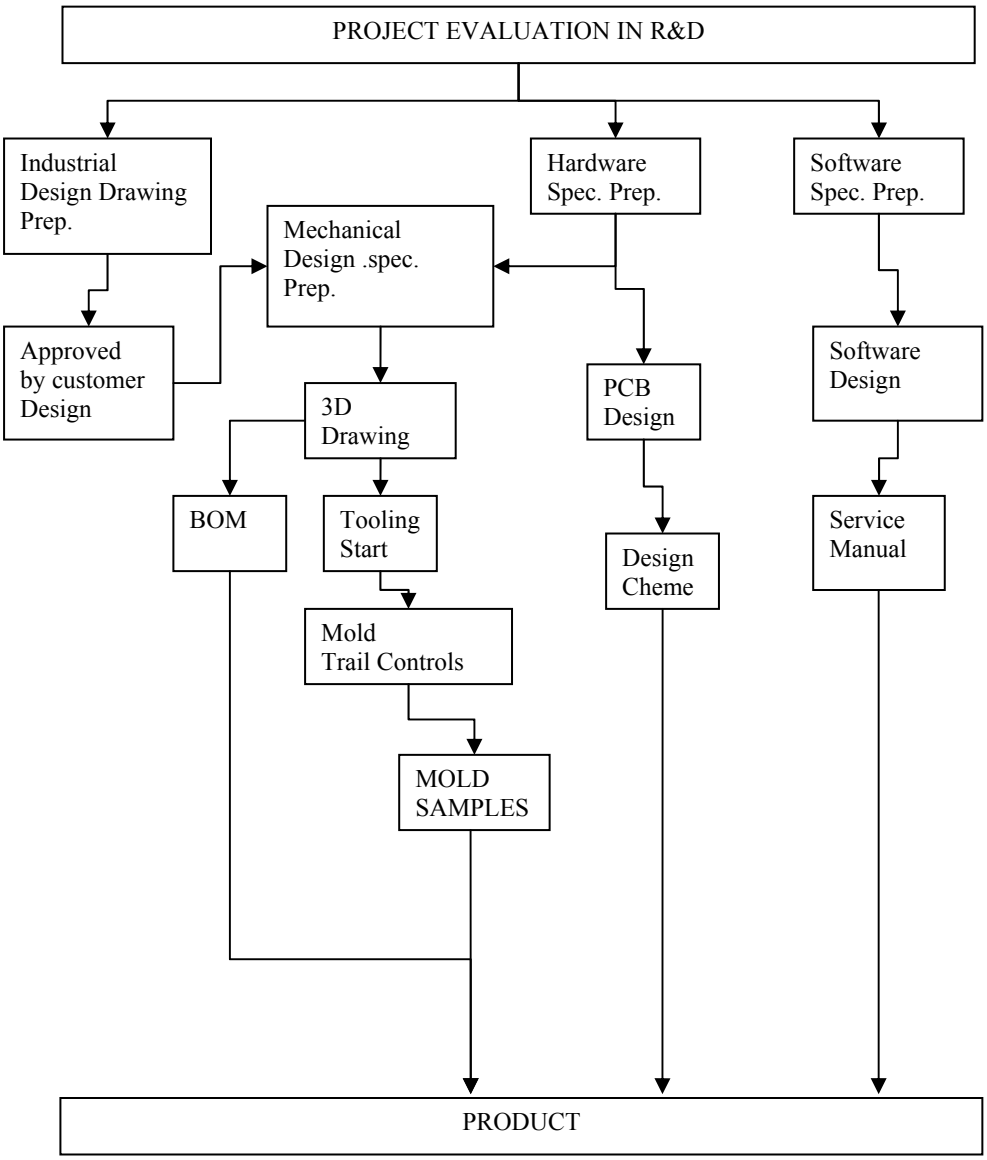


Figure 7.11 Work flow chart in R&D.

Industrial Design; First action in R&D starts at Industrial Design department. Industrial design engineers search the market and try to find out the trends for consumer electronic products. They also get the feedbacks from sales department about marketing requirements from the point of the visual issues. After all of this information they start to create the new models.

It takes 2-3 weeks to create a new model according to customer specifications in ID department. They show the sketches about new models to sales department and also customers. Before start to make mockup they get approvals.

Sometimes ID department create new models without any requirement from customer and make mockup for presenting. Customer chooses one of them or changes something in a model and orders. ID department creates most of the models but sometime orders to out sources companies. At the end of these entire stages ID department gives 3D model to Mechanical design.

Mechanical Design; The aim of the mechanical design is create the industrial design over again considering mass production requirements and techniques. This period takes 3-4 weeks after getting ID sketches then finishing 3D model on Computer. At the end of this period a prototype is made for estimating mass production problems. In respect of the result of this prototype checks, 3D model is updated and started to tooling works for mass production injection molds. The production of the molds takes almost 10 weeks. During this production time, mold trials are made three times and the problems from mold side and mechanical side are sent to mold maker. Mold maker makes modifications on the molds. If mechanical design engineer gives approval to mold maker the molds is taken to VESTEL and tested in VESTEL injection standards.

After all of these works the mold output are tested in the Vestel mass production conditions. All of other electronically and mechanical components are mounted for creating the new model television.

Electronically Design; During industrial and mechanical design works hardware and software departments create the models and components at the same time.

The software works are independent from industrial design models mostly. Sales department engineers follows the trends on the market and informs the new innovations to software and hardware departments During the work of this paper the last innovations was such as digital TV, multimedia cards, USB ports etc… Software engineers try to create the software for new innovations. They also should adapt all software outputs to customer's country. Because all country has different network codes such as digital or manual.

At the same time hardware engineers start to create the components for the new features which requested from sales department. For all new features they should create pcb (Printed Circuit Board) and adapt the components to it. All of software and hardware works take around 28 weeks. It is finished at the end of all mechanical and electronical works.

Artwork; Because Vestel sell its products with customer blends, it should create the boxing systems and logo batches as the customer specifications. This means all of new product types need new box and logo works. The department of Vestel R&D for these works is artwork department.

These works take 2-3 weeks.

Test; Test engineers from R&D department tests the outputs of the works of design engineers (Mechanical, software and hardware). While these tests they found out hundreds of problems and reports to related engineers. Sometimes the period that finding out the problems and solving takes more then design period and the quantity of these problems can be very huge that gets difficult to manage the problems. (I.e. priority of the problems) Some of the test problems cause canceling the studies before production. This means a lot of time and man source losts.

Vestel sell its products to European countries in ninety percent. Each country has own test standards in addition the European Union standards. Vestel should get enough result from the all of these test requirements. This issue also force to Vestel to produce new products.

To create a model takes almost 8 months as explained with figure 13. Because of this large time and fast exchange markets in the world Vestel have to create almost ten TV family models in a year for preserving its place in the market. A family comes into existence with six sizes. These sizes are changed because of panel sizes.

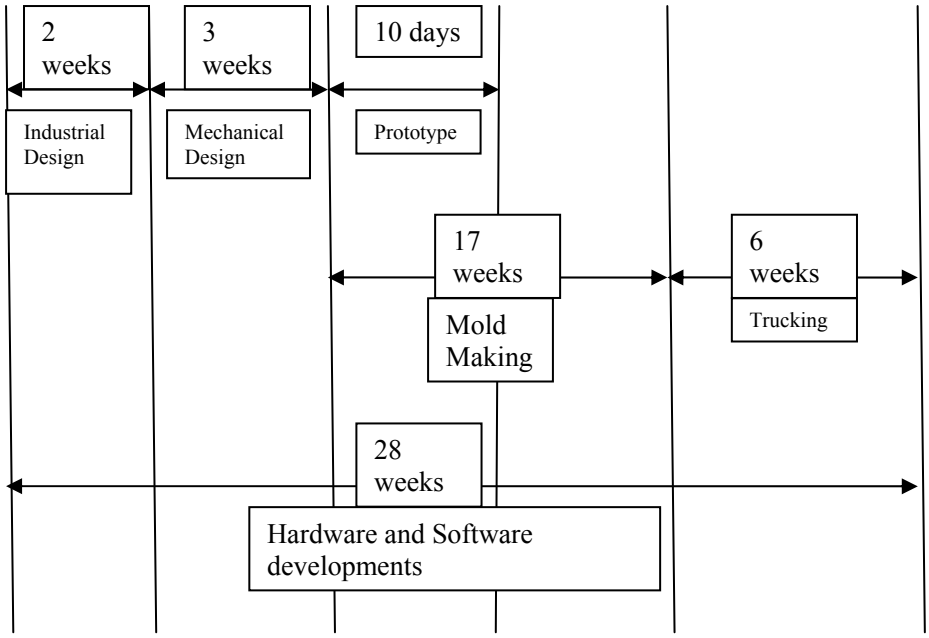


Figure 7.12 Project time schedule

7.4.2 Sales department

As explained in R&D department section Vestel Company exports the products over the entire world. The blend Vestel is not used in abroad. It is used only in Turkey. In the other countries Vestel sells its products with local blends. In this study customer use in the meaning of local blend companies. They buy the products with their logo from factory. Due to this wide market Vestel has a great powerful sales department.

The product specifications set on the Marketing department as the Customer requests. Marketing department gets the product characteristics from customer orders and prepare a specification list for a new product. The name of this list is Development Instruction (DI).

The content of the DI list can be sequenced as below;

- DI number ; All customer order has a number
- Sales person name
- Product code
- Order date
- Customer name
- Customer country
- Delivery time
- Order quantity
- Electronically specification details such as chassis, power system, sound type, picture in picture, teletext, totext, menu sowtware details, headphone, multimedia card etc…

