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IT solutions on project logistics

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IT Solutions on Project Logistics

By

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MASTER OF SCIENCE
In
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DECLARATION

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

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

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ABASTRACT

Title of Dissertation: IT Solutions on Project Logistics
Degree: Master of Science in International Transport and Logistics

Abstract: The report illustrates main framework of the basic principle of designing project logistics management system, and provides the real sample of solutions on a logistics company, and deeply analyzes the business requirement. And the report offers a brief description of the system applications which can help the reader to understand why such system is necessary, and how this system plays roles in real business environment.

Throughout the project logistics management activities, the author managed to combine his knowledge of project management, logistics, IT solutions and business management. The writer had investigated many IT solutions on project, logistics, project logistics, CRM and FICO connections at home and abroad. Furthermore the author tried his best to present the authentic business situation of project logistics, and the solutions which are based on real scenario of the project logistics. The configuration of the IT solutions for the real project logistics world is the ultimate goal of this paper. The sample information, data are collected from the up-to-date business. And the management problems are collected, identified from the front line, the writer then puts technology implementation and future development into consideration, try to visualize, and given the proper IT solution proposals.

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List of abbreviation

ADC	Automatic data collection
ADP	Automatic data Process
AIS	Automatic Identification System (radio navigation).
CRM	Customs relationship management
DDP	Delivered duty paid
DDU	Delivered duty unpaid
EDI	EDI Electronic Data Interchange
EDI	Electronic data interchange
ERP	Enterprise resource planning
EXQ	E-Quay
EXS	E-Ship
EXW	E-Works
FI/CO	Financials, Controlling
GIS	Geographisches Informationssystem
GPS	Global Positioning System
GUI	Graphical User Interface
KPI	Key Performance Indicator
LAN	Local area network
LMS	Logistics Management System
PL	Project logistics
PLMS	Project logistics management system
PPM	Project Profile Management
QC	Quality control
R&D	Research and development
RFI	Request for information
RFID	Radio Frequency Infrared Device
RFP	Request for proposal
RFQ	Request for Quotation
SAP	Systems,Applications, Products
SCM	Supply Chain Management
SOP	Standard Operational Procedure
SQL	Structured Query Language
TMS	Transporation management System
WBS	Work breakdown structure

CHARPTER 1 INTRODUCTION

1.1 BACKGROUND AND REASEARCH SIGNIFICANCE

1.1.1 BACKGROUND

In the new century, due to the ever-accelerating process of global economic integration, businesses face intense competitive environment. Capital Source on a global scale and configuration of the logistics flow greatly enhanced. Countries around the world pay great attention to the development of the logistics industry for reinforce its core competition. China is playing more important rules in global economy, and in the last decades, China have attached great importance to the modernization of the logistics industry, which cover the following fields: information technology, networking, automation, etc.

THE FOLLOWING TABLE INDICATES THE LPI RANK OF EACH COUNTRY IN THE WORLD:
table: 1.1.1.-1 lpi rank
SOURCE:Http://siteresources.worldbank.org/EXTPREMNET/Resources/LPIchart2010.pdf

Country	LPI Rank	Score	% of highest performer
Germany	1	4.11	100.0
Singapore	2	4.09	99.2
Sweden	3	4.08	98.8
Netherlands	4	4.07	98.5
Luxembourg	5	3.98	95.7
Switzerland	6	3.97	95.5
Japan	7	3.97	95.2
United Kingdom	8	3.95	94.9
Belgium	9	3.94	94.5
Norway	10	3.93	94.2
Ireland	11	3.89	92.9
Finland	12	3.89	92.6
Hong Kong, China	13	3.88	92.4
Canada	14	3.87	92.3
United States	15	3.86	91.7
Denmark	16	3.85	91.4
France	17	3.84	91.3
Australia	18	3.84	91.2
Austria	19	3.76	88.7
Taiwan, China	20	3.71	86.9
New Zealand	21	3.65	85.0
Italy	22	3.64	84.9
Korea, Rep.	23	3.64	84.7
United Arab Emirates	24	3.63	84.5
Spain	25	3.63	84.3
Czech Republic	26	3.51	80.5
China	27	3.49	79.9
South Africa	28	3.46	78.9
Malaysia	29	3.44	78.4
Poland	30	3.44	78.2
Israel	31	3.41	77.5
Bahrain	32	3.37	76.2
Lebanon	33	3.34	75.1
Portugal	34	3.34	75.0
Thailand	35	3.29	73.6
Kuwait	36	3.28	73.2
Latvia	37	3.25	72.2
Slovak Republic	38	3.24	71.9
Turkey	39	3.22	71.4
Saudi Arabia	40	3.22	71.3
Brazil	41	3.2	70.6
Iceland	42	3.2	70.3
Estonia	43	3.16	69.3
Philippines	44	3.14	68.8
Lithuania	45	3.13	68.5
Cyprus	46	3.13	68.4
India	47	3.12	67.9
Argentina	48	3.1	67.4
Chile	49	3.09	67.3
Mexico	50	3.05	65.7
Panama	51	3.02	65.0
Hungary	52	2.99	63.8
Vietnam	53	2.96	63.1
Greece	54	2.96	62.8
Qatar	55	2.95	62.6
Costa Rica	56	2.91	61.3
Slovenia	57	2.87	60.2
Senegal	58	2.86	59.8
Romania	59	2.84	59.1
Oman	60	2.84	59.1
Tunisia	61	2.84	58.9
Kazakhstan	62	2.83	58.9
Bulgaria	63	2.83	58.8
Malta	64	2.82	58.6
Dominican Republic	65	2.82	58.5
Uganda	66	2.82	58.4
Peru	67	2.8	57.9
Uzbekistan	68	2.79	57.5
Benin	69	2.79	57.4
Honduras	70	2.78	57.1
Ecuador	71	2.77	57.0
Colombia	72	2.77	57.0
Macedonia, FYR	73	2.77	56.9
Croatia	74	2.77	56.8
Indonesia	75	2.76	56.5
Paraguay	76	2.75	56.3
Uruguay	77	2.75	56.3
Bahamas, The	78	2.75	56.1
Bangladesh	79	2.74	56.0
Syrian Arab Republic	80	2.74	55.9
Jordan	81	2.74	55.8
Mauritius	82	2.72	55.3
Serbia	83	2.69	54.1
Venezuela, RB	84	2.68	53.9
Congo, Dem. Rep.	85	2.68	53.8
El Salvador	86	2.67	53.7
Bosnia and Herzegovina	87	2.66	53.4
Madagascar	88	2.66	53.2
Azerbaijan	89	2.64	52.6
Guatemala	90	2.63	52.4
Kyrgyz Republic	91	2.62	52.0
Egypt, Arab Rep.	92	2.61	51.8
Georgia	93	2.61	51.8
Russian Federation	94	2.61	51.6
Tanzania	95	2.6	51.4
Togo	96	2.6	51.4
Guinea	97	2.6	51.2
Haiti	98	2.59	51.1
Kenya	99	2.59	51.0
Nigeria	100	2.59	51.0
Yemen, Rep.	101	2.58	50.8
Ukraine	102	2.57	50.6
Iran, Islamic Rep	103	2.57	50.5
Moldova	104	2.57	50.5
Cameroon	105	2.55	49.7
Niger	106	2.54	49.4
Nicaragua	107	2.54	49.3
Jamaica	108	2.53	49.2
Côte d'Ivoire	109	2.53	49.2
Pakistan	110	2.53	49.1
Armenia	111	2.52	48.9
Bolivia	112	2.51	48.5
Gambia, The	113	2.49	48.0
Turkmenistan	114	2.49	47.9
Chad	115	2.49	47.9
Congo, Rep.	116	2.48	47.4
Ghana	117	2.47	47.3
Lao PDR	118	2.46	47.0
Albania	119	2.46	46.8
Comoros	120	2.45	46.5
Montenegro	121	2.43	45.9
Gabon	122	2.41	45.4
Ethiopia	123	2.41	45.4
Papua New Guinea	124	2.41	45.3
Maldives	125	2.4	45.1
Djibouti	126	2.39	44.8
Liberia	127	2.38	44.4
Bhutan	128	2.38	44.3
Cambodia	129	2.37	44.0
Algeria	130	2.36	43.7
Tajikistan	131	2.35	43.2
Libya	132	2.33	42.8
Myanmar	133	2.33	42.7
Botswana	134	2.32	42.3
Solomon Islands	135	2.31	42.0
Mozambique	136	2.29	41.5
Sri Lanka	137	2.29	41.4
Zambia	138	2.28	41.2
Mali	139	2.27	40.7
Guyana	140	2.27	40.7
Mongolia	141	2.25	40.2
Angola	142	2.25	40.1
Afghanistan	143	2.24	39.9
Fiji	144	2.24	39.7
Burkina Faso	145	2.23	39.4
Sudan	146	2.21	38.7
Nepal	147	2.2	38.6
Iraq	148	2.11	35.5
Guinea-Bissau	149	2.1	35.4
Cuba	150	2.07	34.3
Rwanda	151	2.04	33.4
Namibia	152	2.02	32.8
Sierra Leone	153	1.97	31.2
Eritrea	154	1.7	22.4
Somalia	155	1.34	10.9

Modern society has entered the information age. The logistics information system is becoming more critical for streamlining logistics procedures. IT solutions will help the logistics managers to standardize the working process, and enable the decision makers to make proper reactions. A typical logistics information system should cover the following functions: business operations, managerial assistance, decision making supporting, and other value added services.

