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Design and implementation of ERP software in material supply chain management for SIIX Corp.

Xing'er Chen

WORLD MARITIME UNIVERSITY

Shanghai, China

DESIGN AND IMPLEMENTATION OF ERP SOFTWARE IN MATERIAL SUPPLY CHAIN MANAGEMENT FOR SIIX Corp.

By

Chen Xing'er

China

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Declaration

I certify that all the material in this research paper that is not my own work has been identified, and that no materials are included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

Chen Xinger

2012-06-09

Supervised by
Professor : Zhao Gang
World Maritime University

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Abstracts

Title of Research paper: **Design and implementation of ERP system software in supply chain management for SIIX Corp.**

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Since the beginning of the 21th century, the enterprise in which the environment has undergone great changes. Customer needs are rapidly changing, technological innovation is accelerating continuously, product life cycles are altering to short, and the competitive market is changing increasingly.

what is an ERP system? It's a software system that facilitates the flow of your businesses information—it pulls all of your businesses information together making it quickly and easily accessible to those who need it. In the process, the system helps reduce costs through decreased errors and a decrease in redundant tasks. It also provides management with ways to track and analyze information across multiple departments for a new window into the company's processes. ERP is based on the resources of the entire enterprise information management software system for planning and control, which is based enterprise supply chain management thinking, on the basis of MRPII expands the scope of management of modern management software tools. The basic idea of ERP enterprise business processes look on as a close connection of the supply chain, including suppliers, manufacturing plants, distributors, distribution network and customers, and divide internal division into several mutual collaboration the support systems.

This project starts from the analysis and discussion of concept of supply chain management and strategic significance, and on this basis for the Higgs trading company SIIX Corp, the Software of ERP system for material supply chain management. This paper studies such as follows:

A. For the characteristics of the material supply chain management and according to SIIX Corp the company's logistics, several important management decision-making will be analyzed and researched, so that could lay a good foundation for the system.

B. Making researches for materials supply chain management and combining the production of SIIX Corp, which could complete demand analysis of subsystem, design the date flow and specific function and make detailed design.

C. In this thesis, we will use the C / S architecture as the development framework of system. The ERP system of C / S structure has the advantages that adaptability, maintenance easily, data security and unified and user-friendly interface, which are the main method of the ERP system.

Keywords: enterprise resource planning (ERP), supply chain management, system Software, the C / S structure

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Chapter 1 Introduction

1.1 General Background

The manufacturing industry is the support of China's national economy. According to the latest statistics of National Bureau of Statistics, the manufacturing enterprises occupy 91.6% of the amount of industrial enterprises, 86.8% of main business incomes and 73.1% of the profits. The manufacturing industry still takes the domination position in China's industry. In the past 20 years, China's manufacturing industry has undertaken the international industry transfer; its status has been rising in the international division of labor.

At present, China's manufacturing industry has ranked the world's top three. With the enhancement of the trend of global manufacturing industry transferring to China, China's manufacturing industry has played a more and more important role in the economic arena. This has brought great and unprecedented opportunities for us. Meantime, it also has brought great challenge, so how to deal with this challenge and how to make good use of it are problems that must be solved in China's enterprises management. The implementation of ERP enterprise resource management planning is one of our important measures.

According to statistics, there are 1.35 million manufacturing enterprises in China, of which about 2000 are large enterprises, 34000 are small and medium-sized enterprises, and 1.31 million are small-sized ones. Now the popularizing rate of ERP Software in China's manufacturing industry is only 10.4%, even in the machinery industry that began information construction early, the popularizing rate is just 15.7%. The degree of informatization of the whole manufacturing industry is very low. At the same time, users' informatization demands are constantly deepening and broadening, China's manufacturing industry ERP system Software has a huge potential for development

1.2 Relevant project research- SIIX Corp.

1.2.1 SIIX Corp.

SIIX Corp. is a global business organizer creating added value by fully utilizing its experience in overseas operations, its extensive personal connections, and tis broad based oversea network nurtured over 50 years to systematically link the business requirements of various firms on global scale. In this way it is able to positively respond to emerging needs by undertaking a comprehensive range of functions in including design and development according to the specifications of individual customers, the procurement and materials, the assembly of sub-units as well as complete products, distribution, and merchandising.

SIIX runs a global outsourcing business taking on all or some of the parts procurement work of OEM makers.

SIIX takes advantage of more than 50 years of experience handling electronic components, a wide range of procurement sources not affiliated with big industrial groups and an excellent logistics network to provide a global electronic parts procurement service.

In addition, SIIX has arranged various logistics services in regard to delivery, including kitting, VMI (Vendor Managed Inventory) and JIT (Just in Time) to support the inventory management systems of our customers.

1.2.2 Existing Problems

Now, SIIX has established an overseas network located in 13 countries including 12 branches for different functions, such as Sales/ Parts & Materials Procurement, distribution center, and manufacturing service. Some of these branches are the predecessor of the Machine Parts Plant specialized factory subordinated to DFM which was a State-owned extra-large enterprise. And some foreign obsolete management concepts and methods of the former enterprise cannot adapt to the

current market competition obviously. As a result, SIIX decide to optimize the current ERP manage system to solve the problems such as:

- The low level of information technology, the complex product structure, the amateurish material coding, difficult to establish BOM(Bill Of Material,product structure or material form),the obstruction in diversity of various system interfaces,the lower level of customer synchronization.
- The enterprise improves its management by using effective ERP and resolves problems mentioned above gradually in the process of ERP implementation.
- The system of ERP is realized by the functions of different modules. including: market,production,warehouse,cost, purchase,BOM,finance. Each module is independent and anti—divided and realizes sharing resources on the same platform in order to fulfill information management.

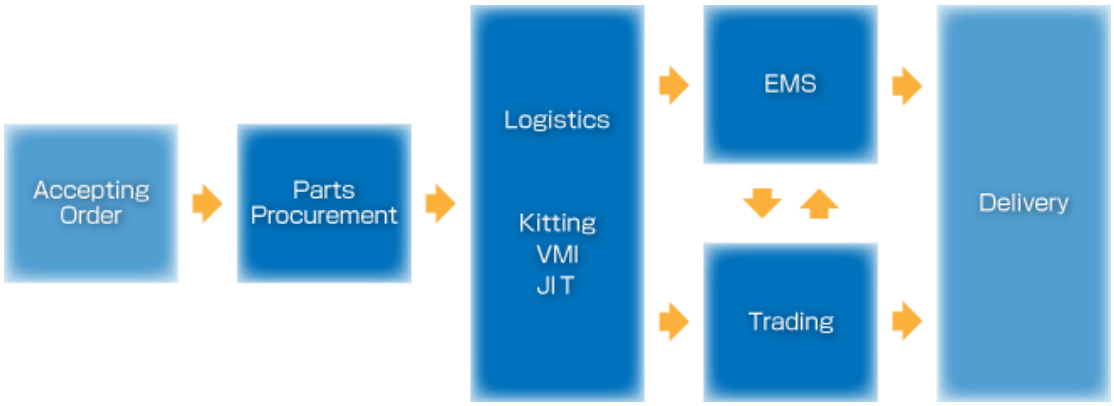

Figure 1-Business line of SIIX Corp
Source: www.siix.com

The development, management system. Main functions of ERP and its combination to material flow system of Our factory are introduced in the first part of this paper. Then discussing my own research Off how to design,normalize and optimize operation flow under the condition of maximizing its feasibility to make sure new operation flow based on computer system Can be accepted by operators. My research also includes the combination of advantage information system and current enterprise reality in the whole system design. We achieved adaptability of information system in flexible reconfiguration of operations, organizations and auditing flow without alteration of

key operation nodes.

1.3 The significance of the research

The most direct and profound impact of the informatization on manufacturing companies is changes of the decision-making thinking ways of enterprises' managers. It is sure that the informatization will bring great impacts to the plan, organization, coordination and control, which are main contents of enterprises' management. After enterprises implement the information technology, many significant differences have emerged between aspects of information source ways, information integration patterns, planning and decision-making modes, operating environments of plans, production and control methods and these of the tradition mode.

The implementation of informatization construction will make the manufacturing industry continually reform enterprises' management organizations, management methods and decision-making methods, and change enterprises' management models in all sides in a long time.

The use of the information system not only aims to improve the efficiency, but also helps enterprises to make changes of organization and management when facing challenges of the external environment. In addition, the use of the information system has also changed organizations' overall operation modes, improved their competitiveness, and made them gain advantages in the competition.

As the core link of this information system, the material supply chain management system has a pivotal position. Under such circumstance, the research, design and implementation of material supply chain management system has become an urgent subject to be solved.

1.4 Methodologies

In this research, the ERP theory will be combined with the actual situations of enterprises' production and operation, ERP system of C/S architecture has been

developed based on Oracle database. Meantime, through the study of the material supply chain management subsystem in ERP system, specific functions designs of the supply chain management subsystem has been provided to achieve the preconceived goals.

Delphi is an integrated development environment (IDE), using the traditional Pascal language developed from the Object Pascal language. Delphi is actually a version of the Pascal language, but with traditional Pascal language worlds apart. Delphi program is a first application framework, and application of this framework is the "skeleton." In skeleton, even in the absence of attachment anything can still be strictly in accordance with the design and operation.

Oracle9i is an excellent relational database management system, its database engine can be expanded, easy to use and safe which becomes one of the best data storage devices. So the ERP system of this article in mainly uses Oracle 9 I relation database.

In order to design Material supply chain Management software, this research respectively contributes to the design decision, the function design, the design of data structure and security design. Through the analysis of the functional requirements of the system, to study the Business Function, draw the system Flow chart, and work out a detailed subsystem with comprehensive planning and function design.

1.5 Structure: the layout of the thesis

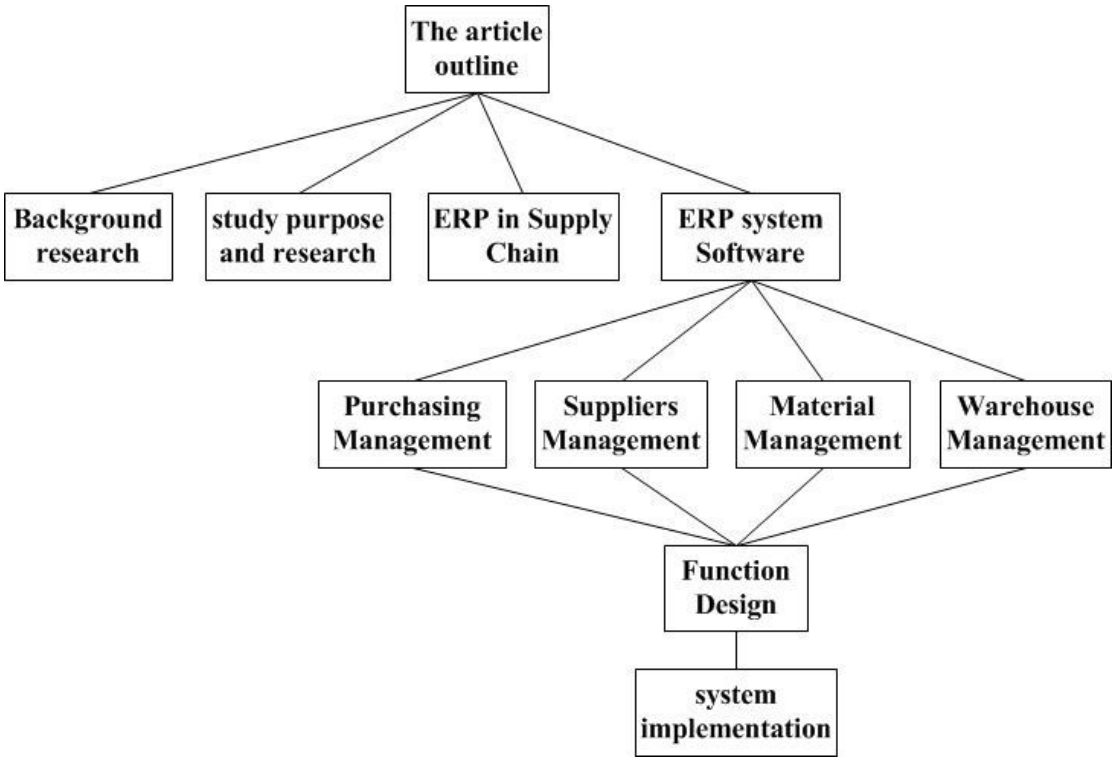

Figure 2- Structure of the article

Source：Own presentation

The structure and layout of the thesis are as follows:
The first chapter is the introduction of ERP, its development history, technology development trend and the current situation of ERP in China. And the research significance and purpose of this project have been expounded as well.

The second chapter is the literature Review, the implementation of ERP, the optimization of ERP, management through ERP, the ERP software, and the basic concepts and principles of ERP for supply chain management.

The third chapter is the "related principles," the basic concepts and principles of the system have been introduced, which has provided the theoretical basis for the system design and implementation.

The fourth chapter is the "analysis of management decisions", combined with the logistics characteristics of SIIX Corp, the decisions of several key points in the material supply chain management have been analyzed and studied.

The fifth chapter is the "system design", the data process of material supply chain management system, specific functions of the corresponding system, database designs and security designs have been completed.

The sixth chapter is the "implementation of the system" and the "operating effects of

the software", the overall structure of ERP software and main supportive technologies to realize functions of software have been introduced; operating interfaces of the system's several main subsystems have been demonstrated.

The seventh chapter is the summary of the whole thesis, problems discussed in the thesis have been presented, and the future research ideas have been explained as well.