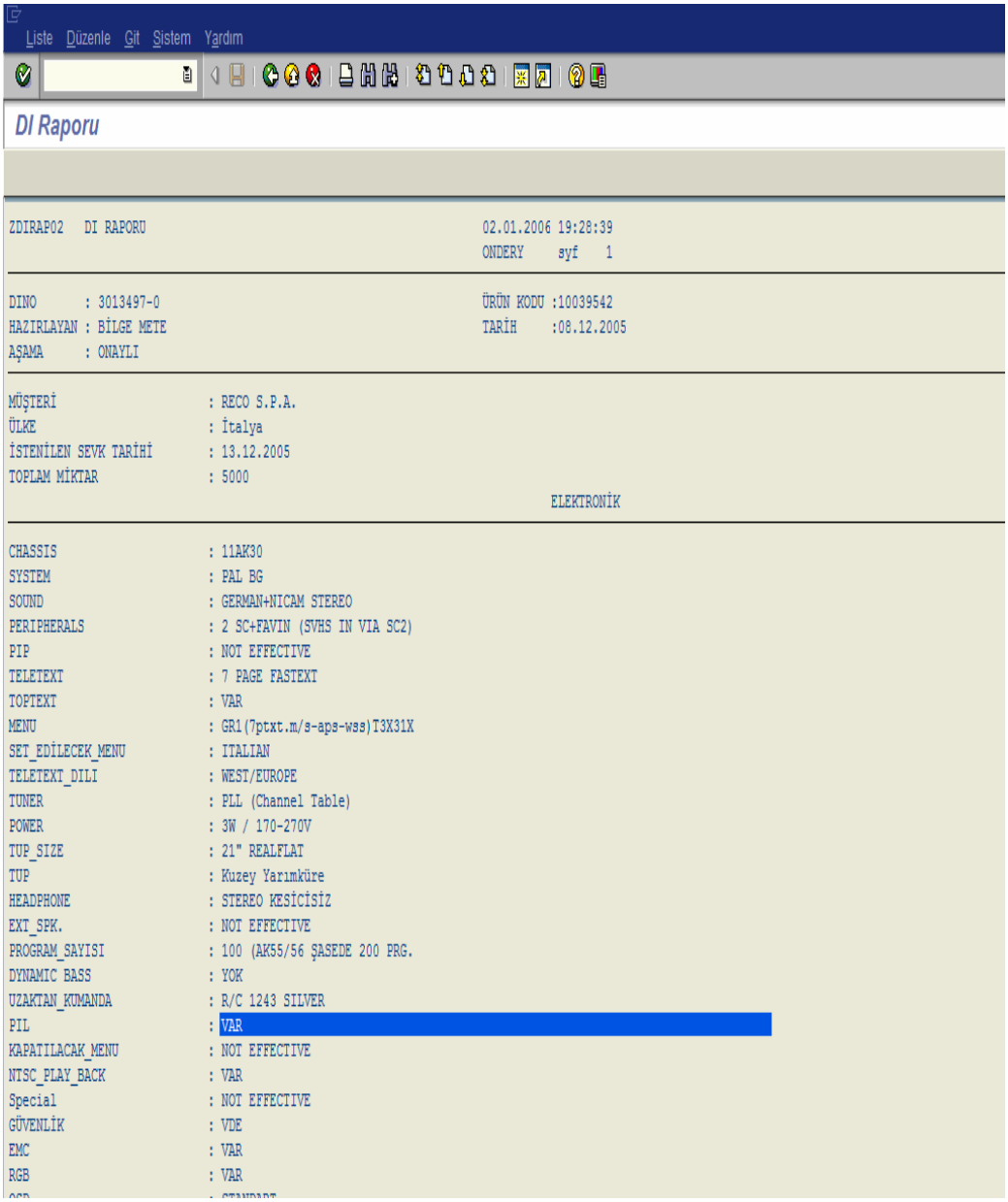


Figure 7.13 Sample DI report

DI list is the combination of the electronically and mechanical specific features that new or old. Old means this feature produced before and new means the feature does not produced before.

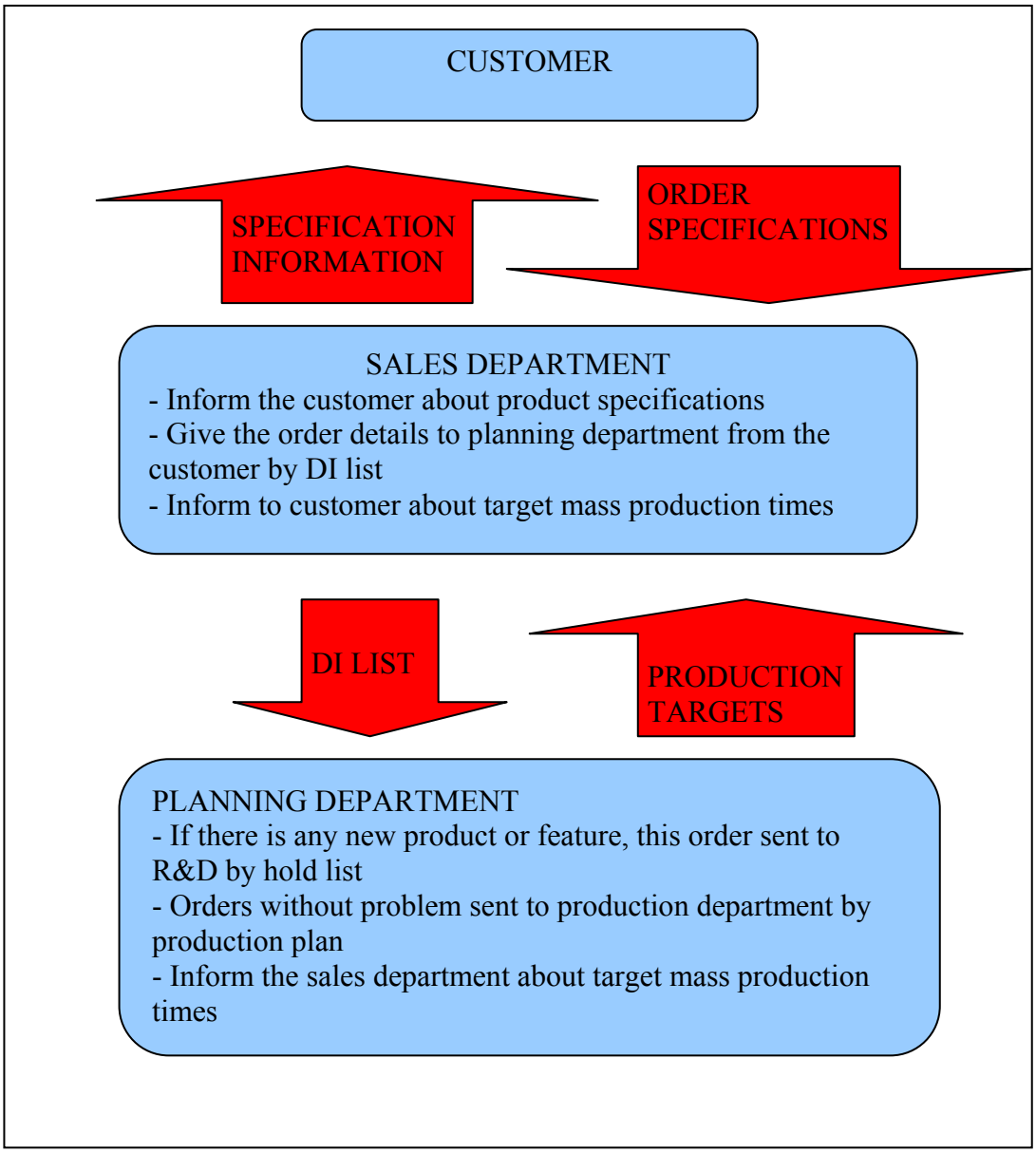


Figure 7.14 DI list flow chart

As shown on figure 14, after all product discussions with customer, marketing department gets the order specifications. To get these specifications they should inform about all product details to customer.

After this giving and receiving period sales department creat the DI list with explained details as below and transport it to production planning department.

Production planning department starts to work after receive the order details with DI list. First of all they should find out that if DI list has a not produced before products or not. If it has they should inform these orders to research and development department for new innovation works.

Production planning department can inform to sales department about delivery times for the orders without problem.

7.5 Hold List

Because of the trend in the market toward to more complex and difficult to produce devices, the problems on testing periods force to vestel for new production techniques.

The hold list problem management system is the one of the production techniques for companies.

After getting DI list from marketing department which is the first step of hold list process, planning department creates the hold list for informing to research and development department about the orders with problem. If an order includes new features or new combinations planning department should inform to R&D department.

New feature means new innovations that not produced or developed before in Vestel. For this new special Vestel R&D engineers should start research and development works. Firstly they searched the market about the products with this new feature and try to solve design and component details.

New combination means that this order includes a new product but old features. For example Vestel start to use multimedia card port in thirty two inches sizes. If customer requests multimedia card with twenty six inches, it can not be produced

before research and development engineers works. In this case the planning department should inform to R&D department about these orders.

Planning department uses hold list for informing all about the orders with problem to related departments. The flow chart of these works can be shown simply with below diagram;

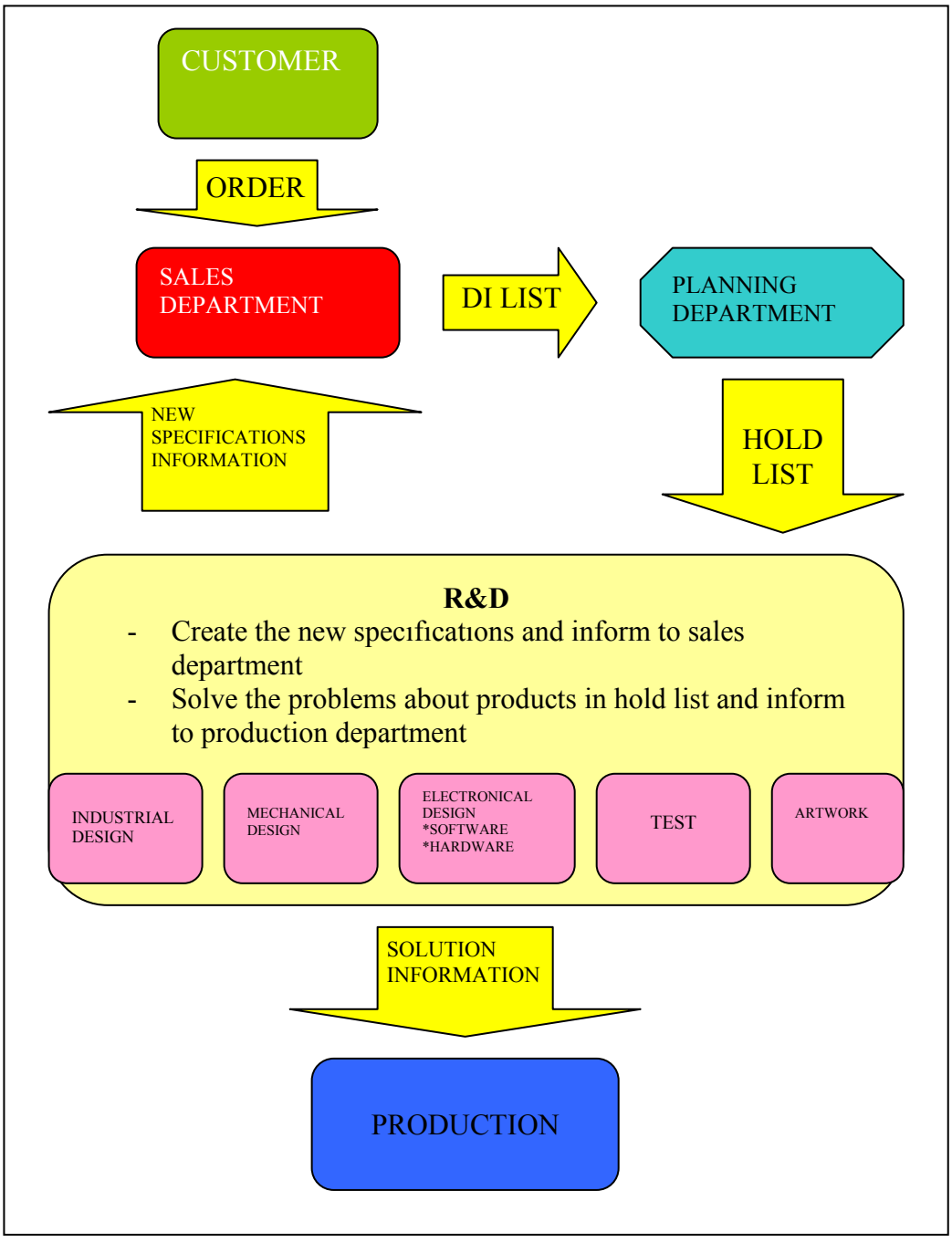


Figure 7.15 The function of Hold list in Vestel

As shown on the diagram to creating DI list sales department personnel should consider also R&D works in addition to customer requests.