1.1.2 EXISTING PROBLEM

For the latest decades, the IT system in logistics industry mainly focuses on container management, SCM, MIT solutions etc. Among these developed systems, the modern logistics methodology has been implemented properly, and those systems are working perfectly inside factories, purchasing, supply chain system.

View the recent vertiginous development of Chinese economy, and the zooming overseas investment and constructions. The percentage of project cargo in Chinese logistics market is increasing steadily every year.

Follow figure 1.4.2- 1 shows us that the rapid development of trade and FDI volumes between Chinese – Africa in year 2001-2006.

Figure: 1.1.2.-1 trade growth between China and Africa from 2001 to 2005

No remaining existing IT solutions specially designed for the project logistics industry. Many logistics companies who are mainly handling project cargo have to develop their own project logistics system, such as SinoTrans which is focusing on problem solving

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solutions for each project logistics jobs, and COSOCO who had developed more Intricate lift and secure system targeting for better engineering solutions (such as special designed system for handling oversize cargo by roll-on roll off the semi-submerge barge.). Other project logistics solutions are RFID system, cargo tracing system, or TMS which target on tracing cargo or focusing on transportation management. Those systems can tackle the technology issues, while from management point of view, they had not develop a comprehensive IT system supervising the whole company's working process.

Theoretically, there are no any it solutions prototype to guide us for "how to build such IT solutions, and what's the main functions the system can handle", and how to evaluate the performance of the new system. As project logistics have many uncertainties, it will remain great challenges for the designer as such system may encounter many uncertainties when applied in real environment. Thus, this system requires a longer period business requirement investigation, and the designer team itself should understand the project logistics management comprehensively and acquaint themselves with the latest IT development, project management, shipping and logistics, which can guide them to utilize the proper IT technology to solve the problem.

1.1.3   RESEARCH AIM AND SIGNIFICANCE

This innovation is reflected in three aspects:

First, the author chooses the novelty topics of project logistics IT solutions.   Presently other topics have been exploring differently on it solutions on supply china management, MIT, and other logistics theory.   The writer combines the new IT technology with the current industry needs, and tries to find the proper solution on this line of business. It is with a strong sense of the current business needs.

Second, this combination of IT solutions with project management is with high pragmatic value. Also the writer has integrated many new management ideas such as performance quality indicators, quality control, cargo tracing etc. and writer will explore how to utilize IT technology to reflect management target. The module used is with a strong practical and high reference value.

Thirdly Some know-how such as: 1. the main functions of the IT solutions, 2. the main structure of the system, 3, others such as how to analysis the manifest by using SQL analyses is the unique thinking by author. It may speed up and working procedures when others facing the same problem, and increase the accuracy and efficiency.

1.2 INTRODUCTION OF ROJECT LOGISTICS AND IT SOLUTIONS

Project logistics covers the jobs of worldwide transshipment with its own logistics specialties:

1. Shipment cargo contains various types: oversize cargo, heavy lift cargo, cargo which need special care or caution.

Following figure illustrate heavy lift vessel under cargo operation.

Figure: 1.2-1: heavy lift vessel loading overhaul and heavy lift cargo.

2. Shipment route usually link the original supplier (ex-factory) to the final job-site, which generally covers land, and sea, air, rail whatever it's necessary. And in most cases those working places are at difficult-to-access locations. For some special cargo like oversize or heavy ones, road survey are very common for pre-shipment, and in some cases, logistics provider have to restudy to current route for normal cargo and choose another road, or even strengthen road and bridges for the safe transit.
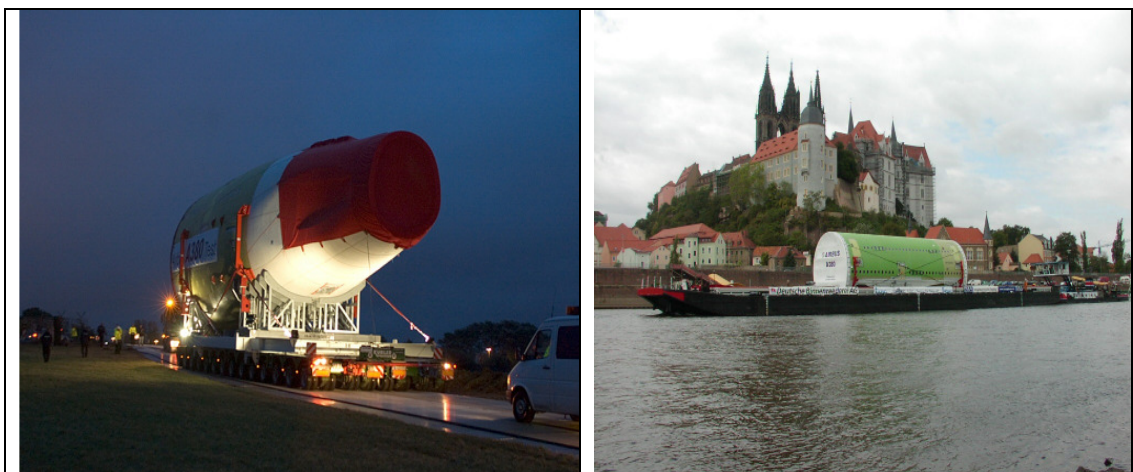
Figure1.2.-2: illustrate the transportation of overhaul cargo by land and by barge
Source:Http://www.iabg.de/presse/download/bilder/images/A380-Transport-Entladung-5-1024.jpg

Project logistics are time sensitive, as generally items transported are unparalleled. In some worst scenario, the whole project would suspend due to one piece of cargo delayed or just disappeared during the voyage.

3. Comparing with container logistics or normal sea shipment, jobs assigned to the project logistics team are also with wider scope. Besides the routine businesses such as all related works for sea transportation: booking, fixing charter party with owner, on-spot supervision of cargo loading/unloading, document clearance, issuing bill(s) of lading etc, what makes the project logistics so different is that the logistics team has to position them at a higher standpoint: They should provide solutions covering the bidding, planning, scheduling, consulting, and provide other accessional solutions such as cargo positioning, tracing, assist head constructor or proprietor for out-sourcing, cost-saving etc.
4. Characteristics of above mentioned, but not limited to it, contribute the fact that it's not very easy for the logistics project team to perform the task under time, cost, resource constrains, not to mention that the team to provide more value add services to their principles.

1.3 PROJECT MANAGEMENT SOFTWARE

Project Software：

Following figure illustrate the market percentage of the prevailing project software.

Table 1.3-1 Project software market share

	Software	Hardware	Engineer	Retail	Wholesale
Microsoft Project (Microsoft Corporation)	54.5%	57.9%	40.9%	37.5%	57.1%
Primavera Project Planner (Primavera Systems)	6.1%		17.3%	8.3%	7.1%
Microsoft Excel (Microsoft Corporation)	6.1%	10.5%	12.6%	8.3%	7.1%
Project Workbench (Applied Business Technology)	16.7%	15.8%	0.8%	25.0%	14.3%
Time Line (Time Line Solutions)	3.0%	5.3%	8.7%	12.5%	7.1%
Sure Trak (Primavera Systems)	3.0%	5.3%	8.7%	8.3%	
CA-SuperProject (Computer Associates, Int'l)	4.5%	5.3%	2.4%		7.1%
Project Scheduler (Scitor)	1.5%		3.9%		
Artemis Prestige (Lucas Mangement Systems)	3.0%		1.6%		
FasTracs (Applied Microsystems)	1.5%		3.1%		
Total	100%	100%	100%	100%	100%

Intuitive to tell us in all applications, Microsoft Project Microsoft holds absolute advantage. The main reasons maybe the system contains many similarities with the Office, which facilitates people to learn and master project management easily.

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Though Microsoft Project provide dazzling functions, while the real unpredictable logistics project environment require more suitable solutions to organize more efficient and accurate job performance.