Chapter 2 Literature review

2.1 Introduction of ERP

The Enterprise Resource Planning (ERP) system is an enterprise information system designed to integrate and optimize the business processes and transactions in a corporation. The ERP is an industry-driven concepts and systems, and is universally accepted by the industry as a practical solution to achieve integrated enterprise information systems. The academic research community has been contributing to the field in various ways. A typical way of contributing to a field is by publishing archival journal papers for public benefits. (Abdinnour-Helm, S., Lengnick-Hall, M.L., et al. (2003) 'Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning system'， European Journal of Operational Research, Vol. 146, No. 2, pp.258–273)

Implementing an ERP system is a major project requiring a significant level of resources, commitment and changes throughout the organization. Often the ERP implementation project is the single biggest project that an organization has ever launched. As a result, the issues surrounding the implementation process have been one of the major concerns in industry. And it further worsens because of numerous failed cases including a few fatal disasters which lead to the demise of some companies.(Al-Mashari, M. (2003b) 'Enterprise Resource Planning (ERP) systems: a research agenda', Industrial Management & Data Systems, Vol. 103, No. 1, pp.22–27.)

Finally, a group of articles is interested in any differences between cultures and Nations in implementing ERP systems. Comparative studies are conducted and analyses are provided in terms of differences and similarities. Explanations for such findings are also attempted. The ERP research community is diverse and comprehensive. The field is truly Multi-disciplinary and inter-disciplinary. In a relatively short period of time, the researchers have contributed so much to the field that newer topics are now covered from various points of view. (Barker, T. and Frolick, M.N. (2003) 'ERP implementation failure: a case study', Information Systems Management, Vol. 20, No. 4, pp.43–49.)

2.2 Implementation of ERP system

Implementing an ERP system is a major project requiring a significant level of resources, commitment and changes throughout the organization. Often the ERP implementation project is the single biggest project that an organization has ever launched. As a result, the issues surrounding the implementation process have been one of the major concerns in industry. And it further worsens because of numerous failed cases including a few fatal disasters which lead to the demise of some companies. Reflecting such a level of importance, the largest number of articles belongs to this theme.

Implementing an ERP system inevitably involves a large portion of the organization and often accompanies with major business process reengineering efforts. Therefore, change management becomes a critical topic in the ERP implementation. A set of articles address the change management by explaining why it is important in the ERP implementation, how to do it effectively, the lessons learned, and the change management strategies. (Boersma, K. and Kingma, S. (2005a) 'Developing a cultural perspective on ERP', Business Process Management , Vol. 11, No. 2, pp.123–13)

The ERP implementation has a life cycle beginning with a company's decision to go

for it to final go live stage. The articles belonging to a sub-theme of 'Focused Stage'address a particular stage of the ERP implementation life cycle. They are the ERP systemSelection process, the customization of the ERP system, the configuration of the ERP system, the determination of a hosting service, etc. (Ehie, I.C. and Madsen, M. (2005) 'Identifying critical issues in Enterprise Resource Planning(ERP) implementation', Computers in Industry, Vol. 56, No. 6, pp.545–557.)

2.3 Making use of ERP

Once the company successfully implements the ERP, the attention moves forward to the most efficient use of the system. Especially since considerable resources have been invested in the ERP implementation, the best possible utilization of the system is anticipated. Indeed, the value of an ERP system draws from its effective and efficient usage and not so much from the system itself. The articles under this theme address various topics of using the ERP system during the post-implementation era, ranging from end user acceptance, to end user satisfaction, to business process reengineering after ERP implementation, to uncertainty management, to particular functions such as designing return material process and handling Sarbanes-Oxley requirements. (Frank, L. (2004) 'Architecture for integration of distributed ERP systems and e-commerce systems', Industrial Management & Data Systems, Vol. 104, No. 5, pp.418–429)

2.4 Nowadays trends and perspectives of ERP

Best practices are incorporated into most ERP systems. This means that the software reflects the vendor's interpretation of the most effective way to perform each business process. Systems vary in the convenience with which the customer can modify these practices. Companies that implemented industry best practices reduced time–consuming project tasks such as configuration, documentation, testing and training. In

addition, best practices reduced risk by 71% when compared to other software implementations.

The use of best practices eases compliance with requirements such as IFRS, Sarbanes-Oxley, or Basel II. They can also help comply with de facto industry standards, such as electronic funds transfer. This is because the procedure can be readily codified within the ERP software and replicated with confidence across multiple businesses who share that business requirement

The emphases seem to be on the intimate relation with Business Process Reengineering (BPR) and a wide range of organizational changes accompanying with the ERP implementation. Some articles attempt to clarify the basic meanings surrounding ERP to provide reflections on many years' of practices. Also, a number of survey studies are reported from the findings of current industry's experience with ERP. These survey studies can complement the general introductory articles supported by the real data.

A number of articles provide different perspectives on ERP. For example, they are perspectives from managers, users, or vendors.

A common observation on the future trends in ERP is its further expansion in scope. New integration technology such as software componentization, Enterprise Application Integration (EAI), service-oriented architecture, web services is introduced and their implications are discussed. A couple of articles attempt to provide a sense of direction in the ERP research community by analyzing the ERP literature. They identify the gaps between industry and academia and within the academic research, thus point out the potential future trends in terms of further expansion.

A few articles provide a similar information, but on a particular sector. The example sectors include the public organizations, the educational organizations, the healthcare organizations, the fashion industry, the manufacturing industry, the service industry.

(Enhanced Project Success through SAP Best Practices – International Benchmarking

Study". PP 35-67)

Chapter 3 Software design theory

In order to better design and implement the steel structure ERP material supply chain management system, it is necessary for us to understand the basic theoretical knowledge about principles of supply chain management first. In the following part, the basic concepts, supply chain management, basic principles of material requirements planning and business process reengineering have been separately discussed.

3.1 Basic concepts

3.1.1 Item number

Item number is the unique identification code for the computer system to recognize materials, which is the search basis for computers' management of materials. To encode all materials that are needed in running ERP system is ERP's most basic work.

3.1.2 Purchasing list

The purchasing list is the technical description file of products structures. It indicates the structure relationship among products components, subparts, parts and raw materials, as well as the number of various subordinate components that are needed in each assembly part.

3.1.3 Routing

The routing mainly states the operating sequence of the actual processing and assembling of materials, the work center used in each process, various time quotas (such as preparation time, processing time and transmission time) and time and costs

of outsourcing process.

3.2 Supply chain management

The core of ERP is the supply chain management. The supply chain management combines enterprises' manufacturing process, inventory system and data generated by suppliers together; it demonstrates various influencing factors in the product manufacturing process from a unified perspective. Its basic ideas are mainly embodied in the following three aspects:

1) Integration. Realize the resource optimization through the integration of enterprises' departments and integration of enterprises, including the integration of logistics, workflow, information flow and fund flow.
2) Systematization. It means that business activities in enterprises' departments and between various partners should be planned and controlled from the perspective of the overall supply chain. The "win-win" cooperative model should be promoted to guarantee the realization of the real overall resource optimization.
3) Coordination. That emphasizes the cooperation. Coordination functions of the supply chain include: supply and manufacture, producing and distribution, the coordination of multipoint inventory; the means of coordination include the information coordination and non-information coordination.

A. The definition and essence of supply chain management

The essence of the supply chain management is to take both demand and supply into account. Each link in the chain contains the two meanings of "supplying" and "demanding". For example, the retailer is not only the supplier of customers, but also is the acquirer of the wholesaler; the wholesaler is the supplier of the retailer, but it is also the acquirer of the manufacturer; the sales department of the manufacturer is not only the supplier of the market, but also the acquirer of the purchasing department; the purchasing department is the suppler of the production department, it is also the acquirer of the supplier.

B. The position of supply chain management in ERP system

When implementing the ERP system project, the problem how to establish the informational material supply system because ERP system mostly focuses on enterprises' internal production and operation, organization and coordination, while enterprises' material supply activities refer to commercial logistics activities with enterprise' external suppliers under the guidance of enterprises' production plan, thus the new management idea, theory and method are needed to guide the construction and management of enterprises' informationized material supply system.

3.3 The basic principles of material requirements planning.

1) Independent requirement

Users' requirements for enterprises' products and services are called independent requirements. The most obvious characteristic of independent requirement is that the required objects and amounts are uncertain, which can only be roughly predicted through forecasting methods.

2) Dependent requirement

Requirements in enterprises' internal materials transformation links are called dependent requirements. The dependent requirement is also known as non-independent requirement; it can be accurately calculated according to the independent requirement of the final products. Once it is the independent requirement, after determining the production tasks, the number of raw materials and parts that form the products and needed time can be precisely obtained through calculating.

3.3.1 The basic idea of ERP system logistics management

The basic idea of ERP logistics management is to transform, organize and manufacture resources around materials, and to achieve the on-time production

according to requirements. In the actual production process, the shape and nature of materials are constantly changed. When gradually transforming from raw materials to products, enterprises' large amount of working funds has been occupied by materials. Therefore, the management of materials has played a key role in improving the economic efficiency of enterprises.

Organizing the production with materials as the center reflects the purpose of servicing customers. The final form of materials is the products, which are things needed by customers, the transformation of materials ultimately aims to provide satisfactory products for customers. Thus transformation, organization and production around materials are embodiments of the idea of organizing production according to needs of the market.

3.3.2 Problems in the application of ERP logistics management

1) **Safe stock**

Setting safe stock is to deal with uncertainty. Although it is the dependent requirement, there are still uncertainties, such as unaccepted products, delayed delivery of bought-in components, equipment failures, power outages and absence. In general, safe stock is only set for lowest level components in the structure; it does not have to be set for the other level components.

2) **Lead time**

MRP lead time is the time standard to determine when to start parts processing and partial assembly, which takes the manufacture time of the products as the starting point. To determine the lead time needs to take the following factors into account: waiting (waiting for processing) time, running time (cutting, processing and assembly), adjusting set-up time, waiting for transportation time, checking time and transportation time.

3) Lot size

No matter in the purchasing or producing, in order to save ordering costs or, adjustment and preparation costs of production, a certain lot size must be formed. The lot-size problem also interacts with the lead time, changes of lot size should lead to changes of the lead time, and changes of the lead time will cause changes of lot size. To simplify, it generally regards the lead time as the known fix quantify to handle. In order to avoid the system tension, generally the lot size is only considered when ordering lowest level components.

Chapter 4 Analysis of management decisions-making model

Through the analysis of management decisions, scientific management modes and measures can be provided for the material supply chain management system; meantime it can also create considerable economic benefits for enterprises and achieve the goal of optimizing the distribution of resources. In the following part, logistics characteristics of SIIX Corporation have been analyzed through management decisions on several key points.

4.1 The balance of resources

1) **Related concepts**

The resources balance means that when the comprehensive planner receives the instruction issued by the craft department, he makes a comprehensively balanced work of the procurement directives based on the current material inventory situation to achieve the goal of taking fully advantage of the inventory and reducing the purchasing costs. Materials inventory status data includes: planned quantity, inventory quantity, occupied quantity and inventory available quantity.

Planned quantity: the predicted purchasing quantity estimated according to the design requirement in the procurement directives issued by the process.

Inventory quantity: the actual amount of storage in the warehouse.

Occupied quantity: the number of inventory occupied by the planned quantity, which has not been actually used, is in a seizure condition.

Available quantity of inventory: the number of inventory that can be used by the planned quantity.

2) **Decision-making thought**

Available quantity of inventory = stock amount - the occupied quantity.

When the first negative value of available quantity of inventory emerges, it means that for the first time the net demand has come out, its value is equal to the absolute value of this negative value. For later inventory level negative value, their absolute value is used to represent accumulated value of net demand in the time zone. The net demand of materials and its occurred time imply the impending shortage of materials. In order to avoid such cases, the planned order quantity should be appointed in the time zone that net demand occurred, and then the order lead time should be considered, the issued time of purchase plan needs to be cleared out.

3) **Decision-making steps**

The comprehensive planner receives the purchasing list issued by the craft department, and determines the purchasing methods according to the materials inventory.

If the stock quantity = 0, then the purchasing plane is issued.

Else if the available quantity of inventory < the planned quantity, then make the part purchasing (one part uses the inventory, purchases one part)

Else if the available quantity of inventory > the planned quantity, then use the inventory:

That means that for each purchasing ways issued by the craft department, the comprehensive planner has the following three disposal pathways:

Issuing the purchasing plan

The comprehensive planner issues the purchasing plan according to material categories, including appointing planners of each purchasing plans, requirements of goods arrival time (determining based on the delivery time on the purchasing list), truing to the purchasing process.

Part purchasing:

For the situation of insufficient inventory, the part purchasing is implemented. The purchasing quantity equals the planned quantity minus the inventory quantity, a purchasing plan is issued for this part of materials; for the remaining materials, the inventory is used.

Using stockpiled materials

① Manual use of stockpiled materials

In the case of available quantity of inventory meets requirements, the comprehensive planner chooses purchasing materials that need to use stockpiled materials, and then specifies its warehouse account page corresponding to inventory, thus the occupied quantity of the materials will generate.

② Automatic use of stockpiled materials

Automatically compare the planned quantity with inventory quantity by computers, and then specify the warehouse account page in accordance with the principle that materials put in storage first are used preferentially, thus the occupied quantity of the materials will generate.

4.2 Purchase decision-making model

1) The principal of purchase decision-making

Purchasing material should take production process and stock current situation into consideration to get the maximal benefit. Purchasing should follow the principles:

a. Meet the demand of production for next month.

b. Avoid a large backlog of inventory

c. Purchasing investment should achieve the best forecast benefit

d. Purchasing according to the order of process instructions

According to the principles above, it puts forward the decision-making plan:

If there are n types of materials in stock, the quantity of stock $\mathbf{E} = (\mathbf{e_1}, \mathbf{e_2}, \ldots \mathbf{e_n})$, unit price $\mathbf{K} = (\mathbf{k_1}, \mathbf{k_2}, \ldots \mathbf{k_n})$, the price of production operation contract is P, the consumption of this month is $\mathbf{B} = (\mathbf{b_1}, \mathbf{b_2}, \ldots \mathbf{b_n})$. Now the investment is **Y** Yuan, the quantity of each material to purchase is $\mathbf{X} = (\mathbf{x_1}, \mathbf{x_2}, \ldots \mathbf{x_n})$. And the object is to get maximum expected profit is $\mathbf{max}\{\mathbf{p} - \sum \mathbf{j_i x_i}\}$.