After getting the DI list which created by sales department considering customer orders and R&D works, planning department investigates the list for finding out about orders with problem. Planning engineers create the hold list by collecting all orders with problem.

R&D department program managers inform to divisions about the products in Hold after received from planning department. Each division makes its job schedule as the Hold List.

R&D engineers start their works after received hold list. During this period such as creating new features they come across so many problems and some times to solve these problems can be almost impossible. This solving period time can not be estimated easily. Because of this no estimated times planning department engineers get difficulties about their plans.

The flow chart for manufacturing planning works can be shown with below diagram;

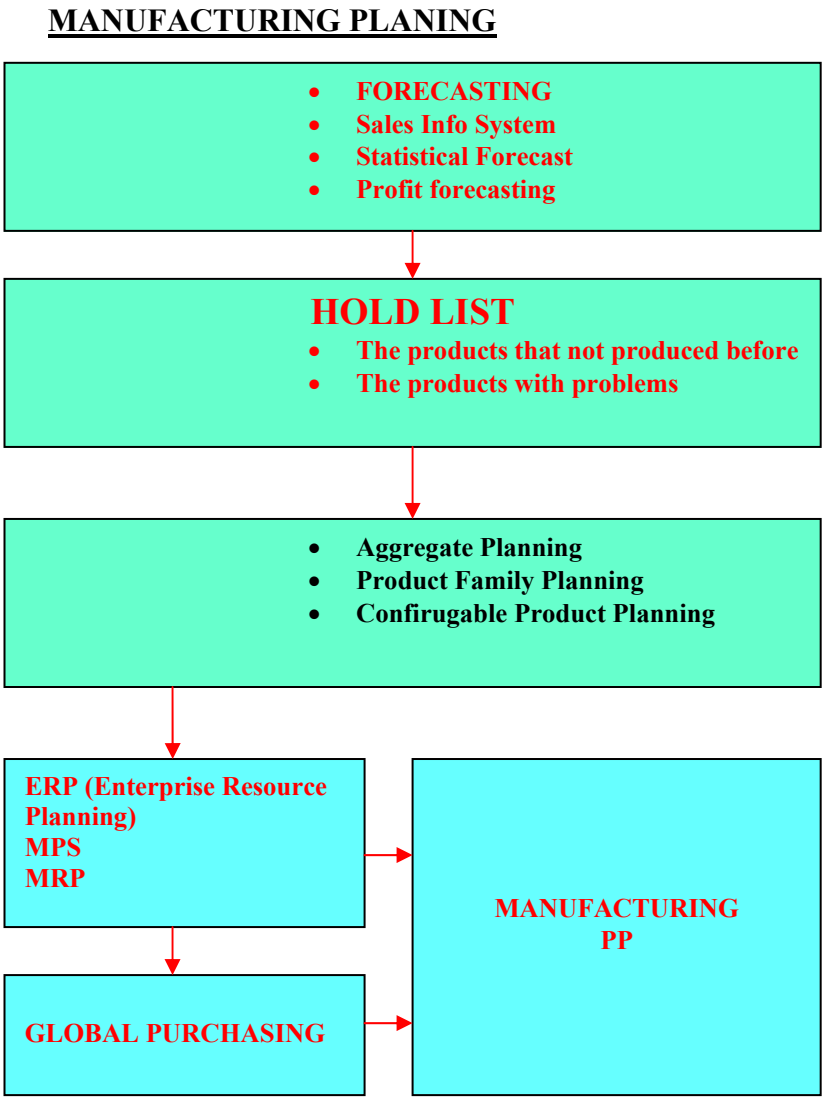


Figure 7.16 Hold list in manufacturing planning

As shown on figure 16 to make aggregate planning, product family planning and configurable product planning, planning engineers need the hold list details which is shaped with orders or forecasting from sales department.

The problems in this hold list such as unrecorded problems, affect the other manufacturing periods. ERP (enterprise resource planning), MPS (master production scheduling) MRP (material requirement planning) works can not be done orderly and it cause time and manpower losses.

Global purchasing has great importance for the companies which has huge capacities because of cost down works. Supplier companies guide the companies to buy the semi product materials in the big quantities. This means big discount for company. The great companies such as Vestel attach to importance for all discounts even in small proportion due to large production capacities.

So hold list which work orderly helps to planning and purchasing department to make their works best. To understand the placement of hold list in Vestel production chart, figure 17 can be investigated;

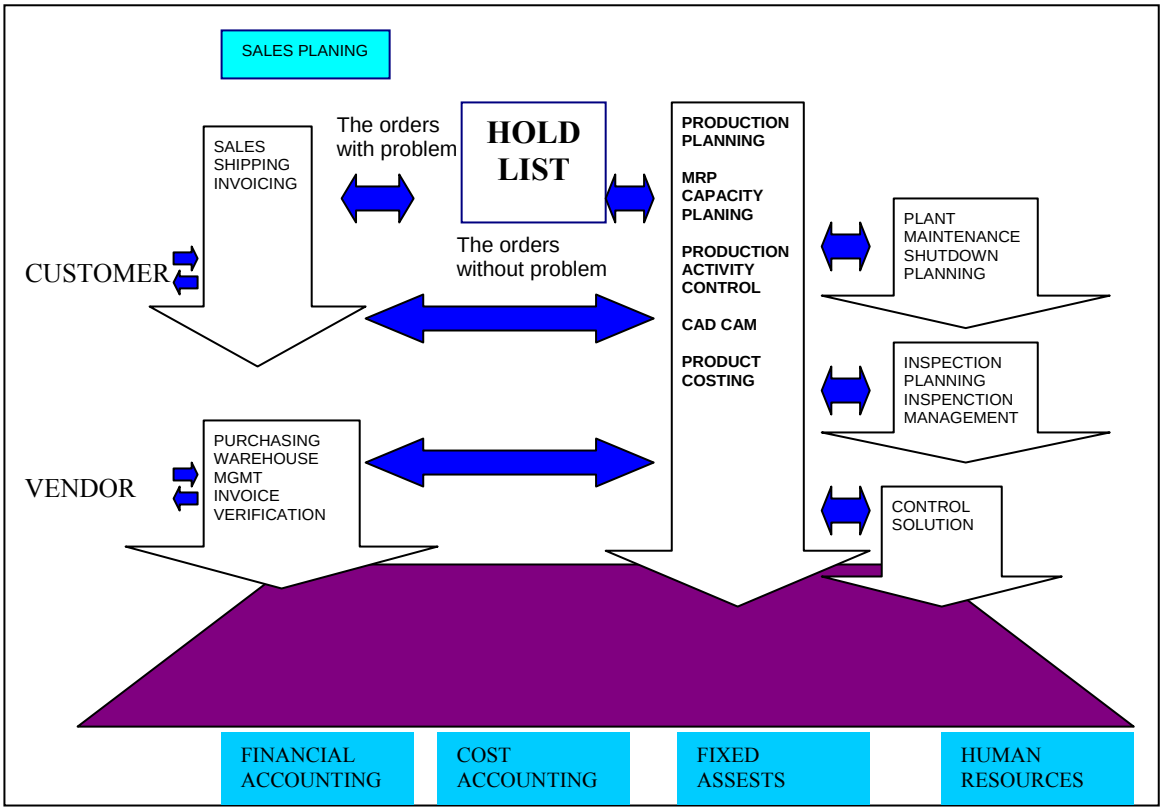


Figure 7.17 General flow chart of Hold list in the consumer electronic company

As shown on figure 17, the information from Hold List can affect many work types such as production planning, MRP capacity planning, production activity control, CAD CAM and product costing works. All of these works affecting the cost or delivery time of the products.

After finish the works explained above study information flows in two ways. One way is to vendor for making purchasing, managing the warehouses and verifying the invoices and second way is for quality control works.

If there is any problem about hold list management, all of these divisions are encountering so many confusions. All of these problems affects the delivery time of orders.

7.5.1 Actual Hold List;

To prevent all of the problems in hold list management system Vestel has started to use manual hold list program around ten years ago. This program arise from an excel sheet. A sample hold list table as below;

PRODUCT CODE	DI NO	DEFINITION	ENTRY DATE	REASON	DEPARTMENT	EXIT DATE
10038687	3101506-0	17MB18 20720 Toshiba LT-20J50SJ	11.11.2005	TFT 20720 IR PCB is touching back cover .	R&D	06.03.2006
10038688	3101507-0	17MB18 26735 Alba 20J50SU(Itl	10.12.2005	TFT 26735 Stickers problem	ARTWORK	05.02.2006
10038689	3101508-0	17MB18 37720 Hitachi LT-20J50SU(CH)	10.11.2005	TFT 37720 Metal appearances Box Customer Aprroval	R&D Artwork Marketing	07.04.2006
10039439	3101562-0	17MB18 20710 JVC-JVC LT-20J50SU(RU)	06.12.2005	TFT JVC 20710 Back cover hanger slot is small	R&D+HEUMB+Marketing+ARTWORK	06.03.2006

Figure 7.18 Sample Actual Hold List.

To inform the orders in hold to R&D department, planning department prepares this table manually. Firstly checks the DI list and compare with the features or products which manufactured before.

As shown on the figure 18 hold list table includes;

- product code
- DI number
- Problem definition
- Entry date to hold
- Problem reason
- Interested department
- Exit date

There are a lot of reasons to hold the orders in Vestel as below;

- All new features such as IDTV (Integrated Digital Television) card, USB(Universal Serial Bus) input, multimedia card etc… In the electronics sector these features are increasing day by day. Because of big competition in the market, every company who need to protect their shares has to create new innovations.

- The new combinations. If a feature used with a product this does not mean it can use for all type of products. For example Vestel can produce English plug in thirty seven inches TFT but to produce in twenty six inches R&D engineers should work.

- New countries for a product. Every country has its own requirements such as frequency. If a product is sold a country, this does not mean it can be sold every country. If sales person sell it a new country, this order should be in hold.

- Cost down works: In the electronics sector companies should make cost down works continuously because of market cost requirements.

- Mechanical or electronically problems during tests. In R& D department engineers run into so many problems during component development. Until solving these problems the orders which have these components should be in hold.

- Customer approval. All products should get customer approval after finish all works. During this period these orders should be in hold.