Project management, technology and computer technology are inseparable, with the rapid increase in computer performance, a large number of project management techniques emerge. They can be used for various commercial activities, used in thousands of project management system software to help users to deploy personals and tasks, manage resources, carry out cost estimates, tracking the progress of the project. Here are some the most popular project management techniques:

(1) Dynamic cost estimates and control technology.
(2) Intelligent resource management and automatic scheduled task scheduling techniques.
(3) Technology of real-time monitoring and tracking the project.
(4) Rich statistical report techniques.
(5) Dynamic data exchange technology.
(6) Handling multiple interrelated technical projects and subprojects.
(7) Assumption analysis.

In terms of application: As mentioned above, various project management software vendors competing for market share with each other, the competition is becoming fiercer. On the other side also shows that more and more attention has been directed to the implementation of enterprise project management level. With the rapid growth of Chinese logistics project growth, IT solutions for project oriented enterprise will be more and more accessible and affordable.

In development: more and more project management system emerged , some of the advanced management system, has integrated project management technology features, such as ERP, CRM and so on, which is bound to bring a new round of project management development boom.

1.4 THE CONTENTS AND RESEARCH APPROACH

This article describes the project logistics management and current status of project logistics management system, its development, prospects and the use of advanced technology. More important, the author study the project logistics system approach, and make a detailed description of the project management system design and analysis process, and how to apply the current development tools, how to utilize the current IT solutions into the system for solving the problem arising form project logistics. Furthermore, the writer illustrates the sample design of the system and database used to decide how to analyze data on goods, and gain comparative advantage against non-system and previous non-software methods. And it further shows the system design method using the advantages of this new technology can improve the management of cargo analysis, time, resource, and personal management. The writer place great importance on real samples and models for the realization of implementation. And at the end of the paper, the author briefly summarizes his comprehension and experience with the others who are interesting in designing project system or project logistics system.

1.5 LITERATURE REVIEW

Real Chun-Chin. W. Gin-Shuh. Ltq in 2007, the use of fuzzy mathematics theory to evaluate the performance of of supply chain project. In 1998,CaronF. Marchet. G advanced the new theory of random method of project planning which can be applied in enterprises transport planning. Since then, Budd. C, and Cooper. M phase introduced in 2005, a new critical path method for the co-ordinating transport tasks, improve enterprise logistics service quality.

Petri Helo and Bulcsu Szekely from University of Vaasa, Industrial Management, Vaasa, Finland illustrate the "Logistics information systems n analysis of software solutions for supply Chain" reviewed the current development of it solutions in logistics industry and the theories applied into supply chain management and anticipate the development in future.

E. Ilie Zudor from Computer and Automation Research Institute SZTAKI and J. Holmstrom Department of Industrial Engineering and Management, Helsinki University of Technology (HUT), Helsinki, Finland put forward a IT solution framework for streamlining project. They proposed IT solutions with specific control makes it possible to implement MIT in the project delivery chain.

Fabio Krakovics , Jose′ Eugenio Leal , Paulo Mendes Jr. , Rafael Lorenzo Santos also Defined and calibrated performance indicators of a 4PL in the chemical industry in Brazil，which try to establish the system to evaluate the 4pl logistics performance.

Christopher R. Jones in his paper Improving Your Key Business Processes wish to utilize "total quality management" (TQM). The organization is viewed as a matrix of internal "customer/supplier" chains focused on the cost-effective satisfaction of agreed client, or "external customer" requirements.

Raymond F. Boykin, Professor of Operations at California State University "We examine the process-oriented versus task-oriented approach used in a high-tech manufacturing organization to validate the conjecture."

Petri Helo, From University of Vaasa, in his A web-based logistics management system for agile supply demand network design This paper proposes an integrated web-based logistics management system for agile supply demand network design (ASDN).

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CHARPTER 2.   RESEARCH ON PROJECT LOGISTICS

2.1   CURRENT LOGISTICS TECHNOLOGY DEVELOPMENT

Current Logistics technology development & Progress in the construction of logistics information

Modern society has entered the information era, the logistics information is the basic necessary requirement of information society and plays critical roles in logistics system. Information is the basis element for development of modern logistics. Can't imagine a project logistics can be performed smoothly without supporting of mature logistics information system. Information technology applications in the logistics world will completely change the outlook of project logistics. Part of the new logistics information technology logistics will be widely used in the future.

RFID (electronic tags) and Bar Code represent the new technology and show strong future market impact

Since 2006, RFID & BAR CODE may be the hottest topics for logistics improvement technology at home and abroad. Especially WAL-MART and METRO and other powerful enterprise require their suppliers to start using the RFID & BAR CODE, making this technology concerns over the future.

Deployment of RFID & BAR CODE applications in China also made substantial progress in recent years. The formal establishment of the Working Group on National standards on RFID & BAR CODE makes RFID & BAR CODE development step by step into the standardization of working process. As a national policy of RFID & BAR CODE industry, "White Paper on China's RFID & BAR CODE technology", put forward a more clear development path of China's RFID & BAR CODE.

In addition to other RFID & BAR CODE technology, SOA (service-oriented architecture) technology and BI (business intelligence) has also become the focuses of the logistics field.

SOA is the English abbreviation of Service-Oriented Architecture, which stands for service-oriented architecture. In essence, SOA is embodied in new system architecture. SOA-based architecture of the system, the specific function of the application and by a number of loosely coupled manners with a unified interface defines the combination of components.

Significant increase of enterprises' participation in the initiative to develop industry standards

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The standard's participants are oriented from the market, and the director motivators are from market demands.　In recent years, enterprises, especially giant enterprises and international groups focus more on logistics standards, and become an important tendency on logistics improvement. COSCO, Sinotrans, China Post Logistics, China Railway Express, UPS, TNT are with high enthusiasm in developing the logistics performance of a high standard, also domestics heavy industrial project construction leaders like Baosteel (biggest steel mill in China), Shanghai Electric Group Co. Ltd., Shanghai (No. 83 of The Top 225 International Contractors Based on Contracting revenue from Projects Outside Home Country http://enr.construction.com/toplists/InternationalContractors/001-100.asp) hold more active and positive position for the standardization of logistics to meet international standards, which shows good prospects for Chinese local project logistics development.

Current development of logistics equipment and technology

Another significant sign of Modern logistics is modern logistics technology and equipment. Logistics and equipment associated with changes in user demand and raises the level of science and technology developments. In recent years, with the rapid development of China's logistics industry, China's logistics equipment and related technology are developing rapidly. Logistics equipment, automation, information technology, attain high degree of specialization, they began to be more intelligent, flexible, green and environmental protection in the direction of development.

GIS, GPS technology is being applied in the logistics system, which form or service as the complementary to project logistics information system.

People's attention to the information technology construction increases greatly, and desire high integration of logistics and information flow online or offline. So that information technology for tracing movement vehicles or cargo has become the core of logistics technology. Logistics equipment and information technology is becoming the core of logistics technology. Logistics equipment and close integration of information technology to achieve a high degree of automation into a new trend.

Green Logistics and equipment and energy conservation has become an important direction of development

With the deterioration of the global environment and people's awareness of environmental protection, some companies choose environment friendly logistics equipment and place priority for choosing less environmental pollution, l green products or energy saving products. Therefore, the logistics and equipment suppliers began to pay high attention on environmental issues and take effective measures to meet environmental requirements. Such as the introduction of new devices, more cost saving and energy saving scientific logistics management and optimal solution system and so on.

2.2　ANALYSIS ON LOGISTICS INFORMATION SYSTEM EXTERNAL ENVIRONMENT

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50 years before the 21th century, logistics activities were running in the traditional manner, the great potential of the logistics have not been effectively utilized. The later 20th century, with the rapid progress of computer technology, and the globalization of trade, speeds up of economic integration process, the development of the value-added logistics services, integrated services, emphasizing service specialization, systematic, networking, information technology, capital flow, information flow integration of management concepts permeate every aspect of logistics activities. Development of globalization, centralization, large-scale, high speed, high attention on the formulation of strategic objectives of logistics, logistics network design, mode of operation through the supply chain, providing customers with high efficiency, low-cost value-added services as new development of modern logistics trend. At the same time, complementary and logistics information flow also visualize on the new stage of development. Content of the information flow from single flows continuously through the interpretation of the variety, level, network development, information management has covered all aspects of logistics management activities.

2.3   Logistics information system internal environment

Flow of information within enterprises, include 1.goods shipment processes associated logistics and logistics information flow generated by cost accounting, time, human resource, documentary controlling. 2. Logistics information generated flow of information between enterprises. Include inter-firm orders, receiving, shipping, transit, agents, and settlement activities,. 3. Logistics Society information The social meaning of logistics information is a virtual platform for social logistics enterprise share information based on various information platform, it is the participation by enterprises, rely on physical or virtual platform to platform in logistics activities and the exchange and the release of all types of information generated. Specific forms include public logistics centers and public information platform for release transfer and transactions. Those three major logistics work flow types and information technology work as a carrier for information flow, to be with a high degree of integration of logistics activities to promote and facilitate the development of logistics management.