Constraints:

- ✧ Try to meet the consumption of production $\mathbf{C_i}$, $\mathbf{e_i} + \mathbf{x_i} \geq \mathbf{c_i}$;
- ✧ Avoid a large backlog of inventory $\mathbf{e_i} + \mathbf{x_i} \leq \mathbf{3c_i}$;
- ✧ Purchases $\sum(\mathbf{k_i x_i}) \leq \mathbf{Y}$
- ✧ Following the order of process instructions

2) Purchasing decision-making model

The invoice data of each material (n kinds) can be expressed as follows:

If there are n types of materials in stock, the quantity of stock $\mathbf{E} = (\mathbf{e_1}, \mathbf{e_2}, \ldots \mathbf{e_n})$, unit price $\mathbf{K} = (\mathbf{k_1}, \mathbf{k_2}, \ldots \mathbf{k_n})$, the price of production operation contract is **P,** the consumption of next month is $\mathbf{C} = (\mathbf{c_1}, \mathbf{c_2}, \ldots \mathbf{c_n})$.

Now the purchase price is **Y** Yuan,the question can be concluded as the quantity of each material to purchase $\mathbf{X} = (\mathbf{x_1}, \mathbf{x_2}, \ldots \mathbf{x_n})$ to satisfy a series of limitations. In order to make the purchase meet the consumption of production of next month, we can calculate the minimum purchase amount

$\mathbf{Y'} = \sum (\mathbf{c_i} - \mathbf{ei})\ \mathbf{ki}$ (i means the stock out kind, $\mathbf{c_i} \geq \mathbf{e_i}$)

Material purchasing decision model and algorithm will be established as below from two situations.

✧ The purchase amount cannot meet the consumption of production of next month $(Y \leq Y')$.

Under this circumstance, the reasonable purchase should minimize the amounts of out stock goods of next month and maximize the profit forecasts.

Suppose there are n kinds of goods out of stock, the purchase decision-making is to choose m kinds of goods from n kinds to fulfill the object. Suppose decision-making vector $\mathbf{X} = (\mathbf{x_1}, \mathbf{x_2}, \ldots \mathbf{x_n})$, $\mathbf{x_i} = \mathbf{1}$ means i kind of good fulfill sales of next months, **or** $\mathbf{x_i} = \mathbf{0}$ means that ikind of goods will not be purchase.

Object: $\mathbf{max} \sum x_i$ **(**minimize the amounts of out stock goods of next month**);**

$\mathbf{max}(\mathbf{p} - \sum \mathbf{k_i x_i})$ **(**maximize the profit forecasts);

Constraints: $\mathbf{x_i}(\mathbf{x_i} - 1) = \mathbf{0}$ $(\mathbf{x_i = 0 \text{ or } x_i = 1})$**;**

$\sum (\mathbf{c_i} - \mathbf{s_i})\mathbf{k_i x_i} \leq \mathbf{Y}$ (purchase price no more than Y)

It can be concluded from dynamic optimization principle available that if each stage of the decision is the best, this decision can achieve the best sum of economic profit and the optimization of economic efficiency, and then the entire decision-making is the most optimal.

Suppose there are n decision-making stages in process, S presents the station of any stage (state variables), and $x_i(s)$ is decision variable which means there are still i stages to go when the station is S, next status to select. $f_i(s)$stands for present status S which means there are still i stages to go. The best optimal decision value is decided by present status. $d(s, x_i(s))$ stands for the value at i stage making decision of $x_i(s)$. Therefore, dynamic optimization principle can be summarized in:

$$\mathbf{F_i(s) = max\{d(s_i x_i(s)) + f_{i-1}(x_i(s))\}} \quad (4.1)$$

In this problem, the whole purchasing activities can be regarded as a multi-stage decision process and for a kind of purchasing of materials can be regarded as a stage of the decision. As long as every time (kind of) purchasing of materials is the best, then the whole purchasing activities is optimal. And every optimal decision of purchase should take up minimum investment $\mathbf{K_i\ (C_i - E_i)}$ (to make all stages the optimal value and so as many as possible kinds of goods procured),so as to do the best purchase (the best profit and the lest kinds of out of stock goods). $\mathbf{K_i\ (C_i - E_i)}$ is the decision factor.

✧ The purchase amount can meet the consumption of production of next month $\mathbf{(Y \geq Y')}$.

Under this circumstance, the purchase object is to achieve the max profit forecast under this precondition of satisfy the need of producing.

At first, to meet the consumption of producing, i kind of good which will be out of stock next month should purchase for $\mathbf{x_i}$, thus $\mathbf{e_i + x_i = c_i}$.

Suppose the purchases areY_1, then the surplus purchases are$\mathbf{Y' = Y - Y_1}$ ($Y' \geq 0$),

The object of purchase turns to:

After investment of $\mathbf{Y'}$, and then make the purchase decision to achieve the best profit.

Limitations: the amounts of any material inventory add the procurement cannot be more than sales of 3 months.

Decision-making model can be built according to above:

Suppose there are n kinds of materials, and the inventory of each materials is less than the sales of three months.

Objective: $p - \max \sum k_i x_i$[achieve the best profit]

Limitations: $\sum k_i\, x_i \leq Y'$[no more than surplus investmentY';]

$x_i \leq zc_i - e_i (i = 1,2, \ldots n)$ [the sum of the quantity of any kind of goods and inventory should be no more than the sales of z months]

This is typical of linear programming problem which can be solved by the simplex method.

4.3 Supplier management model

1) Problem description

There are a heavy industry company and i suppliers in a supply chain. In planning period **[1, T],** it is need to procure j kinds of materials from supplier i to satisfy the need of production. The company puts forward to purchase the sort of material according to the demand of the market condition and actual situation of producing and equipment. In a period **t, t ∈ [1, t]** the demand in quantity, quality and delivery time $\mathbf{d_{jl}}$, $\mathbf{d_{jl}} \in$ **[1, T].** $\mathbf{X_{ijl}(t)}$ means the quantity of purchase at t period.

The objective of purchasing plan is to make a reasonable purchase plan to optimize the cost of purchase, quality, delivery time and supply circulation time, and in the meantime choose the reasonable optimal plan of suppliers and resources, providing procure decision-making with a reliable mathematics basis.

Building model

Objective function:

Because of the importance of cost, quality and delivery time in selection of suppliers, multiple target objective solution is put forward to solve the problem.

Minimize the total procurement costs: the total procurement costs is composed by

material price and cost of transportation. Thus, cost objective function is:

$$\mathbf{Minf_1} = \sum_{t=1}^{T}\sum_{i=1}^{I}\sum_{j=1}^{J}\sum_{l=1}^{L}\mathbf{C_{tjl}X_{tjl}(t)} \quad (2)$$

Minimize supply chain cycle time: Supply chain cycle time is mainly composed by the response time of the order and transportation time. Ignoring the suppliers' order response time and putting emphasize on the transportation time is a purchasing strategy by shorten the logistics of time.

$$\mathbf{Minf_2} = \sum_{t=1}^{T}\sum_{i=1}^{I}\sum_{j=1}^{J}\sum_{l=1}^{L}\boldsymbol{\gamma}_{\mathbf{tjl}}\mathbf{X_{tjl}(t)} \quad (3)$$

Minimize the total late to delivery time: The company should choose a supplier with a good reputation of delivery according to each supplier delivery history records and the market prestige etc.

$$\mathbf{Minf_3} = \sum_{t=1}^{T}\sum_{i=1}^{I}\sum_{j=1}^{J}\sum_{l=1}^{L}\boldsymbol{\alpha}_{\mathbf{tjl}}\mathbf{X_{tjl}(t)} \quad (4)$$

④Minimize unqualified product quantity: non-conforming products will directly influence the quantity and the quality of the products. Thus, measures should be taken to reduce the disqualification rate:

$$\mathbf{Minf_4} = \sum_{t=1}^{T}\sum_{i=1}^{I}\sum_{j=1}^{J}\sum_{l=1}^{L}\boldsymbol{\beta}_{\mathbf{tjl}}\mathbf{X_{tjl}(t)} \quad (6)$$

Because of the different geographic location of suppliers, the transportation time $\mathbf{Y_i}$ and the transportation price $\mathbf{e_{ji}}$ are different. Suppose the unit transportation cost is fixed, the unit material cost is $\mathbf{C_{ji}}$, the unit material price is V_{ji}. Thus, $\mathbf{C_{ji} = V_{ji} + e_{ji}}$.

Y_i. stands for the transportation time from supplier i to SIIX Corp. $\mathbf{a_{ji}}$ is the disqualification rate that supplier provide SIIX Corp with J kinds of material..

Constrains:

① Limitation of demand

Suppliers plans should meet the demand of SIIX Corp. on the types, volume at a given time.

The following equation：

$$\sum_{l=1}^{L}\mathbf{X_{jtl}(t-\gamma_{jl}) = Q_{jl}\ (t)}\ ;$$

j=1,2...,J, t=1,2,...,T, l=1,2,...L (6)

and：Q_{jl}（t）is demand of the j kinds of Material during a period of t .

②Supplier capacity constraints:

With limited resource in a period of time, purchase quantity of the plan cannot exceed its given supply upper limit.

so：

$$\sum_{l=1}^{L} X_{jtl}(t) \leq S_{jl}\ (t)$$

j=1,2...,j, t=1,2,...,t, l=1,2,...l (7)

③Procurement budget constraints

All kinds of purchasing expenditure should be controlled in purchasing budget, and accord with total purchasing quantity,so that：

$$\sum_{t=1}^{T} C_{tjl} X_{tjl}(t) \leq C \quad (8)$$

and：C is the total procurement budget.

④Constraints of the nonnegative number for purchasing volume

As follows:

$$X_{ijl}(t) \geq 0$$

i=1,2,...i, j=1,2...,j, t=1,2,...,t, l=1,2,...l (8)

3）Solving the problem with model

From the above model ,we can see the model is multi-objective linear model. For solving the multi-objective programming problem,there is a variety of methods. We make the use of linear weighted sum method of the evaluation functions. And then,we can use the classic Linear programming to solve the problem.

Objective function：

$$\mathbf{Min}(\theta_1 f_1 + \theta_2 f_2 + \theta_3 f_3 + \theta_4 f_4);$$

And $\boldsymbol{\theta_1 + \theta_2 + \theta_3 + \theta_4 = 1, \theta_1 > 0, \theta_2 > 0, \theta_3 > 0, \theta_4 > 0}$

$\theta_1, \theta_2, \theta_3, \theta 4$ are weight coefficients corresponding different effective solution and weak efficient solutions. In order to make the multi-objective optimization problem with practical significance, the selection of reasonable weight coefficient is very important.

Judge the importance of different targets and then make comparison matrix according to the judgment standard 1.8 . The n element's weight is $W_n = w_n / \sum w_n$. The algorithm can givemulti effective solution set of target function whenthere are different value of $\theta_1, \theta_2, \theta_3, \theta 4$, and the decision maker can choose satisfying solutions in efficient solution.

solution：

First step :Build model and the objective function, according to the requirements of each enterprise on supply chain and supplier capacity:

$$\boldsymbol{\mathrm{Min}\theta_1 f_1 + \theta_2 f_2 + \theta_3 f_3 + \theta_4 f_4}$$

Second Step：Confirm the weight of $\theta_1, \theta_2, \theta_3, \theta_4$；

Third step：Using general linear programming software to calculate the $X_{ijt}(t)$and the objective function values；

Forth step：Calculate the type and quantity of materials to be purchased from different suppliers the suppliers plan to amount and type of purchase materials in every time at the procurement center；

Fifth step：Make use of different value of （$\theta_1, \theta_2, \theta_3, \theta 4$)to solve model, calculate the efficient solution.

4.4 The management of material requisitions

In the material supply chain management of ERP system, the previous manually made small material requisitions are gradually replaced by the form of material requisitions. The supply department checks each specified account page of records on every material requisition, when all records are specified warehouse account pages, this

material requisition is approved. In the case of materials are not be used, the audit can be canceled, and continue to specify the account page.

The specified account age records the storage identification that meets production requirements for each recipient detail on the material requisition (one or more). When the warehouse inventory meets production requirements, there are two following situations:

①the amount of one warehouse account page meets the quantity needed in the production

Record the identification of occupied warehouse account page on the original pre-determined material requisition

②the sum of amounts of several warehouse account pages meets the quantity needed in the production

According to selected warehouse account pages, split the original pre-determined material requisition into several pre-determined material requisitions.

For example:

The production demand is 100KG=50 KG for warehouse account page No.1+20 KG for warehouse account page No.2+30 KG for warehouse account page No.3;

Thus the original pre-determined material requisition is divided into three pre-determined material requisitions:

Pre-determined material requisition No.1: Change the original production demand quantity to 50kg, and record the identification of the warehouse account page No.1;

Pre-determined material requisition No.2: Generate a new pre-determined material requisition, the demand quantity is changed to 20kg, and record the identification of the warehouse account page No.2;

Pre-determined material requisition No.3: Generate a new pre-determined material requisition, the demand quantity is changed to 30kg, and record the identification of the warehouse account page No.3;

Thus it ensures that each pre-determined material requisition corresponds to an

identification, which guarantees the correctness of warehouse's charge-off.

Distribution of material requisitions

When material requisitions cannot be all distributed in one time:

The workshop first puts material requisitions in the warehouse, take materials, and continue to take next time;

If materials are not sufficient on the specified account page when receiving, the custodian can go to other warehouse account pages, as long as they are of the same kind, they can be replaced; it can be checked out in the warehouse that materials of one project are used in which projects.

Material receiving detail on material requisitions issued at different times

If the received number on the material requisitions is 10, but the actual received number is 5, there are five others to receive in the next time.

①if it does not occur in the next month, the first 5 ones are sent out, for the next receiving in the same month, the actual issued quantity is needed to be wrote.