After explain all hold reasons the general view of orders in Vestel can be show with below diagram;

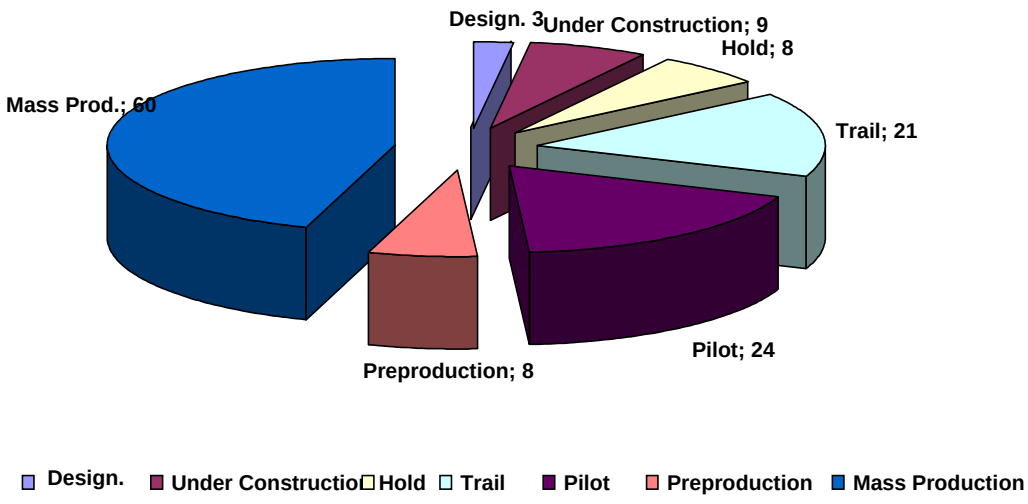


Figure 7.19 The product status for a while (Unit is piece)

7.5.2 The Problems of Manual Hold List;

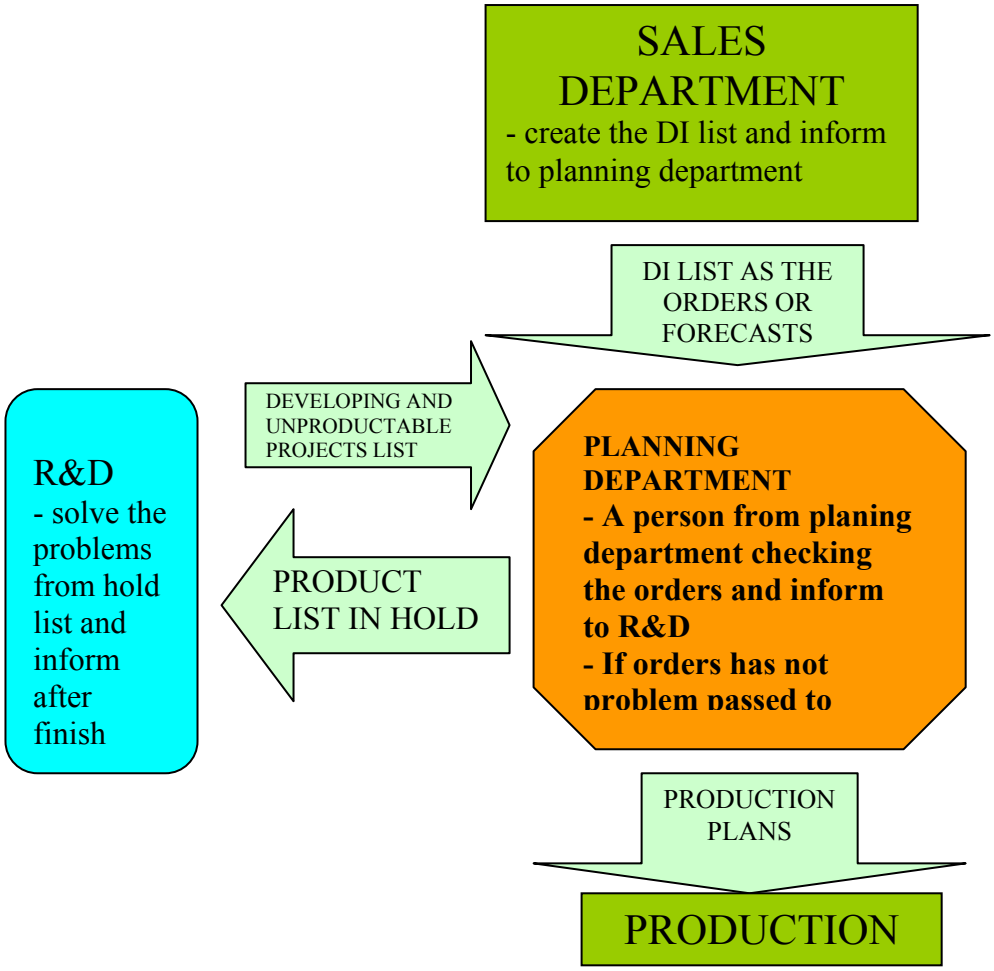


Figure 7.20 The manual Hold List

As shown on figure 20 the problem about manual hold list program can be sequenced as below;

- There are fairly many components in the products and they have a lot of problems. It is not easy to follow all problems manually. This causes to miss some problems without record.
- Missing problems cause the confusion for R&D and other related departments.

- Because of the whole problems can not be followed, related departments couldn't make decision for priority of problems.
- Sales department personnel couldn't present the right products to customer
- Sales department personnel couldn't give exact mass production time to customer.
- Planning departments couldn't order the components to suppliers for mass production
- Because of late entering to market, products loss the currency
- VESTEL company losses trustworthy for customers

7.6 The new developed HOLD LIST program with SAP

To prevent all problems explained above a hold list method integrated with SAP can be implemented in Vestel. The characteristics of new program can be sequenced as below;

- An information sharing module can be created in ERP program. This module should be a sub module of SAP and the user system should be same.
- Related departments are defined as a user of the module; Marketing, Mechanical Design, Hardware, Software, Planning, artwork and application engineering.
- All departments charge a person to use the program and to supply uninterrupted problem checking.
- DI list is created for all products from marketing department after get order or make forecast and input to program
- Official persons check the DI lists periodically and if find out not manufactured combination or component, input to Hold List.
- Related persons inform the hold list to program managers. Then projects starts in R&D.
- Official persons also input the models with problem to hold list.
- Hold list includes product code, DI number, problem definition, entry date to hold, problem reason, interested department and exit date.

- The exit date of a product will be latest exit date of the problems.
- If there will be change about exit dates related department update the list and inform all departments by e mail.
- Marketing department will give this date for mass production time to customer.

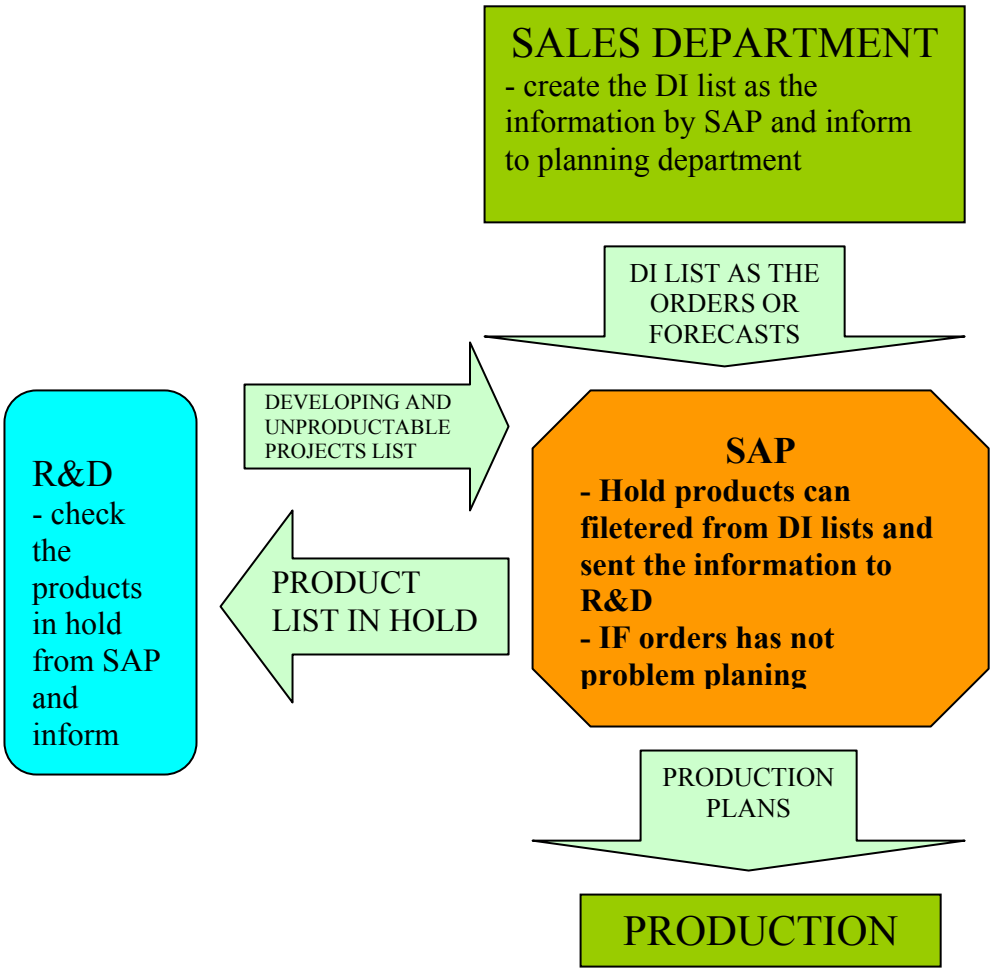


Figure 7.21 Hold List integrated with SAP

The new Hold List module was created in an ERP program. The module is composed of a lot of screens. Each screen is defined as below;