From the time of late 20th century to the present, total quality management (TQM), just in time t (JIT), Business Process Reengineering (BPR), enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM), e-commerce (EC), warehouse management system (WMS), Transportation Management System TMS put forward step by step, greatly enriched the logistics management and information management. Communication technology such as broadband technology, wireless technology, space positioning technology and information management technologies such as Intranet, Internet extensive use of identification technology(such as GPS, GIS, RFID system), data warehouse technology, rapid development, so that the logistics information management jumped on the "Advanced" stage. 。

Although through the process of activities of enterprise logistics information system, we can understand the development of information technology companies have entered an unprecedented journey. We can hardly ignore today's logistics activities and logistics management, compared with any other time in its complexity, very hard to describe a clear correlation between them. Therefore, to improve the information management level continuously, to promote and adapt to the development of the logistics business is still the goal.

2.4 CURRENT SITUATION OF LOGISTCS INFORMATION SYSTEM

In the discussion and analysis of the use of information technology to upgrade its logistics level, we must first understand the business logistics today, the external environment facing the pressures and problems.
1. External environment pressure: the growing demand of customers and consumers; changes in market segmentation and the generation of new sales channels; increasingly shorter product life cycle; scientific and technological progress faster; pressure from interested persons; fierce global competition; industry consolidation and alliances; environmental problems and risk control.

The problems challenge the project cargo are:

1. Time sensitive, most cargo delivery schedule has interaction with the job site construction's time table, and can affect the end construction job's working schedule

2. Intensive handling procedures and guidelines required by client and need the performance team and sub contractor to execute properly.

3. Clients require more detailed, updated, and immediate reports on handling and shipment from logistic project team.

4. Project logistics system will involve large amounts of data processing, and business types cover air, sea, rail, truck, and overhaul transportation, and time span will be of 2-3 years or more.

5. Requiring the inter project analysis, statistics report to reveal the project team performance and provide supporting figure for bidding and further shipment decision. Generally, there are two problems which cause distress for current project team: First, the limitations of the business process, characterized by low efficiency of the process and delays caused by the fault; the poor relationship between Proprietor and logistics project team; superficial, not smooth information exchange, the absence of cross-company processes. Second, the limitations of information systems, showing different information management systems; lack of public platform; information can not be effectively and timely delivered; manufacturers and distributors, logistics center can't shared between construction plans, forecasting and replenishment plans; parts demand forecasting; real-time inventory information and bottlenecks. Generally, the logistics project team is not aware the construction schedule, and not able to forecast

the goods of the next shipment.

2.5 NECESSARY OF IT SOLUTIONS FOR PROJECT LOGISTICS

2.5.1 Work Breakdown Structure

WBS referred to as Work breakdown structure, is one of the principle tool used in project management. WBS help team member to make the tasks separated into basic deliverable element, which organizes and defines the scope of the project. The jobs not included in WBS will be excluded from the scope of the project. The toll set up a working scope area by establishing tree structure. As each element is one deliverable task which have initiation time, completion time, task name, scope, resource utilized and person in charge. Following figure illustrates how to separate a real project logistics into dozens of sub work jobs and then subdivided into smaller jobs, each job can create target result with which the member can close the sub-job with relevant output (such as confirmation from client, an instruction send to supplier etc.).

WBS Format for Projects Structure
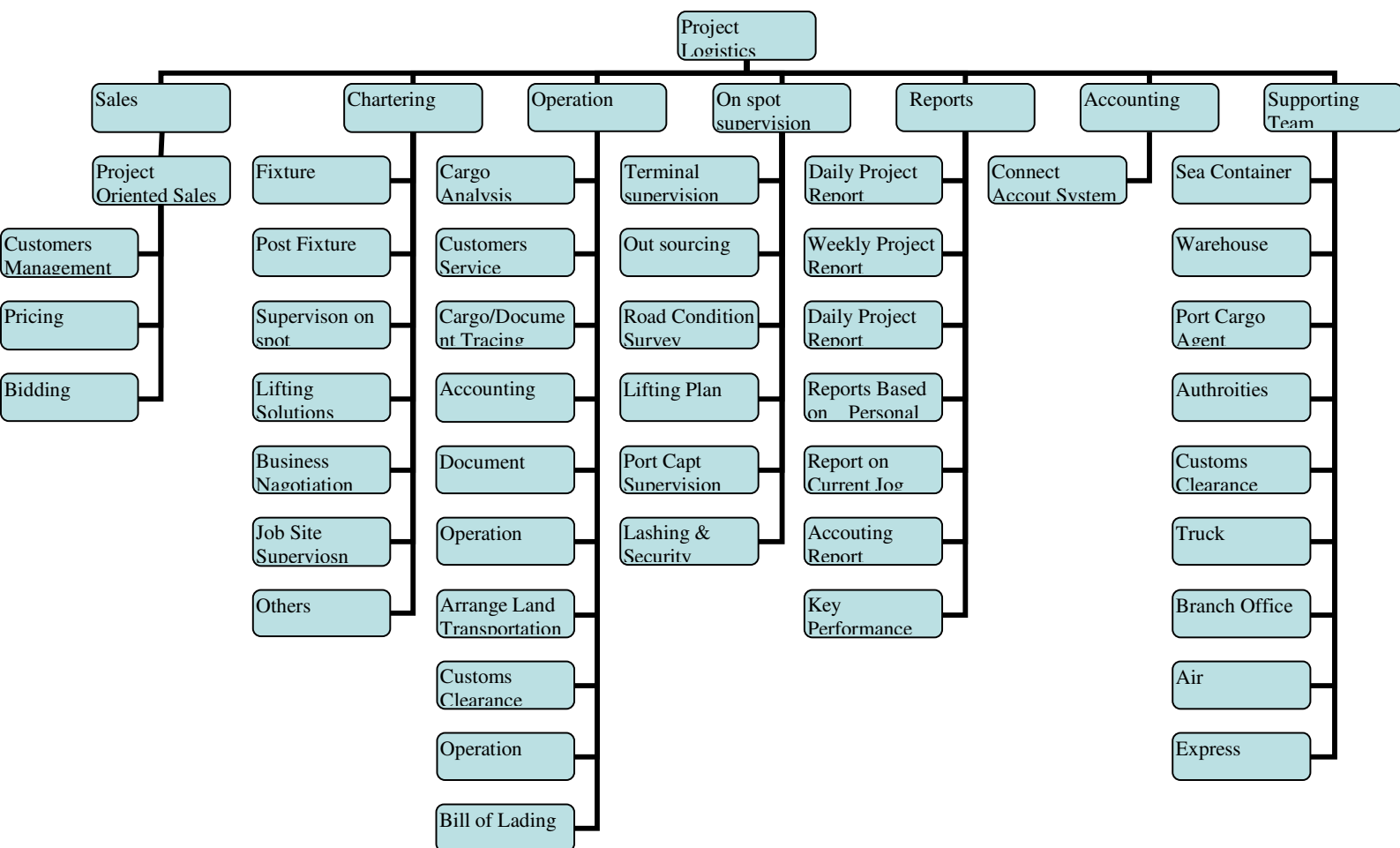
Figure: 2-5-1 wbs formal for projects structure

Further more, one small job section described at the above figure, such as fixture under chartering section, can be further divided into more small jobs which required clear output when processing a real case. Connoisseurs in industrial shipping well know that even small negligence on such small task can make the whole project logistics from secure and profitable to risky and loss. Each corner of the whole job performance need thoroughly checked and clarified timely and correctly. Following figure illustrate one example of charter party checking list by member of chartering team. Each checking result should collect the corresponding data and close the case properly.

Table: 2.5-2 FIXTURE NOTE –CHECKING LIST

Task Name	Duration	Start	Finish	Resource Names
⊟ **section 1. definitions and voyage**	**0.1 days**	**Thu 10-4-22**	**Thu 10-4-22**	**Jacob**
The carrier	0.1 days	Thu 10-4-22	Thu 10-4-22	steven
The merchant	0.1 days	Thu 10-4-22	Thu 10-4-22	steven
The vessel	0.1 days	Thu 10-4-22	Thu 10-4-22	jack
Crane/Derrick Capacity	0.1 days	Thu 10-4-22	Thu 10-4-22	jack
Year of Building	0.1 days	Thu 10-4-22	Thu 10-4-22	tommy
Length of Hold	0.1 days	Thu 10-4-22	Thu 10-4-22	tommy
Loading port	0.1 days	Thu 10-4-22	Thu 10-4-22	frank
Discharging port	0.1 days	Thu 10-4-22	Thu 10-4-22	frank
⊟ **Section 2. - Cargo**	**1 day?**	**Thu 10-4-22**	**Thu 10-4-22**	
⊟ **2. cargo requirement**	**1 day?**	**Thu 10-4-22**	**Thu 10-4-22**	**Jacob**
a)	1 day?	Thu 10-4-22	Thu 10-4-22	steven
sufficient internal strength	1 day?	Thu 10-4-22	Thu 10-4-22	jacky
with any loose parts properly secu	1 day?	Thu 10-4-22	Thu 10-4-22	john
be properly marked to indicate exa	1 day?	Thu 10-4-22	Thu 10-4-22	tommy

In real case, several project logistics will be carried out at the same time, one may be at the initial bidding stage, while others may focus on the final account settlement.