②if it occurs in the next month, the custodian should delete the receiving detail record that has not been charged off, and then recharge off in the next month.

The first five one can be sent out. For the other five, record the material requisition ID. When manually make the list again, after receiving, delete the five receiving detail on the material requisition.

4.5 SIIX's ABC inventory classification

SIIX Corp involves a large number of transactions in the product engineering. In order to produce effectively, managers must avoid distracting by unimportant details, and need to focus on important business related with the manufacturing process. The inventory control method should be adopted to separate materials that need to be controlled precisely from those that do not need to be precisely controlled to make key management. According to 20-80 phenomenon in the Pareto principle, as shown

in Table 1, the total value of materials that occupies 20% of varieties of materials in inventory occupies 80% of that of the total plant inventory materials, and the total value of materials that occupies 80% of varieties of materials only occupies 20% of that of the total plant inventory materials.

Table 1 ABC inventory classification table

Type	Occupied inventory funds	Numbers of occupied varieties in inventory
A	80%	20%
B	15%	30%
C	5%	50%

Source：Own presentation

A-class materials belong to key inventory control objects, which demand accurate inventory records, and are needed to be strictly checked according to their cycle counting. Their quantities and quality conditions should be grimly examined; the use and custody of this kind of materials must be closely monitored.

The inventory level of A-class materials should be reduced as much as possible. Reasonable order cycle time and order quantity should be adopted to avoid waste and the dead stock.

For C-class materials, a lot of management efforts do not need to be invested, the cycle counting can be appropriately extended. B-class materials are between A-class and B-class, so suitable methods can be used to utilize, keep and control.

ABC classification method is the simple and easy-to-use method in the inventory control. But it should be noted that all kinds of materials that constitute products are indispensable, as loosely manage C-class materials, special attentions must be paid to quantities and qualities to avoid influencing the implementation of plans.

According to principles of ABC inventory, inventory costs of SIIX Corp's steels (steel plates, plates rolling, which are the main raw materials for production) storage are the highest, and are listed in the A-class inventory management; because of the less occupied amount of funds, welding materials and paint among products are listed in the B-class inventory management; other various kinds of facilitating goods are listed

in the C-class inventory management due to cheap prices.

Chapter 5 Requirement analysis

The three main lines of ERP design are the supply chain management, production management and financial management. These three main lines are mainstream business in the manufacturing business processing, therefore when carrying out the planning programming and design implementation, the division of labor and coordination should be made closely around the three main lines.

The supply chain management is the main line of enterprises' logistics business, it deals with the whole process from raw material supply, products storage to products sales, and the core of its logistic management is the management of the inventory. Main information and data in this process are items inventory information, items code information and data of suppliers and acquirers. Marketing plans, contracts and orders are entry data for the master production schedule.

With the guidance of ERP thought, this system uses advanced computer information management technologies to make effective management of SIIX Corp's entire supply chain. Previous business processes have been reorganized and reconstructed, mainly including: purchasing management process, price trial management process and warehouse management process. The material supply chain management subsystem has been deployed to relevant units, such as basic resources, shop floor, cost, quality, and finance.

5.1 Analysis of the current status

Since the material supply chain management system of SIIX Corp was officially ran in 2004, it has been applied for nearly 3 years, the hardware and software of the system are needed to be upgraded. With the increasing standardization of the

management, the supply department has many new requirements of the material supply management software. Meantime, the enterprise's emphasized informatization construction project this year and finance department's receivable and payable management system which is ready to go on-line have also put forward the new requirement of sharing information integration. To realize the sharing of material supplying data in the whole company and avoid information islands, the system needs to be ungraded and maintained, the database needs migrating, ungrudging and making centralized management. Through the survey and analysis in the company, there are still several problems in the material supply in production process:

At present, the system for material supply is an island, which does not associate with other departments, because the information is not shared, the information delay happens. The material supply department purchases materials according to purchasing lists issued by craft department, due to the not timely communication, purchased materials do not accord with needed materials. Moreover, the situation of materials can not be fed timely; the operating control of workshops can not be guided.

The material system is divorced from the financial system; for payment requests and invoices provide by the material supply department, the financial department can not judge real sources of data, thus costs can not be controlled.

The material procurement plan has long cycle and unreasonable arrangement. The enterprise is always waiting for materials, it is often that much needed goods do not arrive, but temporarily unneeded goods arrive first. Advanced optimization tools are lacked to assist procurement and inventory replenishment decisions. The inventory occupies lots of funds.

Raw materials structures in the inventory are irrational. Raw materials much needed in part productions are lack in the inventory; some other raw materials have been stored for many year, which occupy a lot of funds. Material inventory information and inventory information of articles being processed in the manufacturing department have not been shared mutually, which are also not shared with workshops, the inventory management is unable to play its role.

5.2 Target of the System Software

1) On the premise of guaranteeing the normal running of enterprise's production, operation and management, ultimate goals of the material supply management software are to farthest simplify daily affairs, lower raw material costs and operating costs, reduce inventory and occupied funds, increase enterprise's flowing funds, reduce financial account mistakes or delays, and make material management staff pay more attention on strategic decision-making tasks, such as suppliers selections, contract negotiations and benefit analyses.

2) Using computers to manage materials can not just copy labor management modes and become the replica of the labor management. It should optimize and rationalize business processes of the labor management, as well as making them scientific. The current business should be surpassed, and management ideas and laws of business should be also abstracted.

3) The logistics, capital flow, data flow and control flow should all be expedite to form a complete closed loop feedback system. The entire material supply management system should take planning and control as the main lines, and fully reflects the management thought of organic integration of logistics, capital flow, information flow and control flow. Meantime, the management efficiency of materials is represented in information collection, transfer and disposing process. The information flow is the image in material supply management process.

4) There should be abundant monitoring, assessment and management functions, plans should be hold in advance, there is the control in the event and business accounting after the event. Each business process should provide affluent decision-making information and assessment data for managers (comprehensive management).

5.3 Process design

5.3.1 The general figure of material supply management business process

Through the analysis of information requirements and processing requirements, the general flow-chart of information is shown in Figure 3.

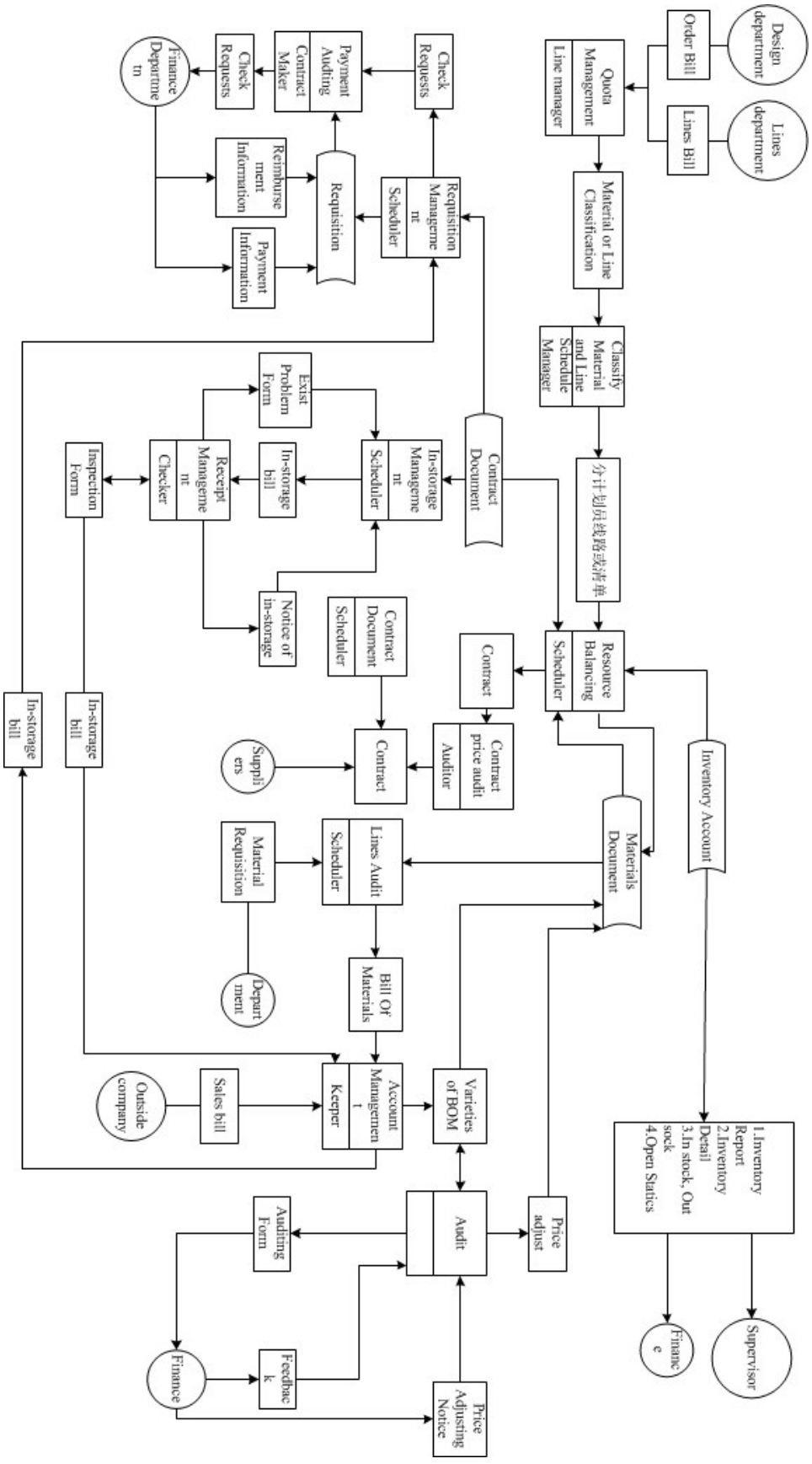

Figure 3-Material supply management business process

Source： Own presentation

The main process of material supply chain management: issuing the purchasing list-balancing resources-applying for purchasing-price checking-purchasing -contract-the execution of contract-examining item by item-putting materials into the storage-registering the bills of materials.
ordering the purchasing list: the craft department issues inventory instructions according to requirements of the routing;

Balancing materials: the comprehensive planner receives the purchasing directives, and creates the purchasing plan according to the inventory;
applying for purchasing: planners create purchase requests according to the purchasing plan, inquire of suppliers about prices, and then submit to price auditors to examine and verify;

Price checking: price auditors examine and verify each unit price of materials on the purchase application according to best prices in the market and previous information;
Purchasing contract: from the audited purchase application the purchasing contract is generated, purchasing material items are combined to form contract material items, the contract fund item is filled at the same time;
The execution of the contract: the contract materials generate the warehousing entry, the contract funds generate the check requests, record invoice information and connect with the financial department's receivable and payable system;

Examining item by item: examine materials that need to be technically tested item by item, and submit to the quality assurance department;
Putting materials into the storage: materials that pass the examination cam be put into the storage, and then make the account list;
Registering the bills of materials: for each warehouse account page, information of all kinds of materials lists (material requisitions, materials returning slip, switch-materials orders and sales bills) on it is recorded.

5.3.2 Procurement and inventory

Procurement and inventory is important link of SIIX Corp's complete supply chain operation, in the ERP environment process. As shown in Figures：