***Users screen*:** In this table official personal list for all related departments can be check. (See appendix 1)

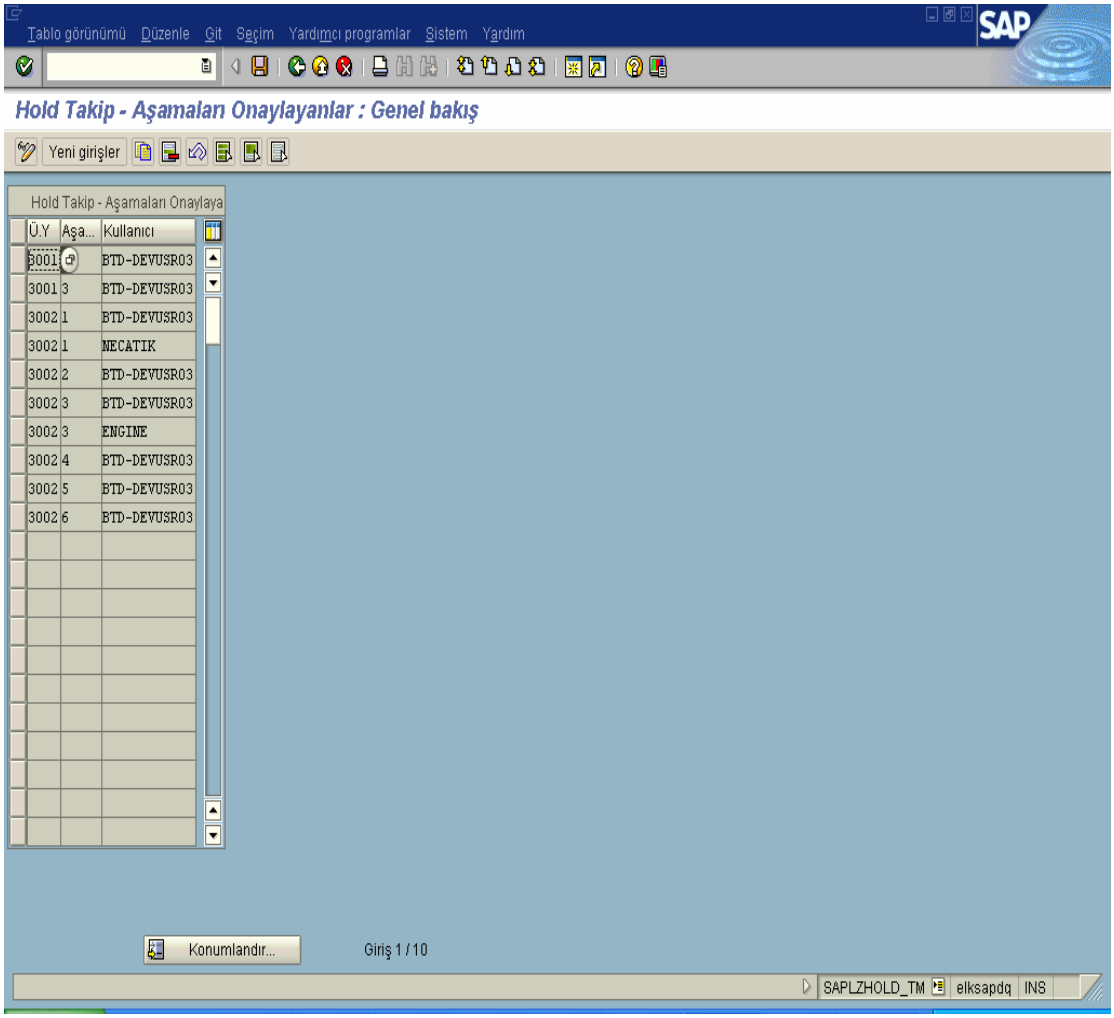


Figure 7.22 Users table

Personal list screen: Some personal who related directly about hold list should be informed by e mail after any changing in the list.

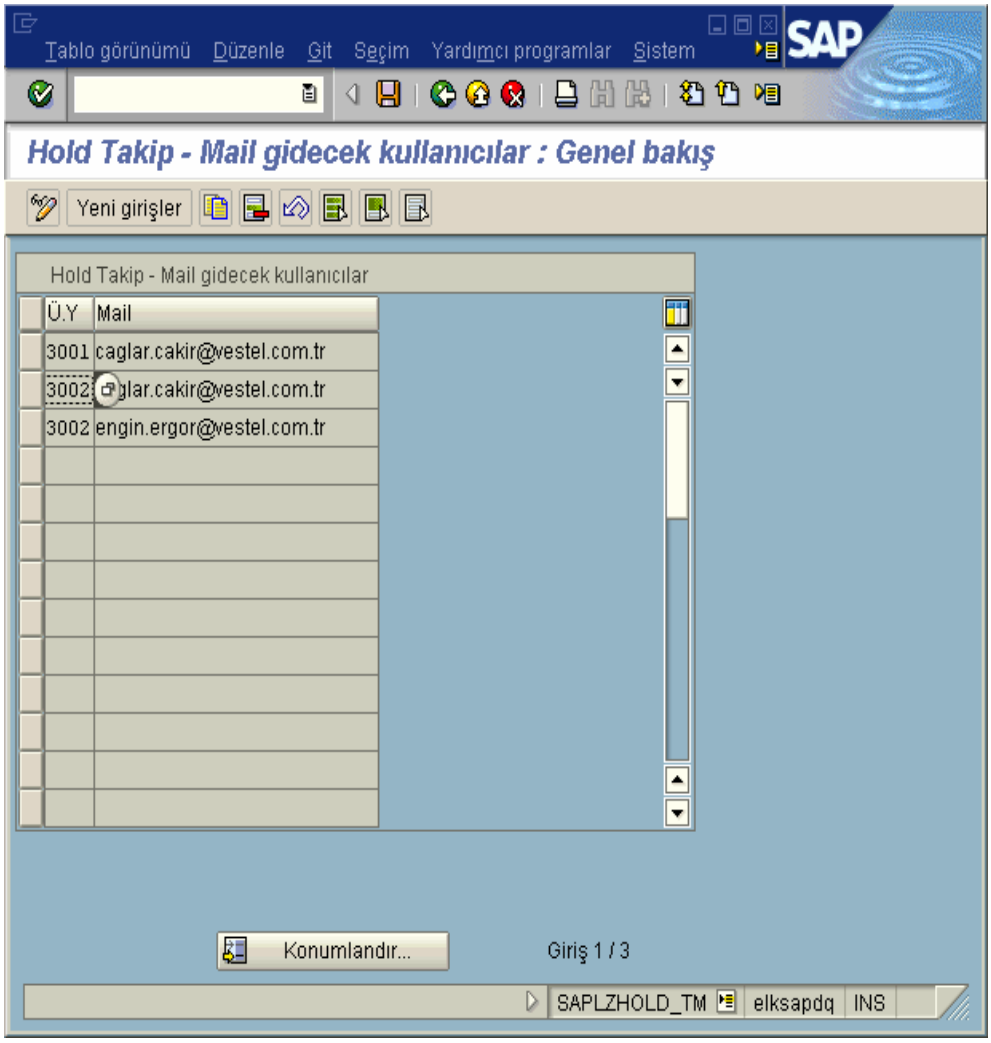


Figure 7.23 Personnel list to be informed about hold projects.

- *Project stages:* All stages are almost same for all projects. In this table users will input the approval stages of a project. These stages are generally; Electronic R&D, Mechanic R&D, Customer, Artwork and Application Engineering. If there is a not approved department this means that this department has problem about the project. (see appendix 3)

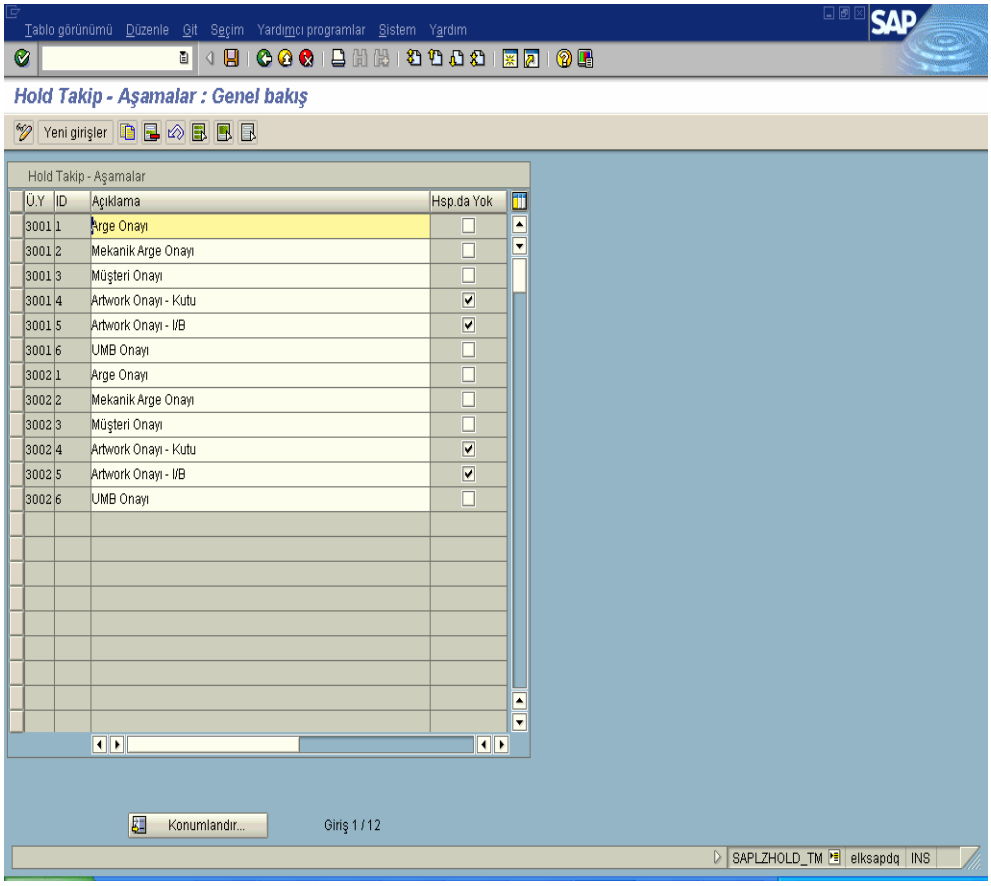


Figure 7.24 Project stages

- ***Problem reasons:*** All problem reasons for hold list can be seen in this screen. (See appendix 41 and 4.2)