Average simple project logistics may include 5 shipment, each shipment contains some 200 deliverable procedures or jobs, including pricing, chartering, operating, document,, etc. etc. A middle size logistics provide may have an average of 5 projects carrying out at the same time. Thus at one individual day, checking point may reach a surprise figure, IE: 5*100*5 =2,500 items. It's hard to image how to make an efficient and cost saving performance without good management tools or IT system.

A large variety of document circulation inevitably involve in international trade and logistics section. Project logistics will inevitably encounter above document when processing the cargo clearance, and transfer relevant document from one to another.

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What makes more complex is that project cargo covers the cargo types of air, ocean, rail, overweight, oversize, land transportation, and barge etc. And shipment commodity itself sometimes requires more cautious handling and specific treatment. For example, the heavy lift cargo or high value commodity, generally will required the supplier provide specific transportation plan and lifting plan, guiding the logistics team and ship owner etc. to handle properly and avoid unnecessary damages. Particular requirement should be visualized and guide the complete shipment. Also, comparing with simple shipment in ordinary logistic transportation such as transfer cargo from factory, project cargo involve more complex guidance, usually specific SOP, or Handling Guidance are needed for supervision of the process and make sure the performer have sufficient knowledge and know how to execute their duties.   Again they often use the bills of lading, letters of credit, commercial invoices, equipment mark, survey report, insurance policies and other dozens of document etc.

With the growing project logistics market and unpredictable environment, make document management more complexity, as more interesting partied involved in project logistics.

Documents gradually lead to high costs and people's attention. According to UN statistics, International total trade of about 6 trillion, of which about 7% (about 4 200 million) was used for the document production and management

On the other hand, technology makes the information circulate more quickly while documents appear to slow down circulation system and fail to catch the growing fast process in trade. In project logistics, document circulation, records, management seem more critical as project logistics are more time sensitive than other forms of logistics.

2.6   THE EFFECTS OF DESIGNING PROJECT LOGISTICS

System is designed to ensure the realization of the logic model in function, based on the target system to maximize simplicity, variability, consistency, completeness, reliability, economy, system operating efficiency and safety.   The new system will analyze model obtained by system logic and try to create a specific project logistics to achieve the program's physical model to represent the real needs from project logistics.

The design issues and the role of the main research method is software engineering requirements analysis which is commonly used in logistics system design. And it will focus on the company's major business processes for system requirements analysis, combined with the existing part of the company's own problems, find solutions to the problem. Hope to improve the company's overall operational efficiency, and logistics service quality, and enhance market competitiveness of the desired results. The system of traditional freight forwarding from original booking, reconciliation, phone tracking, quote model to a completely changed project service oriented system control platform, so that timely information exchange communication and more convenient is to expand the concept of our company's project logistics services.

CHARTER 3.SYSTEM ANALYSIS

3.1 REAL SAMPLE OF SYSTEM REQUIREMENT

Needs analysis is the object of investigation in management system. The investigation must follow the correct method to ensure the objectivity of the investigation, accuracy, and comprehensiveness. These include:

1. Comprehensive study of company structure, working procedures, and business flow, and other document and report requirement.
2 Improvement after analysis
3 Specification and standardize procedure and working process
4 Focus on comprehensive and integrated solutions.

3.1.1PROJECT LOGSITCS WORKING FUNCTION CHART
Again, let's review the sample of company working functions, to have clear view of job structure. Actually project team can be organized by extract members from different dept to organize team which may contains 10-15 persons for the project job.

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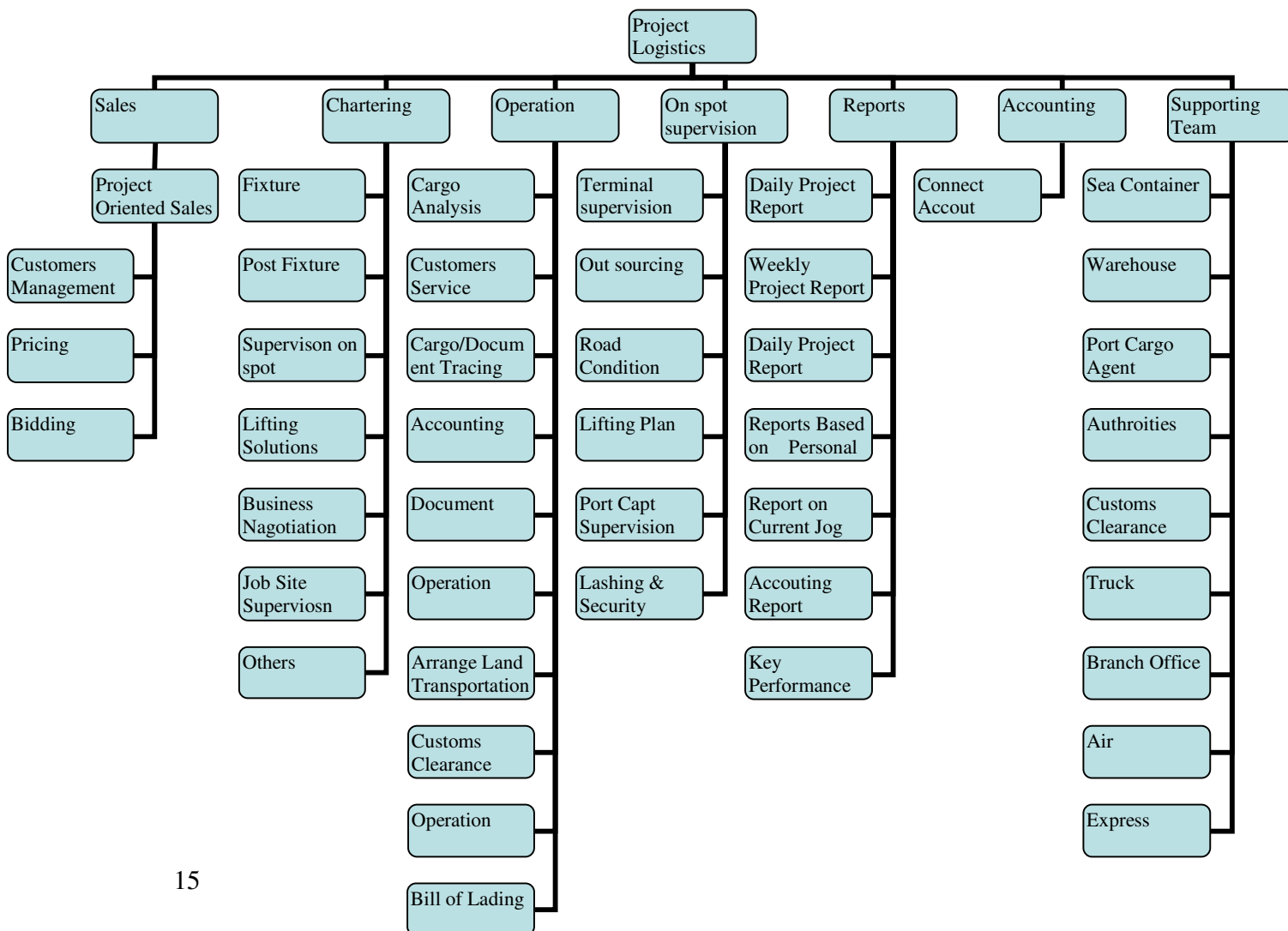
Figure: WBS formal for projects structure – Same as Figure: 2-5-1

3.1.2 PURPOSE OF INTRODUCE LOGISTICS INFORMATION SYSTEM

The purpose of the introduction of logistics information system

   (1) To prevent the chaotic management inside the internal management, lack of efficiency and not able to get proper data and information timely and accurately.

   (2) By strengthening the control of information, improving the company's reaction to the external environment and reflects the ability of make rapid adjustment. The whole system will enhance the project team to become more reasonable and to avoid blindness.