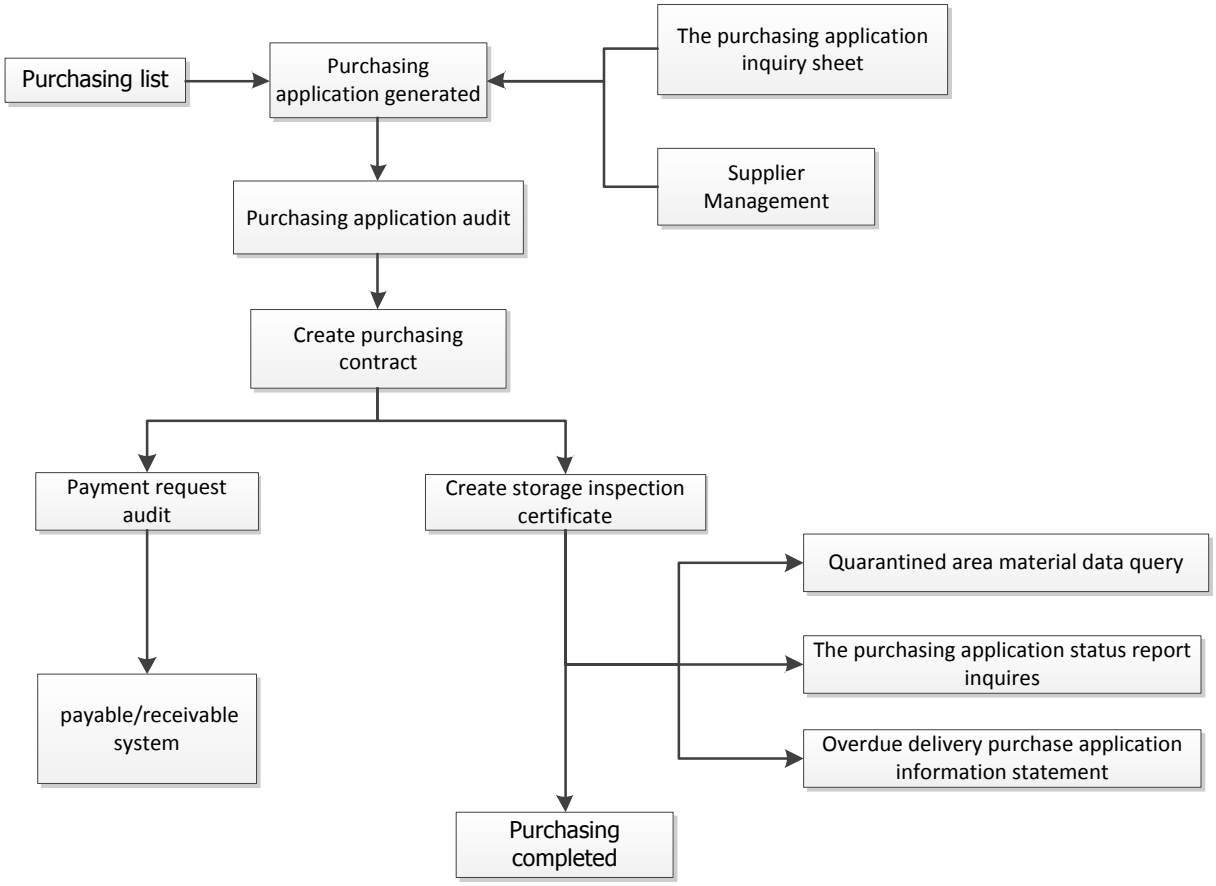

Figure 4-purchasing process

Source：Own presentation

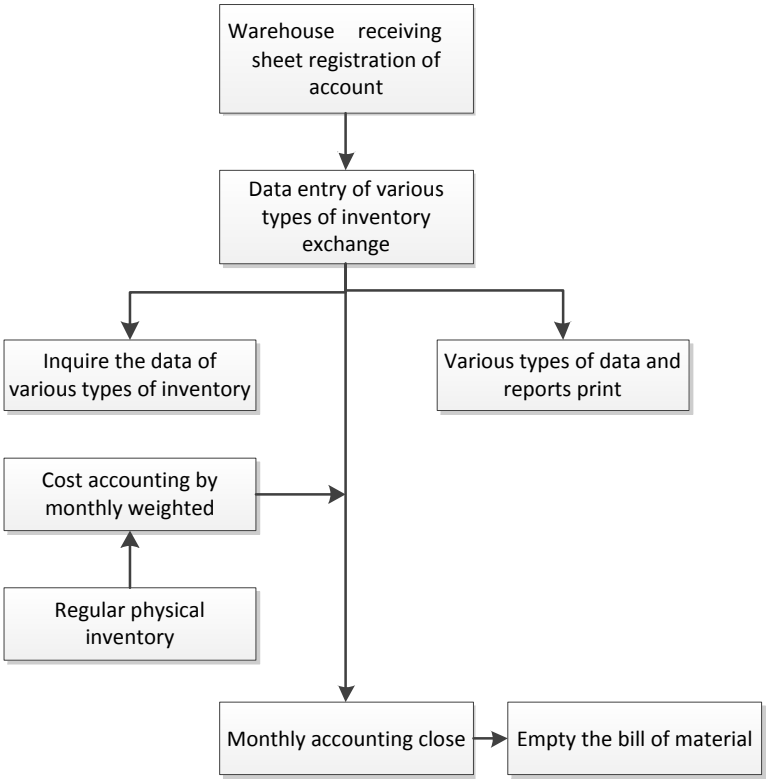

Figure 5- Warehouse Process
Source：Own presentation

1）For the purchasing management, ERP system is focused on determining the reasonable order quantity, selection of excellent suppliers, maintaining optimal reserve .Purchasing department is important entrance department of the enterprise supplies, at the same time it is the logistics major departments, and is closely related with all departments , but the main task of Purchasing department is to complete the production of goods and materials procurement. the main content of Purchasing management is supplier information management, procurement of materials table maintenance, purchase order management. the main function of Procurement management system designed is based on material requirements plan and lead time of material purchasing to develop the purchase order, according to the order when the material is arrived, after Goods receipt, inspection, then were passed the assigned to inventory, registration warehousing single.

2）ERP system solves the inventory problem of SIIX Corp, commonly used by the approach to control raw material inventory, which does not makes some occurs in

shorts, neither won't make it downtime to be expected and not delivering on time. More importantly, inventory will cause a large capital keep long in stock, so we must avoid excessive inventory backlog of funds, working difficulty and increase in the rate of interest, further aggravating the cost burden.

5.3.3 Business process analysis

5.3.3.1 Purchase

From the point of the enterprise mode of produce and selling, its position is very important. Procurement of goods timely meet the production and operation of enterprises' need is directly affecting the normal business activities of enterprises.
And we will introduce the procurement process of the system:

1）Procurement management process
Procurement management process is the source of the procurement, the interface of the process and supply department. Comprehensive plan must distribution follow-up purchasing plan based on the process line of the purchase list command.
List of business process as shown in figure 6：

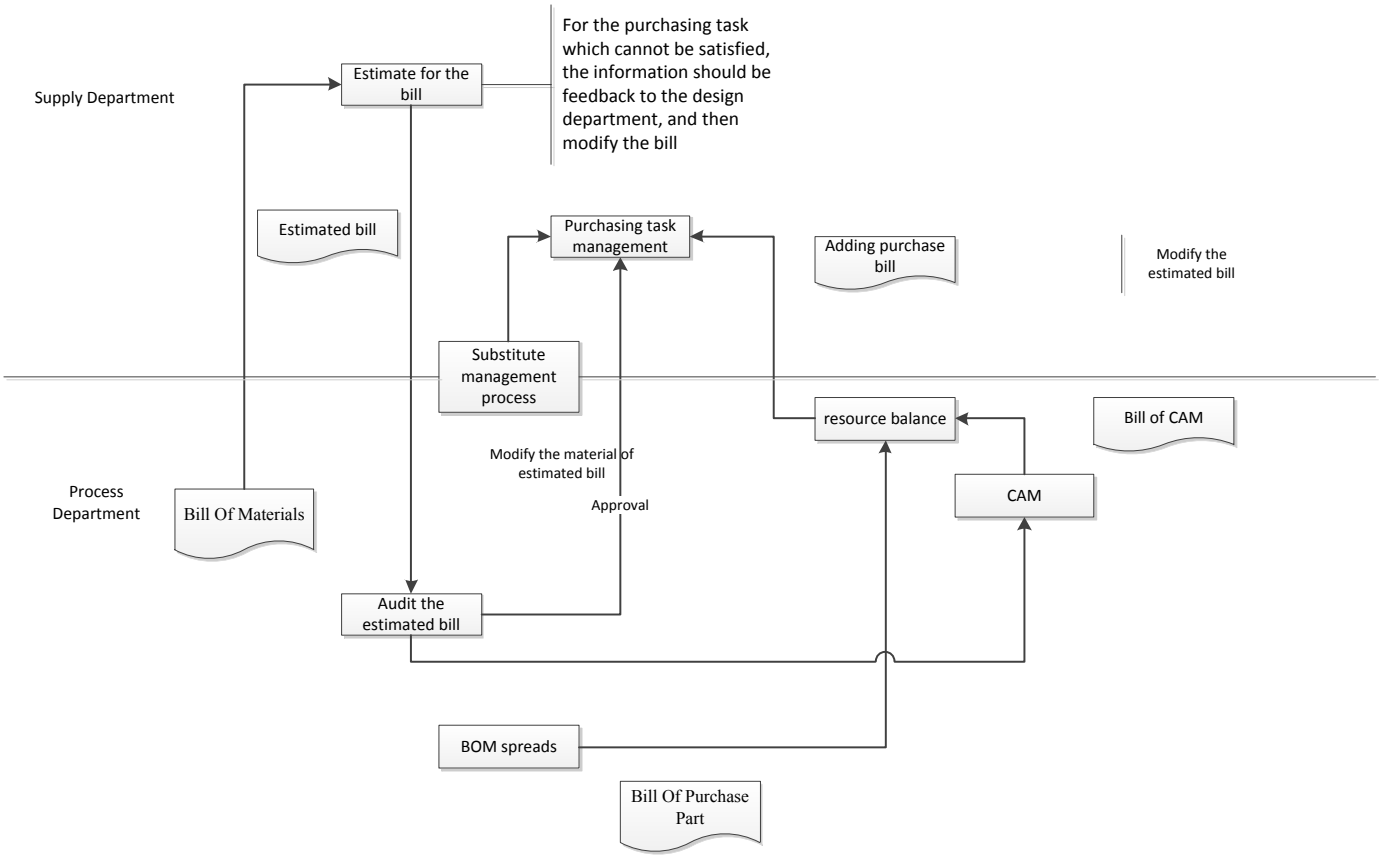

Figure 6- Purchasing bill process
Source：Own presentation

- Current situation

Process design department according to the drawing demand forecast procurement list, fill out the "procurement list", by the Department Manager for approval, to supply department. For the Department of integrated Scheduler according to "buy" list, consider the inventory situation, make a "procurement schedule", and report to the leader for approval; if emergency plan, the company leadership and the leadership of the Ministry of supply and delivery of Scheduler execution of purchase, the official plan to fill the next month, the required program subsequently filled; supply department, financial department, director of company leadership level to "procurement schedule" for approval signature, by category distribution to the Scheduler. The existence of a large number of emergency plan, to follow the great passive; integrated Scheduler cannot control the inventory quantity change, give the

plan brings difficulty; once monthly plan, on the demand of the production was too slow to react: manual operation to increase the workload, but also easy to go wrong.

- Main business change driven by ERP

Through the creation of project resource library function application, has realized the design department and the Department of materials supply and project management department of mutual contact and communication (rationality, accuracy) requirements of the procurement, procurement plan in real time processing, minimizing the occurrence of emergency plan; real time query the various stocks inventory; Scheduler operating supplies supply chain management system to automatically generate purchase requisition; production department can keep track of demand for implementation;

- Business process of the future

Process design based on estimated procurement list building engineering database, and then issued a formal procurement list or library addition procurement list: the technology director after confirmation, data flow for the department of. For the Department of integrated planning according to the inventory, according to the region to the Scheduler issued a procurement plan, fill in the requested delivery time.

Scheduler operating material supply chain management system, from procurement planning generation application; to market purchase inquiry quotation process.

- relates to functional module

Create project resource library, Audit library resources, Issue project procurement list

2） Purchasing business process

Procurement process is the Scheduler execution purchase order business processes, by purchasing requisition to purchase contract to the execution of the contract, all processes are upstream data into the downstream, step by step driving

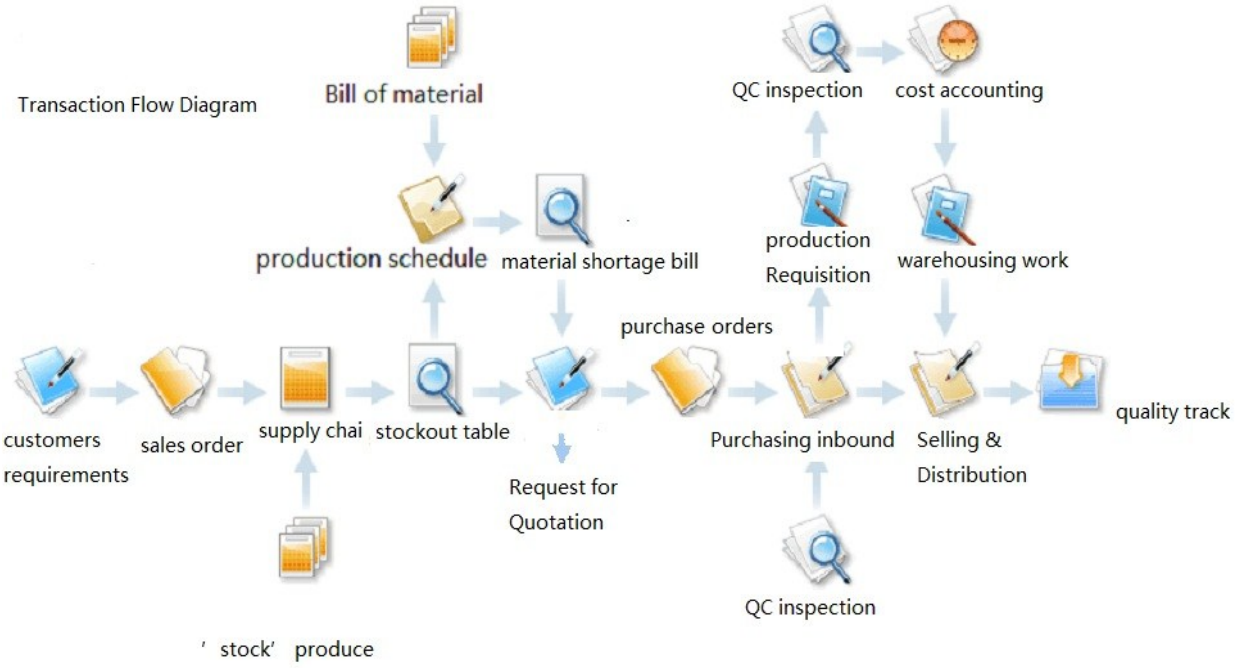

Figure 7- Purchasing business process
Source：Own presentation

- Current situation

According to contract execution purchasing，manual, error-prone, and the poor traceability.

- Main business change driven by ERP

Establishing procurement list management, fitting the purchase plan, purchase application management, price management into the information system management, achieving the procurement management process control (by price, contract management)

According to supplier's quotation, scheduler fill in the procurement of material price, submitted to the price department price; in purchasing application date quotation;

Scheduler can accurately know the purchase application implementation;

Real time tracking the purchasing application makes a timely response to purchase request changes t;

System for printing purchase application substitute for manual operation, to ensure that the purchasing application code and data accuracy;

The disposable supplier and no material code purchasing price by the Scheduler in purchasing application on maintenance, other purchase price by inquiry sheet sent by the Scheduler, not free to modify, effective control of the purchasing price.

Price by purchasing application generates a purchase contract; purchasing contract includes the contract goods and contract fund information;

- Business process in the future

Scheduler fill in material procurement price according to the inquiry sheet；

the system create purchase application, material procurement table from internal；

Schedulers print procurement application form, material procurement table from the system;

5.4 Functions Design

The function structure of Material supply chain management system ,mainly including purchasing management, appraisal management

And warehouse management .below we will discuss the function of these three subsystems respectively.