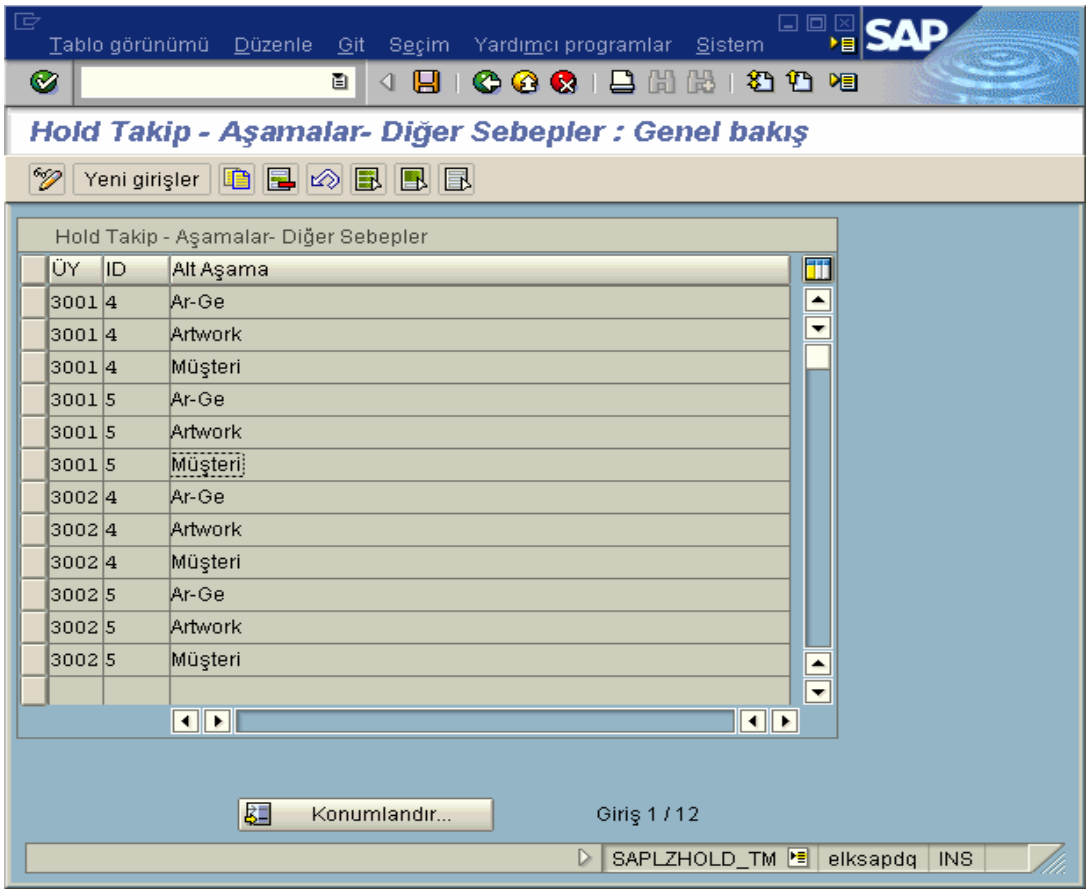


Figure 7.25 Problem reasons screen 1

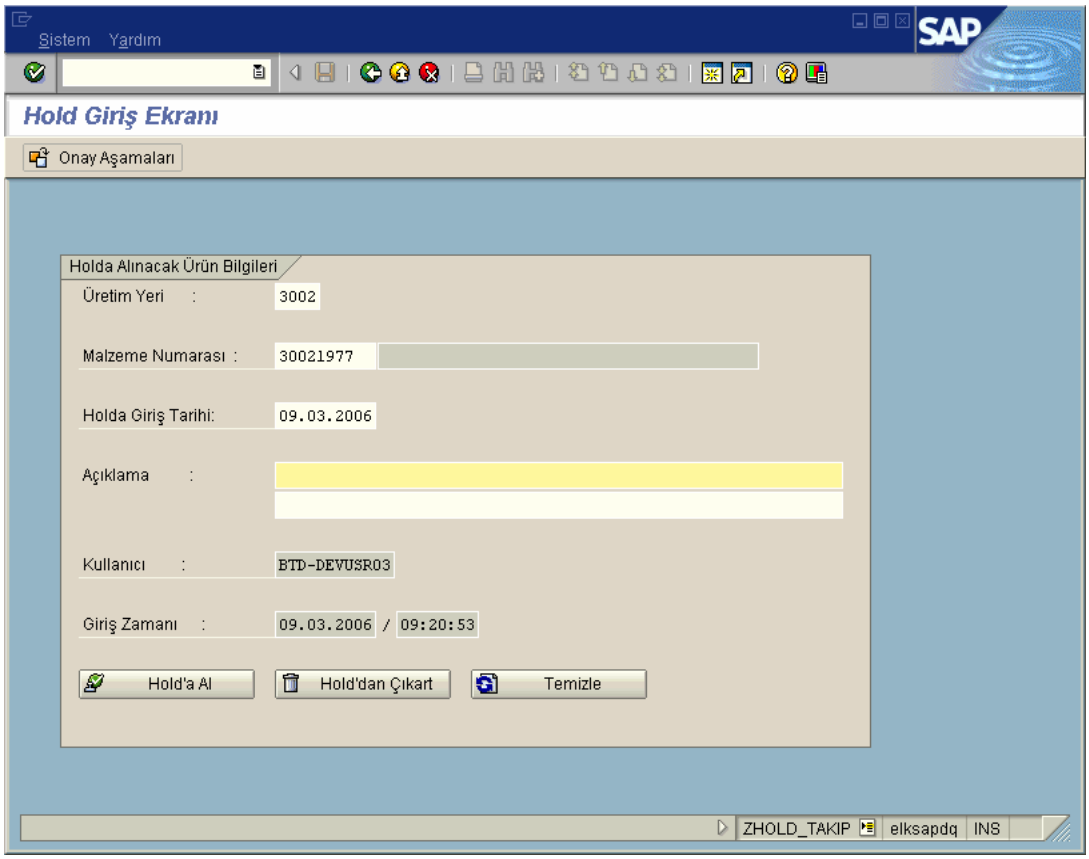


Figure 7.26 Problem reasons screen 2

- ***Hold stages check:*** These 2 screens are used for check the hold problem departments and details for a project. In the first product code is input and then the details shown with other screen. (See appendix 5.1 and 5.2)

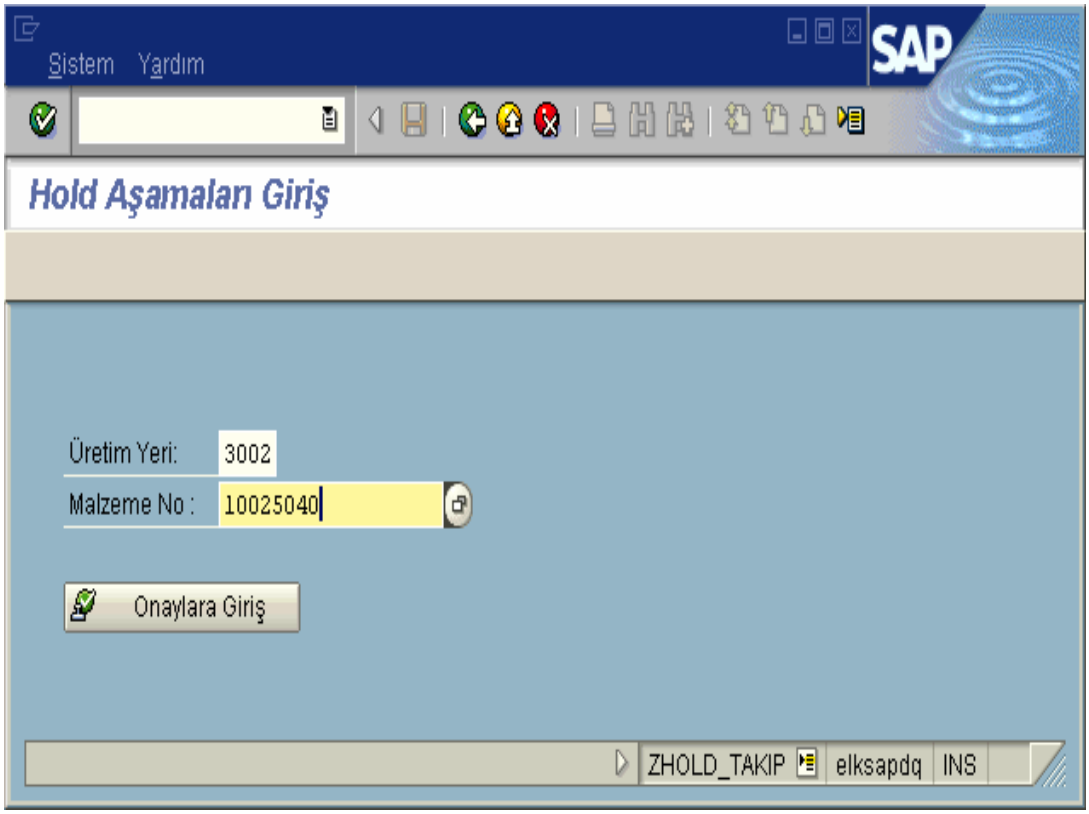


Figure 7.27 Hold stages check screen 1

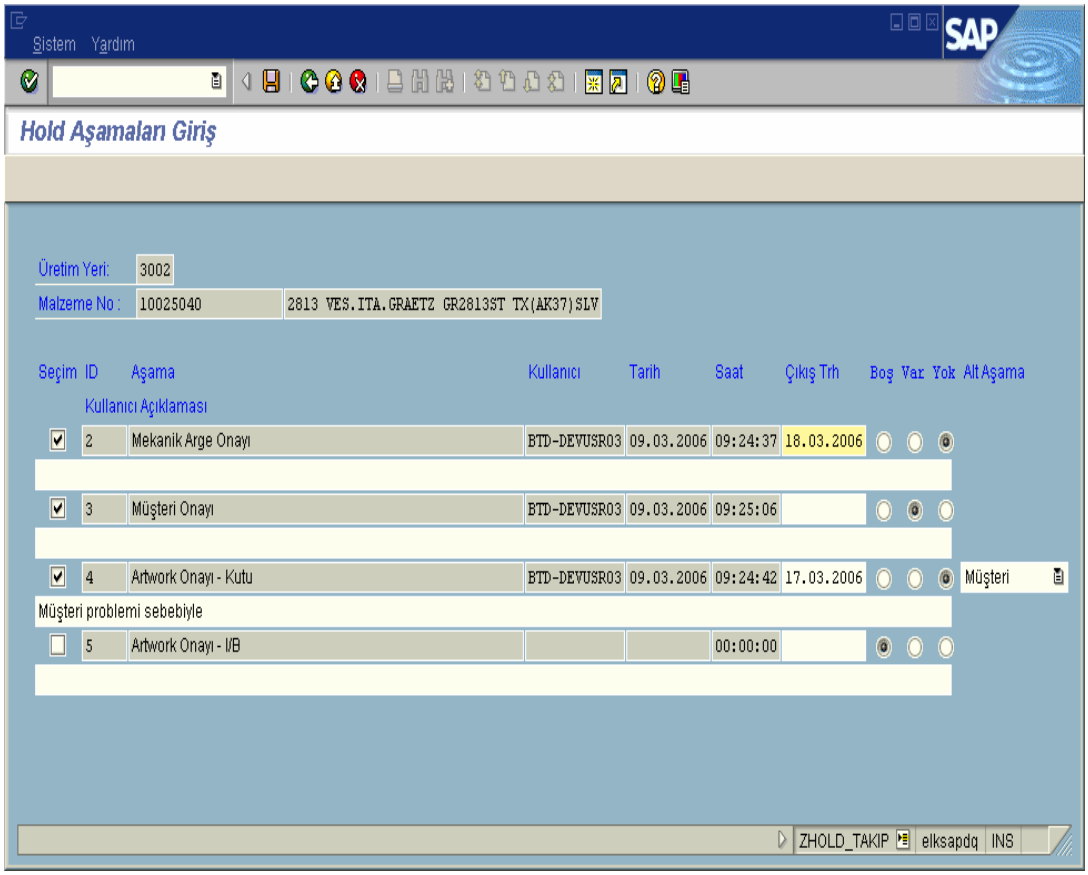


Figure 7.28 Hold stages check screen 2

- *Global Entry or Exit from hold:* Some problems can affect a lot of projects. These screens are used for this aim. (See appendix 6.1 and 6.2)