3.2 WORKING FLOW ANALYSIS

Following is one sample of working flow chart illustes the internal working flow, indicate the logic flow of the job, assigned to different dept. Actually please understand that there are more of such logic flows for different items and solution. Folling is the genernal chart is just set an example of whole project proceeding.
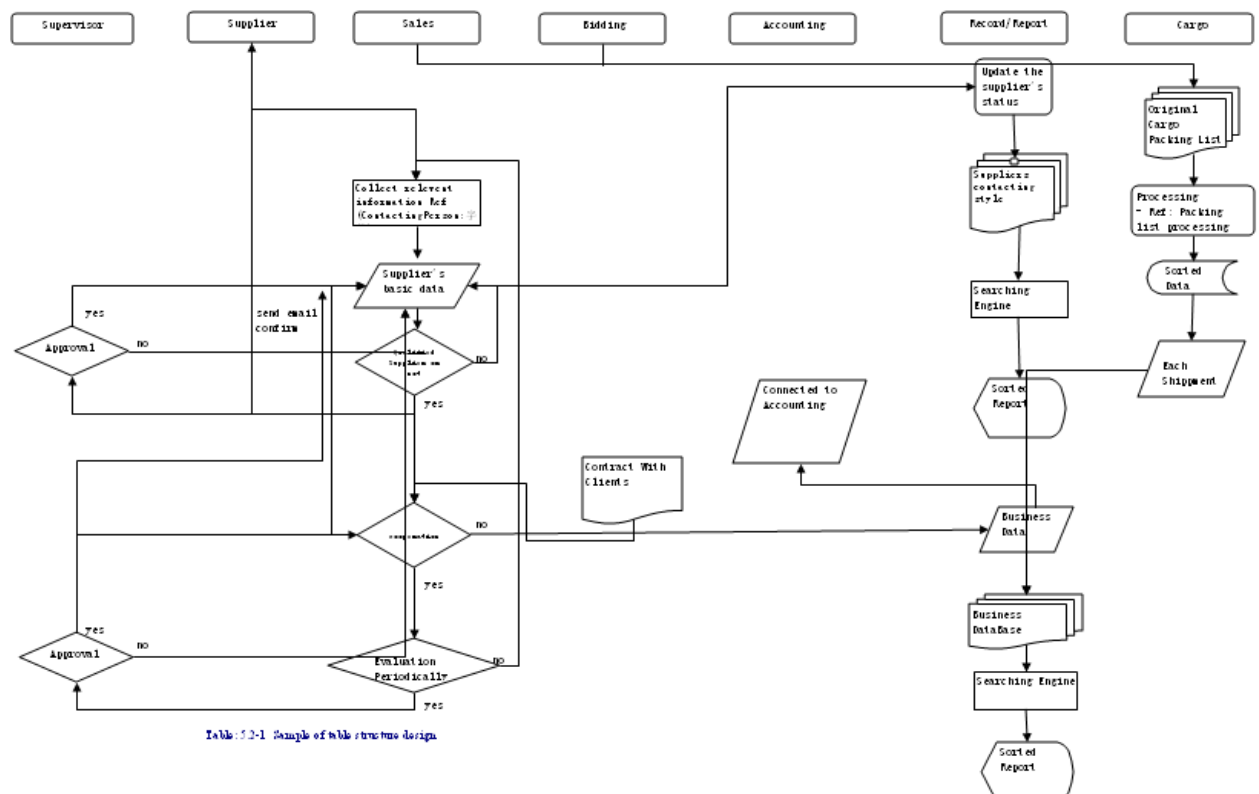
FIGURE: 3.2-1 WORKING FLOW ANALYSIS
3.3   DATA FLOW ANALYSIS

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After the research of the company's existing logistics management systems and current management process, systems analysis personnel have a basic understanding of the company's logistics business processes. Key management services are: Sales management, project logistics performance management,   financial management. Information system has following main external entries: customers, factories and suppliers, sub contractors.

CHARPTER 4. DATA STRUCTURE AND WORKING FLOW DESIGN

4.1 WORKING APPROACH

Two most critical issues with data are targeted for being solved with the new system. There are:

A. How to keep the uniqueness, and high quality data in new system

B Is the data has its effective on streamlining the business

4.2 UNIQUENESS AND HIGH QUANLITY DATA IN NEW SYSTEM

Initially we should focus on the following issues:

Whether the redundancy data remains in the system - Analysis of internal data to find the existence of duplicate data records,

Whether it requires the operators to record of the same content more than twice, such as when the first data of ship particulars has been properly recorded, it's unnecessary to record the same when printing the BSL or other working purpose as the data can be traced from the data base from the beginning.

Whether there is contradictory data which require the system to have the function of real-time dynamic updates. For example: the final loading figure of one voyage: this data must be shared by relevant record such as accounting system, statistics reporting system. Etc.

In addition to data system input also depends on the environment variables outside, which data input is divided into two categories: the static data and dynamic data, also known as the basic data and transaction data. Static data is needed to carry out operations based on data, basic information such as materials, customers, suppliers, data, financial system, and subjects. Characterized it in the whole data life cycle remained unchanged, while it is the basis of dynamic data, the company that all operational personnel by calling the static data to keep the same data in the whole system is unique. Dynamic data refers to information generated from business transaction. Such as shipping orders, instruction to port terminal, order to sub-suppliers. Dynamic data, in accordance with time interval, they can be divided into instantaneous data and daily data.

The data record on electric media? such as hard sick, record, tape or CD? Another key point we must take into account that all data should be with standard format, which can facilitate further access, calculation, statistics etc.

Practical applications for data accuracy in logistics project companies are generally poor. Partly because many companies is relatively slack before starting the project management with IT solutions, and most businesses use to manage manually, furthermore, even with computer assistance which is within narrow area or only using basic tools limited with calculator or Excel spreadsheet . The manual mode of data is with high dispersion, inconsistent, redundant, non-standard, and it's department-based data collection; on the other hand, logistics project manager and team members lack sufficient understanding on data accuracy, completeness, timeliness. Few member can really understand the function of how the new IT application is to improve the success data process.

4.3   ANALYSIS ON DATA 'S EFFECTION ON STREAMLINING THE BUSINESS

Whether can the data be convenient for providing required reports? The report covers: the daily instructions guiding the operators' daily tasks, statistics indicate the business development with certain suppliers or client within a certain period which helps the managers or operators to make rapid and accurate quotations, judgments, and improve the bargaining power with the negotiation opponents.

Is the data with valuable information which can assist managers to make correct and effective decision? Whether the data can provide some value-added services, such as bidding, budgets, business support. Also can the data back up the calculation on land transportation, lashing, lifting and provides data reference is dynamic calculations.

Let's move a step forward to make details analysis on the relationship between data flow and the achievement of business process management to evaluate the data function at different business level or from different view point.

4.3.1   point of view From operational level

a). Can the system embodied in the various process controls, inspection process, while ensuring that the workload can not be too complicated and without extra work load to operators.

Regarding the problems found in daily work, can the new system correctly and effectively reflect the real environmental changes, and work requirement amendment. In other words, is that system flexible enough to make quick response to real business changes?

4.3.2 point of view from management level

How the project system reflects the regulatory and management requirements and modularizes them into specific operational processes. Specific requirements can be formed through the dynamic management of the SOP library, managers can add, delete,

modify the SOP as per real business requirement.

4.3. 3 point of view From strategic level

The system should be able to produce daily, weekly, monthly statements of the overall project process, it is recommended to use the project Gantt chart within one page, which enables top managers to have overall view of all projects' latest development. The system should be able to make summary of resource usage, and allow managers to make more optimal allocation of resources such as staff, material, facilities, time, funds etc.

4.3.4 QUANLITY CONTROL

1) Quality management requires normalization of the quality control indicators. Following figure 4.3.4.1 illustrates a sample of internal quality evaluation of company's shipment section.

Table 4.3.4.1 Sample of internal quality evaluation of company's shipment section.

Internal client	
30% Operational efficiency	70% Shipment program accomplishment (SPA)
	30% Packing consumption efficiency (PCE)
30% Inventory accuracy	50% Internal storage inventory accuracy (ISIA)
	50% External storage inventory accuracy (ESIA)
40% Internal operation product damage	30% Finished product packing sweeping (FPPS)
	35% Finished product internal storage sweeping (FPISS)
	35% Finished product external storage sweeping (FPESS)
External client	
40% External operation product damage	30% Transportation damage (TD)
	30% Transportation accidents (TA)
	40% Cargo theft (CT)
60% Distribution efficiency	40% Out-of-date deliveries (ODD)
	40% External client complains cost (ECC)
	20% External client satisfaction (ECS)
Finances	
50% Distribution costs	100% Distribution/transfer transport cost (DTC)
50% Moving and storage costs	50% Internal storage moving and storing cost (ISMSC)
	50% External storage moving and storing cost (ESMSC)
External impact	
50% Information quality for planning	100% Shipment estimate precision (SEP)
50% Demand variability	40% Shipment tonnage coefficient of variation (STCV)
	60% Same day programmed shipments (SDPS)

The new system is required to sort the valuable data and contribute to the final quality

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report. It also requires an effective data reporting system.