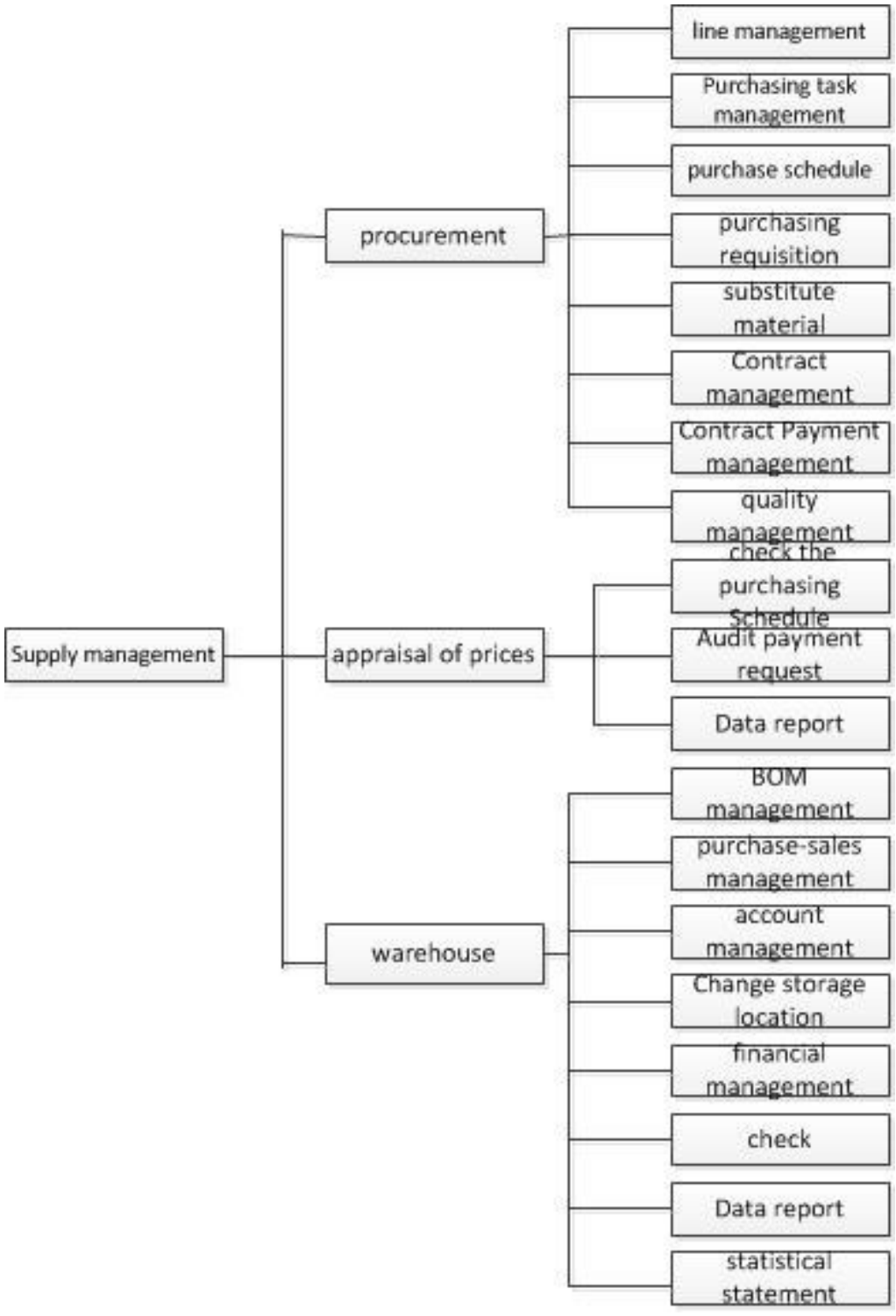

Figure 8 - Function tree of management system

Source：Own presentation

5.4.1 Purchasing management

Purchasing management is the management of purchasing process, and related aspects

in an organization. Because of production companies purchase nowadays about 70% of their turnover, and service companies purchase approximately 40% of their turnover [1], purchasing management is one of the most critical areas in the entire organization and needs intensive management. Purchasing management also covers the areas of outsourcing and insourcing. Models used to aid purchasing managers include the Newsboy model as well as the Order up To (OUT) model.

1）Purchasing Process：

Purchasing Process includes as usual 8 main stages as follows:

1. Market survey
- Requisitioning：
- Approving
- Studying Market
- Making Purchase Decision
- Placing Orders
- Receipting Goods and Services Received
- Accounting Goods and Services
- Receiving Invoices and Making Payment
- Debit note in case of material defect

2）Purchasing Management Process：

Purchasing Management Process consists usually of 3 stages:

- Purchasing Planning
- Purchasing Tracking
- Purchasing Reporting

3）Purchasing Planning

Purchasing Planning may include steps as follows:

- creating purchasing projects and tasks
- providing related information (files, links, notes etc.)
- assigning purchasing tasks to employees
- setting task priorities, start/finish dates etc.

- assigning supervisors
- setting reminders
- control and evaluation

4）Purchasing Tracking

Purchasing Tracking consists of:

- checking task's status and/or history of changes
- receiving status notifications
- sorting, grouping or filtering tasks by current status
- highlighting overdue tasks,,,

5）Purchasing Reporting

Purchasing Reporting includes:

- comparing actual and estimated values
- calculating purchasing task and project statistics
- sorting, grouping or filtering tasks by attributes
- creating charts to visualize key statistics and KPIs

The purchase order management module in resource ERP includes On-time Requisition, Contract Management, Rate Sealing with vendors, Vendor Management. This module also offers access to approved supplier, purchase order management, purchase enquiry to be floated to multiple vendors on just a click of a button.

Further, Vendor evaluation process is integrated in purchase module enabling the purchase orders to be raised only to the approved vendors. The purchase department can also determine whether the vendors perform the services within the specified time frames and appraised the quality of the work carried out.

5.4.2 Audit material purchasing prices

1) Trial price management

Purchase Requisition Audit: the planner generates purchase requisitions and finish the price consultation, then submits to the members of the audit of the trial price. The auditor compares the unit price of the supplier feedback and market best price and

past information, if it is in a reasonable range then be approved, or return the purchase requisition. Only to be approved, the purchase requisition can enter into the process of future procurement contracts.

Check request auditing: the auditor shall audit the check request provided by the planner, only through the audit can be recognized by the Ministry of Finance; market price information: the auditor maintenance the best price based on the material at the first in the market dynamic state, when examining the shopping list of the plan member, if the vendor-supplied materials unit price is lower than the market best price, then the system will be replaced with market best price.

Data Report: Provides four types of statements, respectively, auditing summary tables for the party to review, the price margin ranking table, the procurement plan check list and the shall single audit list;

5.4.3 Warehouse management Design

Some of the more advanced features of warehouse management can include:

1）Review flexibility of warehouse location designations. If needed understand how warehouse physical locations are then broken down as warehouse shelf or area locations and how both are linked when necessary.

2）Determine warehouse pull structure between primary, secondary, and overstock locations when large quantity orders are involved.

3）Verify that needed pick, pack, and ship functionality is available based on your company’s detailed needs, particularly if your company is delivering to a major retailer.

4）Verify support for activities like walking sequence for pulling orders, zone picking, partial picking on incomplete line items, and early picking of future orders.

Key Functionality built into the latest version of SIIX Corp ERP WM:

- Added additional SIIX console (RF) transactions
- Ability to create a replenishment TO automatically
- Handling Unit Functionality
- Physical Inventory Changes – counting at quant level possible
- Basic interleaving possible
- Enhancements to dWM – posting changes initiated from dWM, delivery split
- Proof of Delivery functionality
- Packing Station
- 1 TO possible for multiple deliveries
- Partial GR for an IBDN possible
- TRM (Task and Resource Management
- Data changes to dWM can be timed
- Several ERP systems can be tied to a single dWM instance
- Support for DSD (Direct Store Delivery)
- Planned and Opportunistic Cross Docking functionality
- Value Added Services
- Yard Management
- Dynamic Cycle Counting
- RF serial number capture possible on the Delivery

5.4.4 Function requirement

1) The higher level of integration, to achieve information sharing.

2) The opening performance, the system should have good versatility, portability, scalability and interoperability

3) Better reliability, system hardware, server and network with high reliability ensure the normal operation of the system and cannot lose data.

4) Better adaptability to have a good user interface, easy to operate, simple to enter and easy to maintain and expansion.

5) Fast response.

5.4.5 Data interface

Material supply chain management is the core part in ERP management, and among multiple system the association exists ,Specific as follows：

1) Process interface：The Process Department place purchase list to the Supply Department, namely the purchase order. Engineering resource database that technology creates generates purchasing list issued to Supply department.

2) Financial interface：Scheduler generates invoice to the financial sector, treasurer checks the relevant contract and payment information, and proceed accounts business.

3) Quality assurance interface：The supply station needs to confirm the material which is to have special inspection. Only materials confirmed can flow to the quality department.

4) Workshop interface：Workshop, can prompt understanding materials status through the workshop work billboards（Planning, procurement, pricing, contract, in stock, inventory, material）.

5.5 Design of the database

The database is the soul of ERP software. Each ERP software has its own database. In general, the basic task of database design is: according to the information demand of a unit and process demand and the Support environment of the database, the data model and typical application can be designed.

5.5.1 Design of the Data structure

5.5.1.1 Data structure

As follows is the table structure that this system mainly makes use of ：

JZSJ：Data, handlers;

PDM project resource library：

construction number, serial number, material code number, Material code, material,

material specifications, standards, predicting gross, weight, type, identifier, if valid, note, lead time, substitute materials, whether the board, Unit of measurement, the generation time

Purchasing list：

Task number, craft file number, serial number, project number, account number, serial number serial number processing, process, material type, material code, units of measurement, weight, design unit, change notification number, date of birth, standards and requirements on materials, remarks, whether effective, source, material, quantity, the requested delivery date

Purchasing schedule：

Procurement planning ID, craft file serial number, serial number, the requested delivery time, number of procurement, procurement task time, purchase task master, Scheduler, Scheduler receives time, purchase task status, material procurement contract material ID, ID, effectively marking, material code, units of measurement, substitute number, a predetermined collar number, source identification, storage allocation identifier, number, project number, standards and requirements on materials, the responsibility of units, the task of purchasing ID, accounting, substitute responsibility, processing number, service unit, remarks, asked to complete time, actual finish time, setting time, setting, examination, evaluation, inspection time, focus, weight, material, material specifications, material ID, notification No.

Supply -procure application form：

Application form number, to declare the Department, reporting date, price, manufacturer ID, supply factory 1 number, 2 number supply plant, supply factory 3 number, the audit time, auditor, Scheduler, contract number, valid identification, notes, have been recovered, external contract number

Supply -procure Materials table：

Application form number, serial number, material code, measurement units, quantity, unit price, audit, project number, standards and requirements on materials, procurement of goods procurement plan ID, ID, feeding the size and number of notes, inquiry, identification, weight, material, material specifications

Supply -procure Product contract table：

Contract No., external contract number, contract time, supply factory number, amount, Scheduler, payment, reimbursement, payment plan, uses, note, logoff time, shall take delivery logo, responsibility unit, place of delivery, transport mode, the burden of object data, software, standard or agreement, the station of arrival, the settlement method duration, contract type, material aging, packaging related content, contract liability, divided over time, tax, audit, contract audit opinion

Content for the contract goods table:

Contract number, contract number, commodity code, project number, quantity, unit, contract delivery time, arrival weight, amount, to cancel the time, measurement unit, factory number, contract material ID, unit price, purchase plan ID, notes, weight, material, material specifications

Content for contract funds table：

Contract number, serial number for money, time, amount, abstract, has asked the amount, the amount paid, project number, payment type, has been reported to the amount, Scheduler

Content for the substitution table：

Project number, raw material substitution material code, the original code, material specifications, substitute material specifications, substitute, review identification, substitute time, applicant, approve, substitute number, failure identification, quantity, production factory, name, part number, part number code, substitute, substitute production plant, application department, raw material, raw material substitution material, specifications, material specifications

Supplier File Table：

Supply factory number, file name, file time, period of validity, to cancel the time, provide, ancillary products, document number

Supplier After-sales Service：

Document number, supply factory number, project number, product name, the nature of the problem, time, Scheduler, service, repair, service personnel, complete break, conclusion, unit, product over time, conclusion

Supply Reimbursement requests：

Request number, payment time, contract number, number of funds, project number, amount, payment ID, supply factory number, being abstract, the time of payment, reimbursement time, Scheduler, logoff time, payment, inspection ID, account number, bank account, external contract number, payment type, auditor, auditing time, payment certificate category, payment voucher number, payment vouchers, department number, external invoice number, funding approval, print merge.