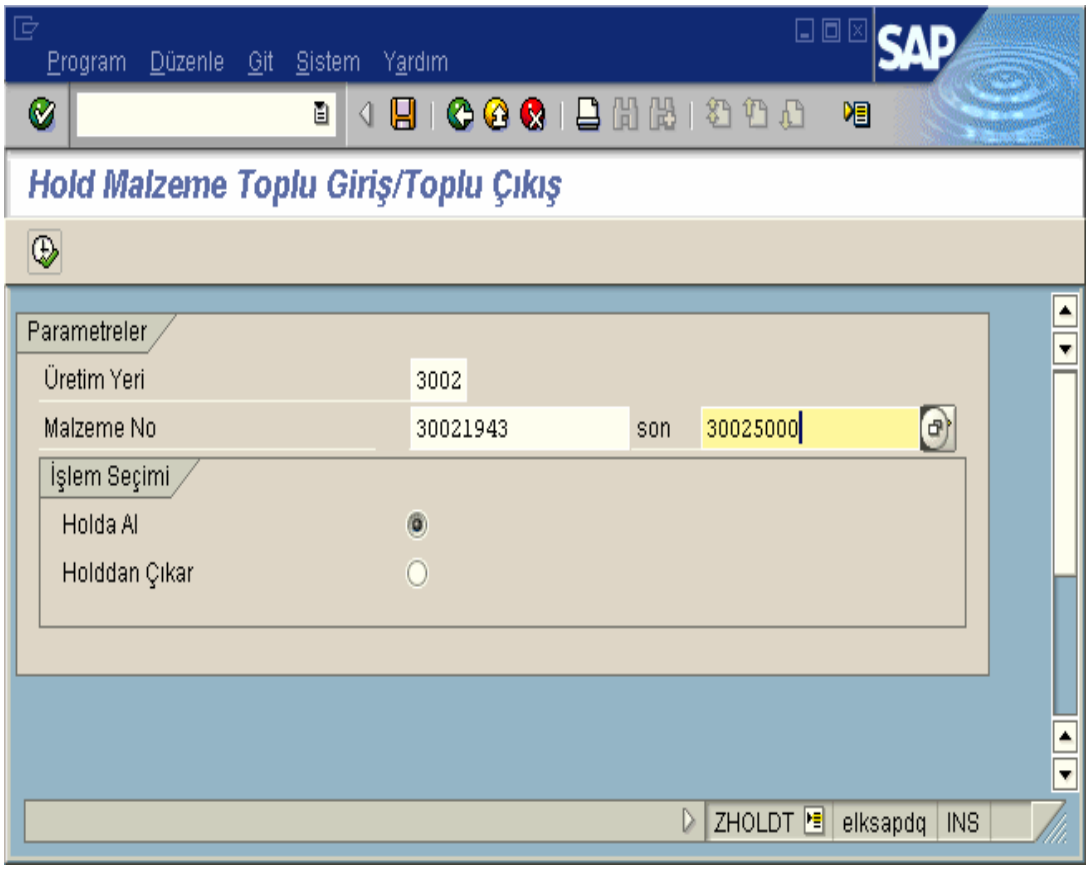


Figure 7.29 Global Entry or Exit from hold screen 1

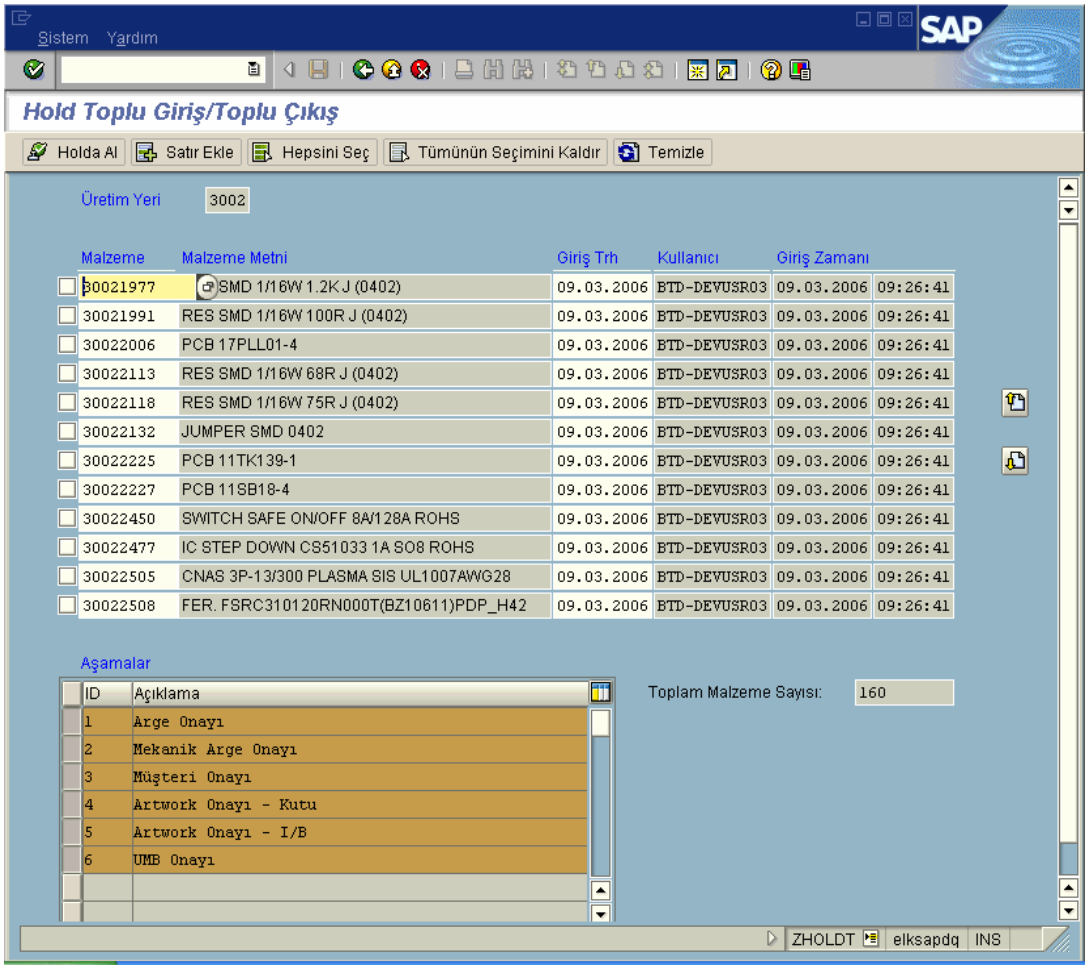


Figure 7.30 Global Entry or Exit from hold screen 2

- *Hold Report:* Using these screens we can take report for all Hold list projects. This report are sent to top managers and related personal. (See appendix 7.1 and 7.2)

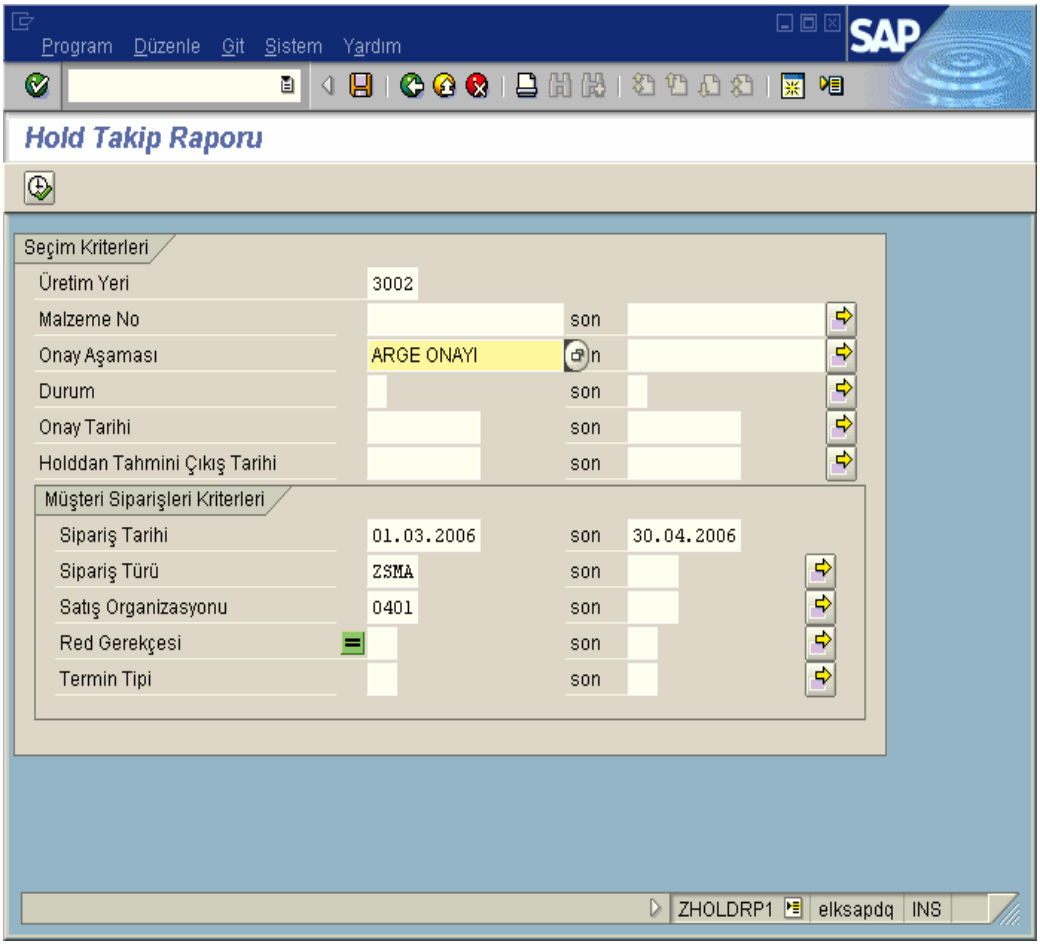


Figure 7.31 Hold Report screens 1

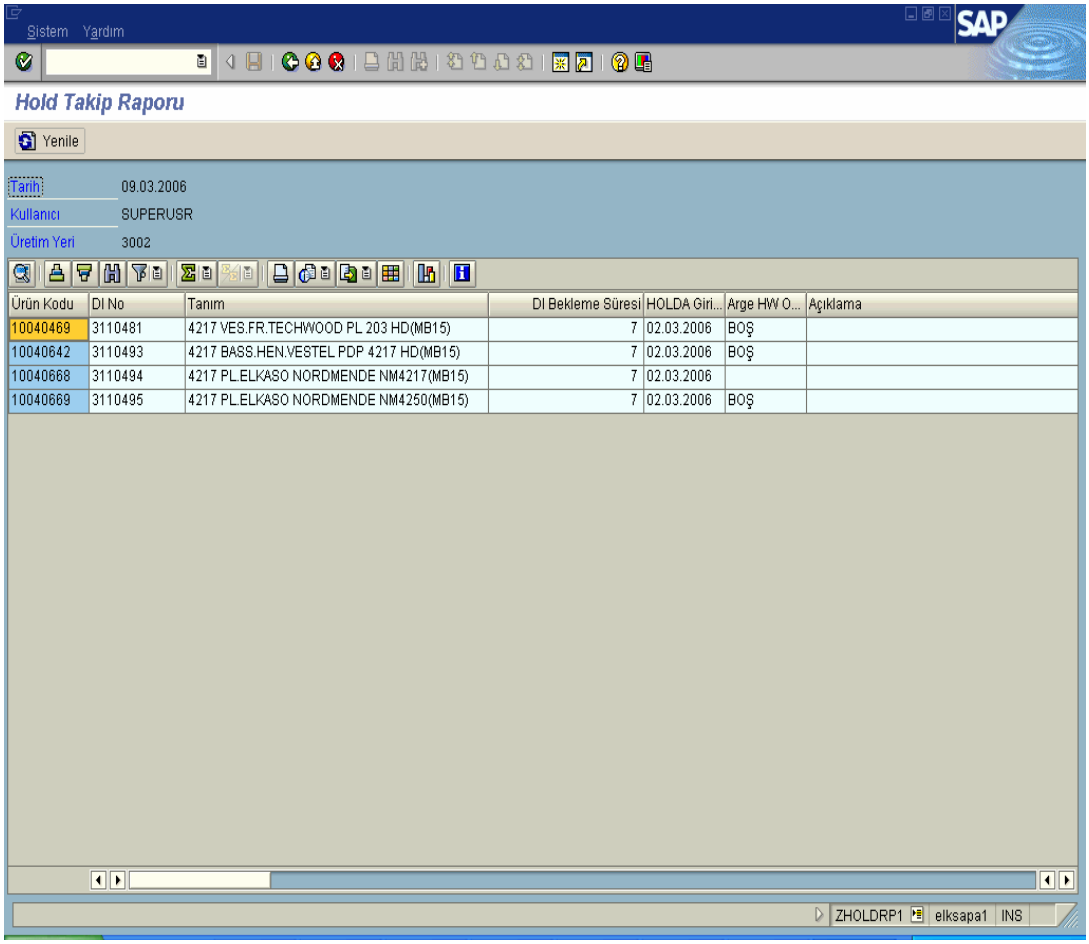


Figure 7.32 Hold Report screens 2

7.7 The general view of company after hold list implementation

Hold list tries to prevent the problems in the production lines. After implementation of automatic hold list program the problems in the production line became decrease. To show the benefits of the hold list program, a sample table can be shown. In the first figure total production numbers for a year is presented. And in the second chapter, rejected product numbers in the production is shown.