2) Laws and regulations and the company's system or project specification compliance need to be complied, checked, and summarized into the SOP library. Which also the quality control system to verify whether each working procedures follow strictly with rules applied.

3) Performance excellence

How the system will reflect the establishment of rules, implementation of rules, responses to feedbacks, and reasonable rule changes, and finally create a virtuous circle of job performance.

4) Environmental Protection

Ultimately, we have to evaluate whether the system can save energy and resources, such as actions of preservation of electronic data instead of paper media, saving as far as possible to reduce printing and paper use.

5) Staff training

With standardized work processes and the relevant guidance, we can simplify the training procedures of new employees. As after standardizing the procedures, mistakes and accidents can be greatly decreased accordingly.

4.4 DATA INTEGRATION AND MINING

Forecasting and anticipation of the future market plays critical import roles on project logistics. However, most applications still relay on static forecasting methods without adequate update. The new system requires dynamic anticipation methodology to reflect the real business development.

4.5 OTHER SYSTEM REQUIREMENT:

4.5.1 DOCUMENT MANAGEMENT

Document management involves the integration of the original document, and tries to create paperless working environment.

4.5.2 CRM

The implementation of the CRM system, logistics companies can access customer information, customer service and information exchanges in a timely manner, which ensure that the company has mastered the latest customer information, thereby greatly reducing or even prevent the loss of customers. Furthermore, CRM system not only helps logistics enterprises to carry out effective and scientific sales and sales process management, the system make the sales of the logistics enterprises understand the whole situation, to help shorten the sales cycle, and improve sales staff's efficiency. Again, CRM system implementation bring advanced enterprise "customer-centered" development strategy and operational concepts, thus To foster and enhance the core competitiveness of logistics enterprises to provide comprehensive protection.

4.5.3 INTERNAL AND EXTERNAL COMMUNICATION

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Specificity for the project activities, internal communication can be belongs to the internal information platform. The system provide platform for members and managers to publish project related information to target group or staff.

4.5.4   FUTURE SYSTEM DEVELOPMENT

OTHER EXTENDED SERVICES SUCH AS CARGO CONTROL TECHNOLOGY SUCH AS BAR CODE , RFID AND CARGO TRACKING, VEHICLE AND VESSEL TRACING SYSTEM ARE STILL LOGISTICS COMPANY'S CHOICES FOR UPGRADING THEIR SERVICE LEVEL AND CUT DOWN DAMAGE, LOSS RATE DRAMATICALLY .

OTHER ENGINNERING SOLUTIONS SUCH AS LASHING, LIFTING SYTEM MAY RELATED WITH MORE SOPHISTICATED AND INDEPENDENT MODEL, THE TECHNOLOGY INVOLVED MORE MATHEMATICAL MEHODS SUCH AS LINER PROGRAMMING OR SIMULATION TECHNOLOGY.

4. 6   SAMPLE OF DATA PROCESSING

A. Let's review how to collect data properly.

Sample:

Cargo detail description contains the essential information of the cargo and cargo related information process, which is also the basic information element for further analysis and further information process. Furthermore, all related parties involved in the logistics, trading, shipping, and project section will make their document, calculation, analysis based on that information.   Following table is one real sample of project cargo packing list.

Table :4.6-1 Sample of packing list
Packing List for Contract No.   TEJK - 02-06

No.	Sub-contract No	Name	Contract's ge No	Specification	Package Style	Dimension (cm)			Volume (CBM)	G.weight (kgs)	N.weigh (kg
						L	W	H			
1	TCDRI F115(M)005		1/4	Accessories	Wooden Case	120	80	90	0.864	450	40
2	TCDRI F115(M)005		2/4	Main Body	Unpacked	525	320	290	48.720	2,600	2,58
3	TCDRI F115(M)005	Cyclone	3/4	Main Body	Unpacked	525	320	290	48.720	2,600	2,58
4	TCDRI F115(M)005		4/4	Air Duct	Unpacked	590	280	230	37.996	5,400	5,30
1	TCDRI F115(M)008	VRM-China part	1/5	rails and motor bracket	pallet	650	327	92	19.555	6,525	6,32
2	TCDRI F115(M)008		2/5	gearbox plate	pallet	381	372	106	15.024	9,950	9,75
3	TCDRI F115(M)008		3/5	foundation frame	pallet	680	195	320	42.432	14,050	13,85

| 4 | TCDRI F115(M)008 | | 4/5 | foundation frame | pallet | 620 | 290 | 230 | 41.354 | 10,150 | 9,95 |

Please note that the packing list above is only very small part of the whole project cargo packing list. The data source itself is far more complex and hard to handle. The main reason is that:

A. The information is collected from different information source, one part of it is from the supplier A, the others are from factory B, etc. Also, please note that a typical mega-sized and complicated project are usually organized by integrated complex and using world-scale capacity. In most occasions dozens of companies and groups involved in the project. It's very hard to confirm the same data format, due to different communication style, some data are collected from EDI system, some data uploaded from web of internal information system. Others are collected from different electrical format such as notepad, word, excel, sql database etc. We are not able to have the unique format of the data source, not to mention that all this data table structure to be unified and with exactly same format.

B. Different requirement based on different needs. Let's review above table, as the packing list is project-oriented, and cargo itself must indicate which component each item is belong to the whole project. Also, as this is an EPC (Engineering, procurement, and construction) project, the cargo packing list will indicate the contract number, means cargo itself is order/contract driven.

C. The project construction team or project logistics team do not have a set of technical standard to govern the whole process of data flow and information processes. As the logistics project provider, generally place the project logistics team as sub contractor, thus in most cases, have no bargaining power with the suppliers/factory side. Customarily the logistics provider will sign contract with the proprietor or business owner, then as agreed, the principles will place order with suppliers for material and equipment. The suppliers then provide document and information to logistics providers. Thus, actually logistics service companies have no any legal or business domination over suppliers, unless the suppliers receive direct order from their proprietor or business owner's instructions.

As mention above in step 1, there are two different types of data: the static data and dynamic data,

1, Different with other logistics solutions, project logistics must have the support of senior corporate leaders usually called the project manager. The project logistics IT solutions must be "number-one" project. Because the project is to enhance management of project logistics systems, and implementation related to business management concept, model, and many other aspects of business process change, the project itself needs a concerted effort. Data collection, especially when need consolidation job within the various departments and require their support and cooperation, and not able to be done as easy as we can image. Sometimes some members are unwilling to release the department data to some public services.   This required the company to support senior leadership decision-making.

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2. Under the leadership of project manager, the project team should establish a specialized data preparation group which is composed of members of business unit and IT supports. The main job is to collect data and business process by working closely with all dept involved and other related parties outside the project team. The main purpose of a clear source of the data sector and the related responsibilities of various departments is to maintain and strengthen operational coordination between various departments, in order to minimize the data preparation process from the mistakes and errors, and for the future project management system with prompt and accurate data and provide an important safeguard to protect.

3, Great importance and attention should be paid to the accuracy, completeness and timeliness of data. It also required above said team to establish a standard data maintenance processes and systems. Establish a clear process and accountability, regardless of the data source – static or dynamic data, maintenance (including material structure, suppliers, customer etc.), or update the business data (such as the order of business data entry, inventory changes, etc.) should follow these processes and systems to reduce risk of the data maintenance, upgrade data accuracy, completeness and timeliness.

4, Prior to the implementation of the new system, project team should focus on doing each of the implementation process of data preparation. A series of scientific and standardized encoding rules should be set to standardize the data. In the last stage, date should be minimized to certain in order to secure accurate and timely data. We should speed up the time of reconciliation, because more time span of reconciliation , can create more chances for being wrong. After the implementation, from the stringent requirements of business process, data entry should be simultaneously updated with the business process.

If the team can really perform above points when design and implement a new system, we can control the data quality. The new system can actually represent the real business world and truly assist the team member to perform their job better, under the condition that the accurate input data are available timely and with required form.

4 .6. 1   SAMPLE OF   THE PROCESS OF   DATA SORTING

I would like to separate data with two different categories. One is data of client information, order details, shipping information etc. Another data is of cargo information only. The criteria for making such separation is that cargo details contains much more information, and a good data processing or sorting will greatly streamline the data flow, and is good for further output from the system.

For part one data, we only have to set up standard format, enable members to key in or collect the necessary information within the structured format.