Supply packing list ：

Certificate number, material code, content, quantity, unit, unit price, amount, freight, invoice number, supply factory number, production factory number, time, storage time, contract number, contract number, project number, claim number, number, material batch, notes, claims, Scheduler, storage ID, container classes, inspection status, financial identification, modification time, production date, order basis, the acceptance criterion, external contract number, passing time, units of measurement, the contract goods ID, printing time, qualified self-inspection, mutual inspection qualified time, specially qualified inspection time, inspection, inspectors, price adjustment period, price difference, inspection number, number of re-inspection, material, material specifications, BZ, reimbursement vouchers, reimbursement document categories, reimbursement voucher number, check sequence

Supply materials invoice：

Internal contract No., invoice number, invoice, invoice, invoice, invoice tax, invoice, note, receipt categories, tax reimbursement, document number, reimbursement vouchers, excluding tax amount, internal invoice number, invoice category code, reimbursement time, supply factory number, project number, the internal rate of, BZ sequence, audit, audit date

Supply authority list：

Job number, position, material, serial number

Supply schedule stores requisition：

Material code, warehouse logo, quantity, unit of measurement, time, project number, purchase plan ID, material batch, storekeeper, predetermined requisitions ID,

receiving unit, receiving time, printing time, picking list, under the material list, approve, approval time, process ID, feeding task under the master, feeding task time, affirm, confirm the time, substitute substitute responsibility person, number, number of storage, the time to complete the task, the warehouse number, weight, material, material specifications, set plate number

Supply Account page attributes: Account page attributes, account page ID, Scheduler mark

Materials Code library ：

Current layer, material code, identification code, material name specification, variable time, units of measurement, conversion coefficient, conversion unit, the operator, the report code, an upper material code, thickness, width, length, the optimal price, discount prices

5.5.2 Example for Design of the database

1）The material inventory list

The structure of material inventory list is as shown in Table 2：

Table 2- The Structure of material inventory list

Serial number	Data element names	data types and length	illustrate
1	Warehouse logo	VARCHAR（7）	keywords
2	Material code	VARCHAR（9）	
3	Warehouse code	VARCHAR（10）	
4	report code	VARCHAR（2）	
5	Scheduler	VARCHAR（6）	
6	storekeeper	VARCHAR（6）	
7	conversion factor	NUMBER（10, 5）	
8	department	VARCHAR（6）	
9	variation time	DATA	
10	last year number	NUMBER（15, 5）	
11	last year amount	NUMBER（12, 2）	
12	Jan number	NUMBER（15, 5）	
13	Jan amount	NUMBER（12, 2）	
14	Feb.number	NUMBER（15, 5）	
15	Feb.amount	NUMBER（12, 2）	
16	Mar.number	NUMBER（15, 5）	

17	Mar.amount	NUMBER（12, 2）	
18	April number	NUMBER（15, 5）	
19	April amount	NUMBER（12, 2）	
20	May number	NUMBER（15, 5）	
21	May amount	NUMBER（12, 2）	
22	Jun number	NUMBER（15, 5）	
23	Jun amount	NUMBER（12, 2）	
24	July number	NUMBER（15, 5）	
25	July amount	NUMBER（12, 2）	
26	Aug number	NUMBER（15, 5）	
27	Aug amount	NUMBER（12, 2）	
28	Sep number	NUMBER（15, 5）	
29	Sep amount	NUMBER（12, 2）	
30	Oct number	NUMBER（15, 5）	
31	Oct amount	NUMBER（12, 2）	
32	Nov number	NUMBER（15, 5）	
33	Nov amount	NUMBER（12, 2）	
34	Dec number	NUMBER（15, 5）	
35	Dec amount	NUMBER（12, 2）	
36	remark	VARCHAR（50）	
37	in storage time	DATE	
38	purpose	VARCHAR（50）	
39	construction number	VARCHAR（15）	
40	Lot Number	VARCHAR（20）	
41	number of storage	VARCHAR（16）	
42	Account attributes	VARCHAR（1）	
43	identification	VARCHAR（1）	
44	Date produce	DATE	
45	factory	VARCHAR（11）	
46	YEAR	NUMBER（20）	
47	plant num	VARCHAR（11）	
48	account price	NUMBER（15, 5）	
49	Scheduler number	VARCHAR（4）	
50	storeman number	VARCHAR（4）	
51	Material	VARCHAR（50）	
52	material specification	VARCHAR（50）	
53	Alternative material	VARCHAR（50）	

Source：Own presentation

2）Bills Of Material library

The structure of Bills Of Material library：

Table 3-The structure of Bills Of Material library

Serial number	Data element names	data types and length	illustrate
1	certificate number	VARCHAR（7）	
2	Material code	VARCHAR（9）	NOT NULL
3	Warehouse code	VARCHAR（10）	associated word
4	Warehouse logo	VARCHAR（7）	
5	number of storage	VARCHAR（16）	
6	bills type	VARCHAR（1）	NOT NULL
7	sales identification	VARCHAR（1）	
8	number	VARCHAR（15, 5）	
9	amount	NUMBER（12, 2）	
10	conversion factor	NUMBER（9, 5）	
11	sort code	VARCHAR（2）	
12	department	VARCHAR（6）	
13	Transportation	NUMBER（8, 2）	
14	TIME	DATE	
15	construction number	VARCHAR（15）	
16	Fetching department	VARCHAR（4）	
17	Route number	VARCHAR（20）	
18	report code	VARCHAR（2）	
19	Scheduler	VARCHAR（6）	
20	Date checkout	VARCHAR（1）	
21	Account page attributes	VARCHAR（1）	NOT NULL
22	Lot Number	VARCHAR（20）	
23	storeman number	VARCHAR（6）	
24	Ration identification	VARCHAR（1）	
25	identification	VARCHAR（1）	
26	statistical quantity	NUMBER（15, 5）	
27	Units of Measurements	VARCHAR（6）	
28	Quantity	NUMBER（15, 5）	
29	Requests for Payment	NUMBER（12, 2）	
30	Processing Numbers	VARCHAR（20）	
31	accounting number	VARCHAR（10）	
32	Scheduler number	VARCHAR（4）	
33	storeman number	VARCHAR（4）	
34	requisition number	VARCHAR（10）	
35	weight	NUMBER	
36	Material	VARCHAR（50）	

37	material specification	VARCHAR（50）	

Source：Own presentation

3）Supply- stores inventory Table

Supply- stores inventory Table structure is consistent with the structure of material inventory table. The annual inventory table is used to store the situation of material balance, in the end of the year, all data that balance to zero will be imported into the Supply- stores inventory Table, only keeping the left and inventory data. This method can preserve the historical information, and ensure the inventory table data is relatively stable, so as to ensure the program running speed

4）Supply-Material list library

Supply-Material list library's structure is consistent with Material list library's structure of the Month. Monthly settle accounts, importing the sheet database of Material list library into the Supply-Material list library, and then empties the sheet database, for prepare to the next month of entry.

5.5.3 View design

The view is a select statement stored in the SQL statement, when using the view name; it will execute the SELECT statement. The View does not retain a copy of the data, thus through the view, visible data is always new. If the view is a simple view (such as not contains summary data, the query SELECT part does not alter column, no proud table connection), you can through the view to insert, update and delete operations. Using the view can be simplified for access complex data.

For example, there is a SELECT statement, of retrieval data from the multiple tables that are using complex connections and function, and then we can create view as term this query as the underlying SELECT statement. Every time you want to access these complex data, you can run a simple query in the view; it will execute the SELECT statement at the bottom.

Chapter 6 System implementation

6.1 The tools and operating environment of system development

6.1.1 Delphi programming language

1）Delphi is an integrated development environment (IDE), using the traditional Pascal language developed from the Object Pascal language. Delphi is actually a version of the Pascal language, but with traditional Pascal language worlds apart. Delphi program is a first application framework, and application of this framework is the "skeleton." In skeleton, even in the absence of attachment anything can still be strictly in accordance with the design and operation.

2）Delphi is completely object-oriented; it is at your fingertips Delphi as a promotion tool for the development of software reuse, which has powerful appeal. You do not have to build their own object, as long as the procedures provided in the framework of accession to complete the function of the code, and the rest have to do to Delphi. To generate beautiful interface and well-structured procedures do not have the slightest racked his brains, Delphi will help you easily completed.

3）Delphi has the following features: form-based and object-oriented methods, the high-speed compiler, and strong database support, closely integrated with Windows programming, the powerful and mature component technology. But the most important thing is Object Pascal language, it is the entire fundamental. Object Pascal language in the Pascal language is developed on the basis of, and easy to learn.

6.1.2 Database of ERP Software

In the ERP system, database technology is one of the most important support technologies.

Database Technology includes theory and experimental methodology for building computer systems that handles large data volumes. Central is development of concepts, languages, software, and methods for describing, storing, searching, analyzing, distributing, and other data processing to make access of data simple, efficient, scalable, reliable, and adaptable for new application areas.

Database research deals with storing, searching, and analyzing very large information volumes. The area has been very influential for today's IT-systems. Internet created vastly increased demand for systems to handle large data volumes, Database Management Systems (DBMS). Three important technical achievements have driven the technology: fast and efficient data storage, query languages for searching data, and data distributed over many computers. Advanced queries are central in modern software for inventory control, analysis, prognosis, planning, etc. DBMSs are inside most large systems. New applications put new requirements on the technology, e.g., for scalable search and analyzes in scientific and technical applications within physics, medicine, and engineering. New applications require management of large information volumes stored in different formats and sources. E.g., some data may be stored in conventional relational databases while other data are produced as streams from sensors.

6.1.3 Connection technologies for Delphi and Oracle

The developed system is based on database, so to set up the correct development platform and data connection is necessary. From the aspects of Integrated operation speed, easy installation, etc factors to consider, it will be connected with the BED technology, and the specific procedure is as follows：

1) Install Oracle In the user client machine, connect to database service, and test successfully

2）Install BDE engine

3）Configure BDE. What is Important is to set the two parameters：Server Name, Use Name；these parameters are related to the database you have set up.

6.1.4 Running environment

1) Hardware configuration

- Based on the Pentium chip ・ 64 MB memory and 4 GB hard drive capacity of the personal computer.

2) Software requirements

- Running under the operating system Windows 2000 or above,
  Oracle Client

3) Network environment

According to the existing network and the company's present needs of the application system, the entire network system is divided into inside and outside network through two level firewalls; the network solutions support the Internet access.

Information portal is access to validation according to the authority to realize information.

6.2 Architecture of the C/S

The client/server model is a computing model that acts as distributed application which partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server machine is a host that is running one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming requests.

Functions such as email exchange, web access and database access are built on the client/server model. Users accessing banking services from their computer use a web browser client to send a request to a web server at a bank. That program may in turn forward the request to its own database client program, which sends a request to a database server at another bank computer to retrieve the account information. The balance is returned to the bank database client, which in turn serves it back to the web browser client, displaying the results to the user. The client–server model has become one of the central ideas of network computing. Many business applications being written today use the client–server model, as do the Internet's main application protocols, such as HTTP, SMTP, Telnet, and DNS.

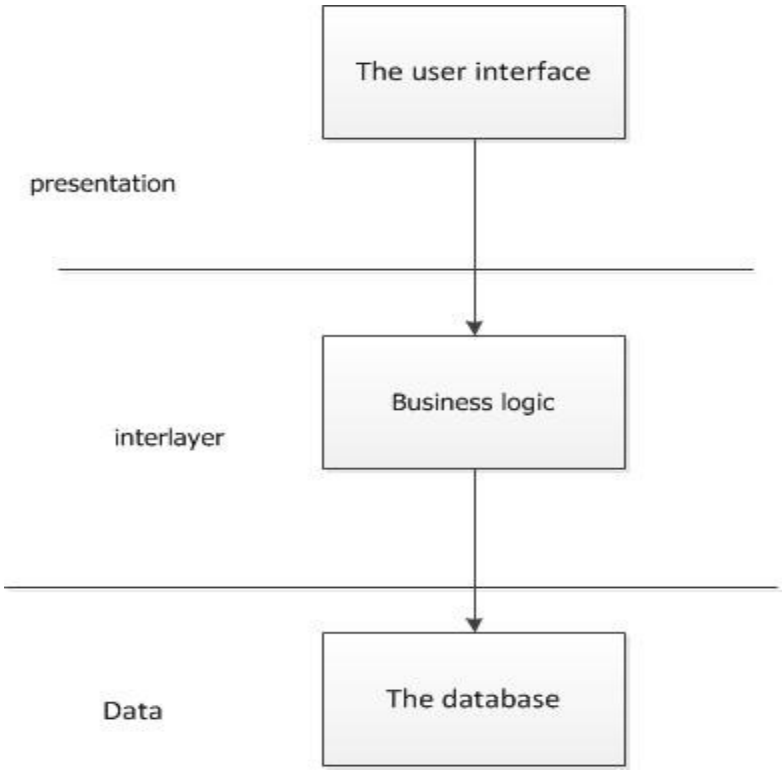

Figure 9-Three-tired C/S model
Source：Own presentation

6.2.1Characteristics and basic structure of Client／Server

1、the characteristic of Client／Server

Client/Server is the separation of the logical entity, Through the LAN cooperation to

complete a task has the following characteristics：

1）Function separation；Server progress is service providers, and Client progress is Service users. They are a kind of relation in of run process in different computer .

2）Resources sharing； Server the server provides service for some Client server and coordinates their access to Share resources at the same time.

3）Location transparency：Server can stay in the work site that is same or different with the user.

4）Service package：Customer process only need to know Server interface, and don't need to know the specific logic.

5）Synchronous/asynchronous operation：The user can request service way by using the synchronous or asynchronous. Asynchronous can make the Server concurrently handle multiple user tasks.

6）expandability：Support horizontal or vertical expansion.

2、 Basic structure of Client／Server

1）Client：The user is part of applications. It runs on a distributed service operation system which supports and access GUI what the operating system need to do is transmitting work to middleware, let Server process the local services.

2）Server：The application's server part. Server contacts a server request middleware depending on the operating system.

3）Middleware：Running on both sides of an application of the user and the server. Middleware is the connecting link between the preceding section of Client/Server basic structure.

6.2.2 Advantage of the C/S model

1）interactivity

In c/s mode, there is a complete set of application in the client which are powerful functions and can be free switching in the procedure on the aspects of wrong hints, on-line help.

2）secure access mode

Due to c/s mode is a point-to-point structure model, and it is applicable to local area network, more secure network protocol, so security can be guaranteed.

6.3 The C/S information system structure model

The original information system uses mostly centralized structure model, all of the processing and calculating are finished by the center machine room, the client does not have the ability to dealing with the terminal. With the development of network technology, people put forward higher request on sharing and making full use of the information and resources, then there is appeared Two Layer Architecture C/S model. With the application of the large-scale, Two Layer Architecture C/S model more can't meet the requirements of the distributed applications, Two Layer Architecture C/S also gradually make the transition to the Three Layer Architecture C/S.

6.4 Effects of System Software designed for SIIX-Corp

The material supply management system is mainly composed of three subsystems the purchasing management, price checking management and store management. The system running effects are introduced separately in these three aspects:

6.4.1 Running effects of the purchasing subsystem

The main operating interface of the purchase management subsystem is shown in the figure. The application of the purchase management subsystem can help planners control and complete the purchase of materials, from the purchase plan, purchase application, purchase orders to receiving arrived goods and putting them into the storage after examining. It can effectively monitors the implementation of purchase plans, changes of purchase costs and supplies' delivery and agreement performance situations, thus it can help planners choose the best suppliers and purchase strategies to ensure the high-quality, high-efficient and low-cost process of the purchase, which

makes enterprises in the best production and supply condition.