Sum of MİK			AY										
iç/dış	ÜRÜN Tİ	ÜRÜN GR	1	2	3	4	5	6	7	8	9	10	11	Grand Total
VDT	HE-LCD	26" 15:9 LCD	202									2		204
		26" 16:9 LCD	6002	17276	9631	15310	7123	4894	8843	8136	14077	19441	18382	129115
		26" 16:9 LCD IDTV	267	1161	35	356	1166	3096	1324	534	14077	6957	10013	38986
		27" 16:9 LCD	14849	17082	18192	2444	4965	787	4289	8041	6350	8426	9198	94623
		27" 16:9 LCD IDTV	3876	4408	1918	4742	7742	390	2023	5109	896	1312	5221	37637
		27" 16:9 LCD W/DMP	88											88
		30" 15:9 LCD	1435	50	1192	5		66	50					2798
		32" 16:9 LCD	26449	33888	35005	25495	11914	6390	18230	31543	28654	34672	67621	319861
		32" 16:9 LCD IDTV	1725	373	1937	8754	4232	3450	2046	5228	13883	17386	23905	82919
		32" 16:9 LCD W/DMP	96	11		270	149				47		46	619
		37" 16:9 LCD	3188	7647	6704	9143	706	444	843	6224	6153	7692	14498	63242
		37" 16:9 LCD IDTV	26	85		50	75	1233	738	3822	3042	2100	4481	15652
		37" 16:9 LCD W/DMP	51	28		134	45						48	306
		40" 16:9 LCD					312	412		183	292	93	2103	3395
		40" 16:9 LCD IDTV								61	349	362	653	1425
		42" 16:9 LCD				349	1157	26		336	955	2166	7034	12023
		42" 16:9 LCD IDTV										685	3411	4096
	LE-LCD	15" LCD	5284	4324	16458	2989	4493	14400	10017	8274	22614	2015	10652	101520
		15" LCD IDTV									10	150	1302	1462
		15" LCD LOW SPEC	9666	5123	1490	8882	21285	25631	42960	49513	64312	45469	49804	324135
		15" LCD LOW SPEC IDTV								4000	870	11538	9891	26299
		17" 15:9 LCD IDTV	3827	73		740	2794	5664	155	620	607			14480
		20" 16:9 LCD	4153	5004	5467	2369	2349	1512	5129	2390	3854	3045	905	36177
		20" 16:9 LCD IDTV	5292	4676	6462	5281	7677	7666	12909	9440	7963	4817	4108	76291
		20" LCD	19380	14124	19570	14923	13010	14541	10285	32723	31534	40353	59074	269517
		20" LCD IDTV	1455	941	2647	3283	1711	5990	5212	741	7440	10618	7781	47819
		23" 16:9 LCD	3508	3246	3389	1602	1087	3820	203	1487	1535	365	1545	21787
		23" 16:9 LCD IDTV	1243	1565	3623	1070	2335	1622	2130	3823	3894	2928	1221	25454
		23" 16:9 LCD W/DVD											49	49
VPA	HE-LCD	26" 16:9 LCD		349	251		200							800
		27" 16:9 LCD	1206						350	155		45	386	2142
		32" 16:9 LCD	1509	2508	1000		250			15	60	1357	1306	8005
		32" 16:9 LCD W/DMP	2395	807	62	1256	1415	56						5991
		37" 16:9 LCD						56	697	413	166	3	146	1481
		37" 16:9 LCD W/DMP	337	658	412	589	1663	1517	573	1				5750
		42" 16:9 LCD						460	226	453	37	431	1250	2857
	LE-LCD	15" LCD	495	306				1499	498				198	2996
		20" LCD	2006	196	865	391	2908	300		27	5	120	356	7174
		23" 16:9 LCD	202		200			496		200	200			1298
VCI	HE-LCD	26" 16:9 LCD	25				159	1						185
		27" 16:9 LCD									364			364
		32" 16:9 LCD	40								173			213
	LE-LCD	20" LCD									718			718
Grand Total			120277	125909	136510	110427	102922	106419	129730	183492	235131	224548	316588	1791953

Figure 7.33 The total production number of a year

HE FABRİKA LCD MONTAJ ARIZA ORANLARI GELİŞİMİ

	Üretim adedi	Arıza adedi	Hata grupları arıza adetleri				Toplam			Hata grupları arıza oranları			
			Yan sanayi	Montaj	MND	Diğer	Low End Arıza %	High End Arıza %	Genel Arıza %	Yan sanayi	Montaj	MND	Diğer
May.06	92.547	17.090	4.399	7.589	2.243	3.386	13,1%	26,4%	18,5%	4,8%	8,2%	2,4%	3,7%
Haz.06	118.312	20.207	3.931	9.555	3.112	3.609	16,3%	24,3%	17,1%	3,3%	8,1%	2,6%	3,1%
Tem.06	135.965	18.231	3.280	8.280	2.603	4.068	11,3%	20,3%	13,4%	2,4%	6,1%	1,9%	3,0%
Ağs.06	190.143	21.032	5.362	8.830	3.136	7.708	10,1%	18,2%	11,1%	2,8%	4,6%	1,6%	4,1%
Eyl.06	239.836	30.880	6.129	11.036	4.686	9.029	10,2%	17,0%	12,9%	2,6%	4,6%	2,0%	3,8%
Eki.06	227.614	33.362	7.426	13.804	3.604	8.528	11,9%	17,6%	14,7%	3,3%	6,1%	1,6%	3,7%
W44	66.761	10.140	2.450	4.514	1180	1.996	12,0%	17,7%	15,2%	3,7%	6,8%	1,8%	3,0%
W45	71.579	10.099	2.304	4.255	1230	2.310	14,3%	13,9%	14,1%	3,2%	5,9%	1,7%	3,2%
W46	79.668	10.603	2.404	4.232	1440	2.527	11,2%	15,2%	13,3%	3,0%	5,3%	1,8%	3,2%
W47	74.140	10.139	2.260	4.316	1400	2.163	11,8%	15,2%	13,7%	3,0%	5,8%	1,9%	2,9%
W48	72.276	8.907	1.957	3.766	1077	2.107	11,5%	13,2%	12,3%	2,7%	5,2%	1,5%	2,9%

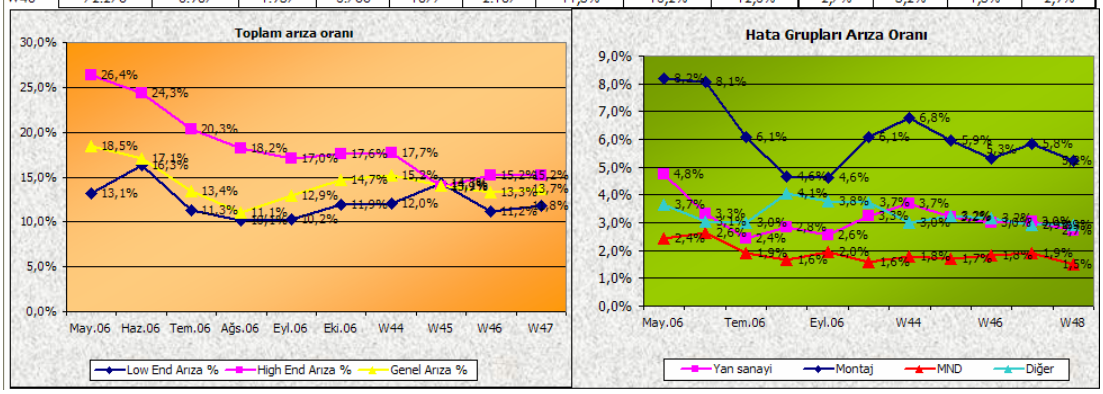


Figure 7.34 The variation of the problem list in the production

As shown in figure 36 the quantities of the problems are decreasing constantly. This means, after start to use hold list, company reduce the rejection cost in the production. This table does not reflect all hold list results because the new program couldn't applied effectively in Vestel due to large product varieties. After finish the implementation, the target is to get five percent reject rate.

CHAPTER EIGHT
CONCLUSION

8.1 Conclusion

The paradigm of technology management is now shifting towards strongly emphasizing the value of technology. In accordance with this rapid change, firms are more concerned with technology valuation and packaging as a core task of enhancing their competitiveness. Technological development is getting more difficult products for production. During production development process, companies face so many problems because of new technologies.

In this sense to define the priority of the problems is essential because of to make balance between the limited manpower source and the market demands.

In this study the problems highlighted about scheduling and its affects to the company throughout ERP - implementation. These jointly impact forced to firm create hold list program.

For application an electronics company was selected in Manisa in order to implement an atomized Hold List program as a module in an ERP program. Therefore current processes were investigated to clarify. Solutions were developed to correct the causes and improve the process, then it was decided that atomized hold list method instead of current manual one. The main problem was determined as no integration with SAP ERP program that the company uses already for process management. Fro this reason current manual hold list method was examined and actualized in order to synchronize it with SAP R/3.

Hold List in this article is used as a method that makes the schedule possible for problems in R&D department. To aim of this study is to create a scheduling method. When necessary of the creating we used PM, TQM and ERP approaches.

The benefits can be sequenced as below;

Using this new program;

- The managers could check all problems about his/her department,
- Marketing department could check the problems about all components and could inform customer about real mass production time,
- Salesman could force to change the specifications of product to customer ,
- Planning department could make real production plans ,
- Provision department could make real plan for the purchased components ,
- Marketing experts could force to departments about real mass production time
- R&D divisions could know which problem is more important then others about delaying the mass production.

This system provide a system that bring the statistical information about product failures for new models and it is also essential for reliability prediction. This statistical information emerges from hold problems for all products.

8.2. Future Research

For further studies, a set of improvements for the solution methodology and a new joint program to facilitate the application of the steps may be developed.

The human factor for defining the priorities can be passed by using more development software. This solution required introducing all problems to system and the priorities could be selected automatically.

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