The comprehensive tracking and monitoring of the implementation situation of the purchase contract have been realized, and the contract's actual delivery quantity, delivery date and delivery quality have been completely recorded and counted, which can be used as the main basis for the assessment of suppliers and planners.

Make the file management of suppliers; establish a set of scientific and reasonable supplier assessment mechanism, which records a wide range of data of suppliers' contract execution rate, delivery date, product quality, price and service. Moreover, classify suppliers for management and adopt different purchase policies according to the assessment results.

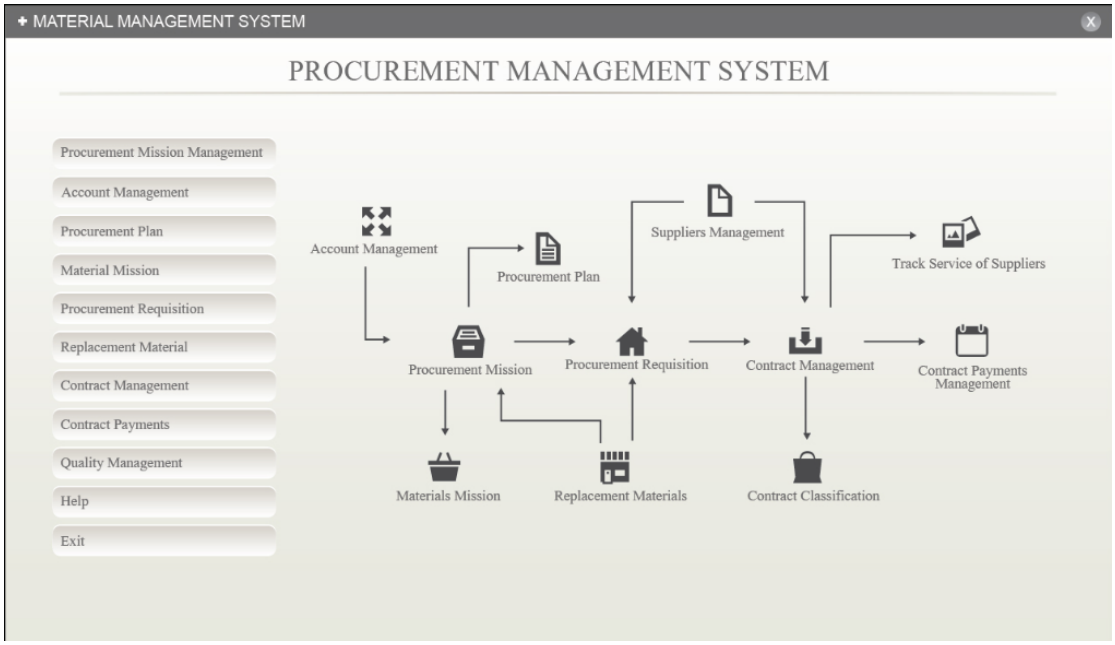

Figure 10-Procurement management system

Source：Own presentation

6.4.2 Running effects of the price checking subsystem

The price checking management, although has little functions, has played an important gatekeeper role in the procurement process. Price auditors examine and verify unit prices of purchasing materials provided by suppliers according to the

previous prices information of materials and best prices in the market. Only purchase applications that pass the audit can generate the purchase contract. Only check requests that pass the audit can be delivered to the financial department's payable system. This greatly eliminates previous behaviors that are not in accordance with the procedure and effetely control costs. Prices of purchasing materials are closely related with the market, so the reasonable price supervision mechanism has been established. Price auditors take charge of collecting the market information, monitoring the market prices of raw materials, and considering the market factors comprehensively to set the purchase limited prices. In addition, they establish a complete market price information banks system to record and update purchase prices of various kinds of materials, and this system is also used as the basis to supervise planners

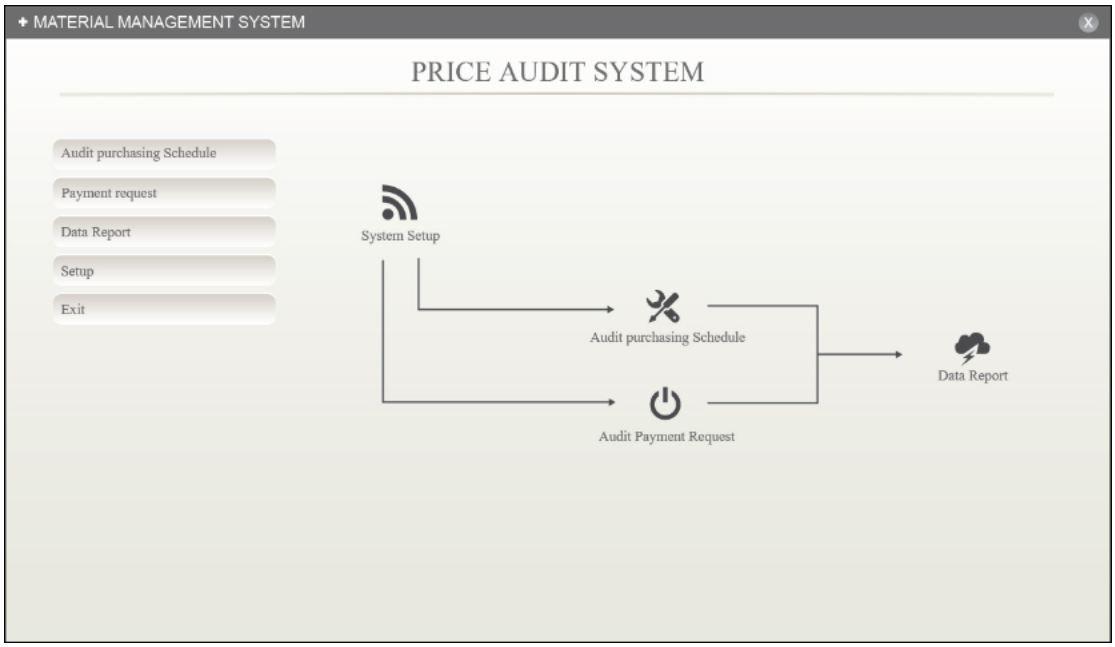

Figure 11 -Price checking subsystem
Source：Own presentation

6.4.3 Running effects of the warehouse management subsystem

Warehouse Management System function: warehouse management input various information, including storage, a library, but also libraries, demand information, enter

and so on. Warehouse management all kinds of information access, correction and maintenance. Equipment purchase report generation. Adding the highest in the inventory management reserves and minimum reserve fields, materials and equipment in the warehouse implementation monitoring and alarm. Material needs of each department's management. Operation log management. The use of warehouse management help

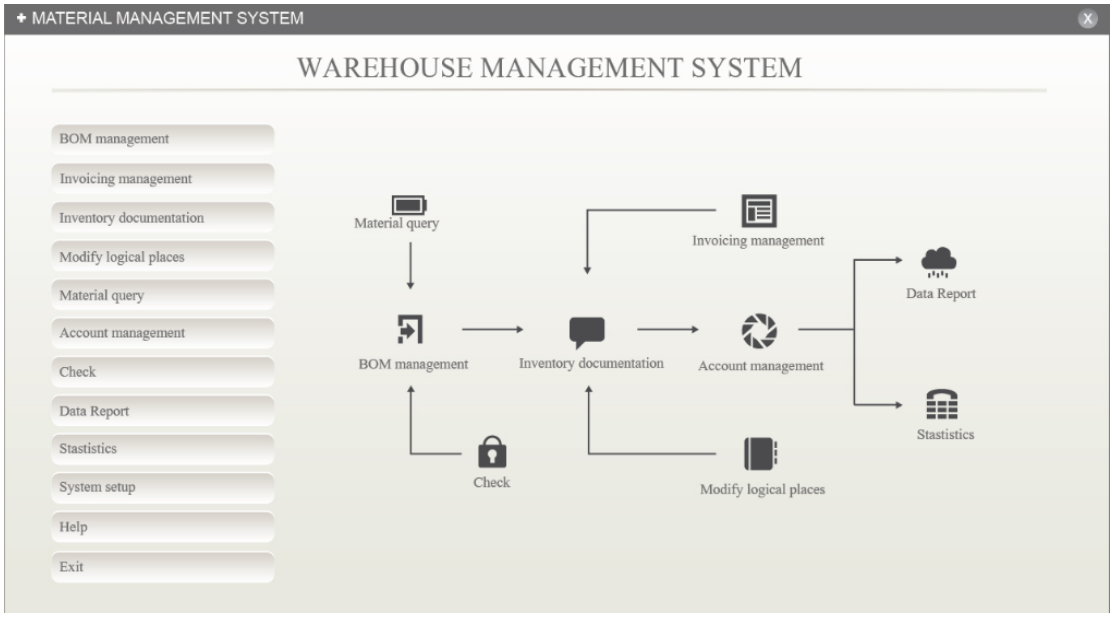

Figure 12- Warehouse management subsystem
Source：Own presentation

Chapter 7 Conclusion

For manufacturing enterprise, such as SIIX Corp., the supply chain management is a very important part of ERP system. Outstanding supply chain management can effectively manage the enterprise materials, make full use of enterprise resources, then reduce the cost of raw materials and the manual operation time etc., .by Applying the information engineering methodology,

7.1 Summary of Subject research

The major work of this project

1) Detailed understanding of SIIX Corp management status, more in-depth analysis the key points of the materials for management decision on the management of several, complete the analysis of supply chain management system needs, design of business process and the data flow and the specific functions of the system, and the design for function of the detailed.

2) The application of Oracle enterprise management tool design the Software of material supply chain management subsystem of database system, database tables and views for establishment, establishment and storage process of development, on the basis of system data flow process of development of the corresponding system memory process.

3) Application of Delphi platform to design C / S (client / server) pattern material supply chain management system software, to achieve the corresponding subsystem specific function, so that the material supply chain management subsystem in ERP system as the necessary link, to other subsystems and achieve good connection, data is the main connection.

7.2 Prospect of Subject research

Based on the study of design for the system architecture and material supply chain management subsystem, relatively successfully realized the construction of C / S structure system , making full use of the characteristics of software reuse, improve system maintainability and efficiency of development, but because of personal ability and energy constraints, the system also has some problems, to be further study.

7.2.1 Problems of Enterprise supply chain management

1）Inaccurate arrival time of data production waiting requisition process, for may also be on the orders of the state changes, especially when delivery is delayed after. But for not timely and accurately to postpone the arrival of orders to modify the data supplied to the production, the results of course leads to discontent of the production.

The main reason that the state data is not timely and inaccurate is the problems between information transmission systems.

2) Supply information is not in special ways to being presented to the relevant departments, resulting in insufficient information sharing. At present only supply departments has a related query functions, and then allocated to the project management department, financial department. But these departments is needed to analysis, statistics data from the sector perspective, so in the next round of maintenance work, according to the Department's demand to adapt to the development of the Department of special function module.

3) in the supply chain ,information transmission system is low efficiency, the demand forecasting between all the enterprises in the supply chain, inventory state, production planning, and so on these are important data in supply chain management .Which are distributed in different supply chain organization, to be effective, rapid response to users' demand, and the data must be passed in real time, however, sometimes certain responsibility is not in place, such as a Scheduler to generate warehousing declaration form, due to reasons such as the keeper of the arrival not timely registration, lead Scheduler cannot review of reservation requisitions, causing material delay.

7.2.2 Countermeasures and suggestions for Enterprise supply chain management

1) Constructing scientific, reasonable and efficient enterprise supply chain

Enterprise supply chain management must build a penetration of function, organizational boundaries, efficient operation, integrated supply chain organization profile, build a scientific , rational and efficient enterprise supply chain. Specific methods:

Firstly, to construct the manufacturing enterprises as the core, by the desired material

equipment suppliers, manufacturers, business of transportation and sale and all types of users. The enterprise supply chain:

Secondly, the analysis of clear their core business and core competition ability, can choose to make the whole supply chain optimal partner, effectively improve the overall supply chain competition;

Thirdly, based on supply chain management of business requirements for scientific analysis and process reengineering, focus and resources for the enterprise can create special value link;

Fourth are actively building with modern logistics management requirements of the model management system, implementation of the integration of management to improve the efficiency of the supply chain.

2) Coordination of supply chain enterprises

Enterprise supply chain management must be avoiding and coordinating the conflict of interest in supply chain departments that are related to, A ： supply chain members shall establish a "win-win" cooperation in the supply chain management concept, through cooperation and common sharing of costs, share technology and market access, in common interests on the basis of the value chain, the value gross continued to expand, eventually achieve a win-win or win-win; two is to give full play to Enterprises Association intermediate liaison role, so that enterprises in the various departments in the seek common interest activities must cut the throat coordination: three is the implementation of supply chain management, strengthen and improve enterprises, suppliers, distributors, users of the trust relationship between supply chain partners.

3）To improve the level of enterprise informatization

By the implementation of ERP system Software, SIIX Corp integrates the resources inside and outside effectively that makes the material the schedule, procurement, distribution, management, acceptance and other sectors of materials more clear and the process more standardization. The system can not only ensure the normal

operation, but also improve the management level of the material.

Each of the department coordinates with others to ensure independent accounting as well as comprehensive accounting. It ensures clear responsibility and definite data, guarantees the normal production and operation activities, and also improves the level of material management. Connecting real conditions and characteristics of the enterprise, the production management system of SIIX Corporation is developed.

However, with the development of inventory management information system implementation, there are still some shortcomings and inadequacies. We should have a full understanding of the defects of original supply chain management technology. On the other hand, relevant improvement measures should be put forward to constantly improve supply chain management technology so as to maximize its effectiveness for the development of the enterprise, which make enterprises more standardized, scientific in the procurement and inventory management.

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