Above stated the complexity of the cargo details and the reasons that we fail to collected the detailed structure as we wish. Let's review what will be the final data structure we want for implement a good project logistics system:
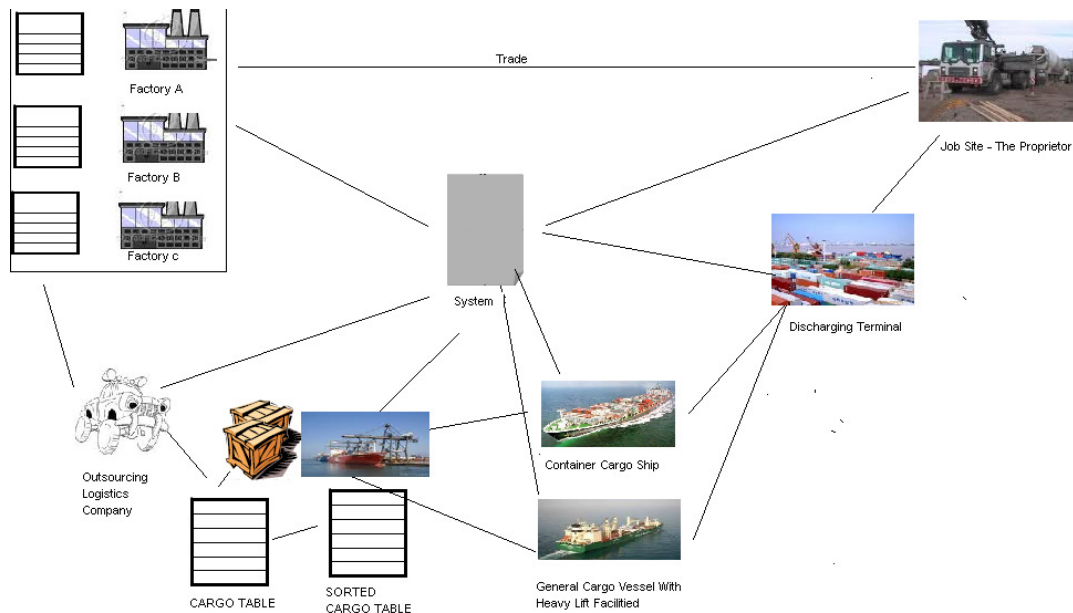
Figure: 4. 6-1 Table of cargo packing list flow in the project logistics system

First let investigate into one single component of the cargo, it should contain the information of the project itself. – Project name, project id, project site, supplier, project logistics team (who arrange to make the transportation), shipment schedule. Etc. For the supplier point of view, it should contains contract name, project name, cargo details, such as description of cargo, component name, length, width, height, and volume, gross weight, net weight etc. From the project logistics point of view, it should contain information of sub-contractor name and id (who arrange the truck, who arrange the ship, who arrange the customs clearance etc.), place of loading, discharging etc. The main table is the table created by logistics team, other tables can be connected to the main table by primary key of cargo code (or cargo id or bar code no). A primary key is used to uniquely identify each row in a table. A primary key can consist of one or more fields on a table. When multiple fields are used as a primary key, they are called a composite key.

Let's focus on the table contains the key element of cargo description itself and see what the basic structure of that.

CargoBatch
CargoComponentID

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CargoDescription	CargoSupplierID
CargoID	CargoLogisID t
CargoPackingList	CargoTradeID
CargoDescription	Continues
CargoComponentID	
CargoGrossWeight	
CargoNetWeight	
CargoPackage	
CargoPiece	
CargoLength	
CargoWidth	
CargoHeight	
CargVolume	
CargoBarCodeID	

Measurment
CargoPackingList
M.L (Length after Measurement)
M.W (Width after Measurement
M.H (Height after Measurement)
M.V(Volume After the Measurement
Continues

CargoDescription ... Continues

TableList	Functions
Project table	Descript the basic information of the project
Each Shipment Table	Descript the cargo information of each batch
Measurement	Contains the new volume, length,width, height after the sureveyor's measurement
Client Information	Contains of clients information

Figure: 4.6.1-1 Illustrate the internal connection of tables

With those data, let's further illustrate the real sample: usually after all cargo reached port, ship owner will arrange their surveyors to measure or sample measure the cargo, ensure that the shipper provide the correct volume. Usually, part of the cargo is found mis-measured, and new table: we can call that table after measurement, will be tendered by surveyors. The problem is that how to replace all existing figures with the new ones.

Following table illustrate the sample how SQL database processes the data of new volume after the surveyor's measurement.

Table: 4.6.1-2 Sample of SQL process on interconnected tables

/* 20th-batch*/

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```sql
/*logic testing whether already existing table sql_fianl_20*/
drop table sqlFinal_20
/*input Excel into sql table and create table name as 'sqlFinal_20'*/
SELECT              *              INTO              sqlFinal_20              FROM
OPENROWSET('MICROSOFT.JET.OLEDB.4.0','Excel
5.0;HDR=YES;DATABASE=I:\20th \packling_List_20th_batch.xls',sqlFinal_20$)

/*logic testing whether already existing table measurement_20*/
drop table measurement_20
/*input Excel into sql table and create table name as 'measurement_20'*/
SELECT              *              INTO              measurement_20              FROM
OPENROWSET('MICROSOFT.JET.OLEDB.4.0','Excel
5.0;HDR=YES;DATABASE=I:\20th                                                    \
packling_List_20th_batch..xls',measurement_20$)

/*view table of sqlFinal_20 and table measurement_20*/
select * from sqlfinal_20
select * from measurement_20

/*logic testing whether already existing table sqlafterMeasurement_20*/
drop view sqlafterMeasurement_20

/*create view of sqlAfterMeasurement_20 based on the connection of table
measurement_20 and sql_Final on same packageNo*/
create view sqlafterMeasurement_20 as select * from sqlFinal_20 as s left join
Measurement_20 as m ON s.[packageNo]=m.[M_PackageNO]
/view all changed data after the connection /
select * from    sqlafterMeasurement_20 where m_volume is not null

/update table sqlAfterMeasurement_20 for items of l, w, h, and volume/
update sqlAfterMeasurement_20 set l=m_l, w=m_w,h=m_h,volume=m_volume where
m_volume is not null

select * from sqlAfterMeasurement_20
/*create excel table sqlaftermeasurement_20*/

/view sqlAfteterMeasurement_20 after update/
select * from sqlaftermeasurement_20

create view generalReportFromServer_20 as (select general as general_Server,
[generalPackage] AS [generalpackageno],sum(pcs) as pcs, sum(gw) as gw, sum(nw) as
nw, sum(volume) as volume
  from sqlAfterMeasurement_20 GROUP BY GENERAL, generalpackage)

/*Create table of sqlaftermeasurement_20_table from view*/
```

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```
select * into sqlaftermeasurement_20_table   from sqlaftermeasurement_20

/*create table of generalReportFromServer_20_table from view*/
select * into generalreportfromServer_20_table from generalreportfromServer_20

/*create table of general_20*/
drop table general_20
SELECT             *            INTO        general_20            FROM
OPENROWSET('MICROSOFT.JET.OLEDB.4.0','Excel
5.0;HDR=YES;DATABASE=I:\20th\packling_List_20th_batch..xls',general_20$)
/*create paralle compareTable compare_20 to view the difference of group volume
between the original and measured packing list*/

/create view of grouped/sorted table based on different supplier/
create  view  generalReportAfterMeasurement_20  as  (select  general  as  general,
[FILENAME]  AS  [fileName],sum(pcs)  as  pcs,  sum(gw)  as  gw,  sum(nw)  as  nw,
sum(volume) as volume
  from sqlAfterMeasurement_20 GROUP BY GENERAL, [FILENAME])
```

Finally through above processing, all figures (new length, width, height and volume)
are replaced by new ones, and then new table with the correct figure is created. The
system also makes "group by" calculation to see the final volumes from different
suppliers.

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5. SYSTEM STRUCTURE ANALYSIS

5.1 SYSTEM STRUCTURE DESIGN

Following is the overall system design:

```
                    ┌──────────────────────┐
              ┌────▶│ Project team database │
              │     └──────────┬───────────┘
              │                │
              │                ▼
              │     ┌──────────────────────┐
              │     │   Shipment system     │
              │     └──────────┬───────────┘
              │                │
              │        ┌───────┴────────┐
              │        ▼                ▼
              │  ┌───────────┐   ┌──────────────────┐
              │  │ FICO DEPT │◀─▶│ Operation System │
              │  └───────────┘   └────────┬─────────┘
              │                           │
              │     ┌──────────────────┐  │
              └─────│ Sales and Bidding │◀─┘
                    └──────────────────┘
```
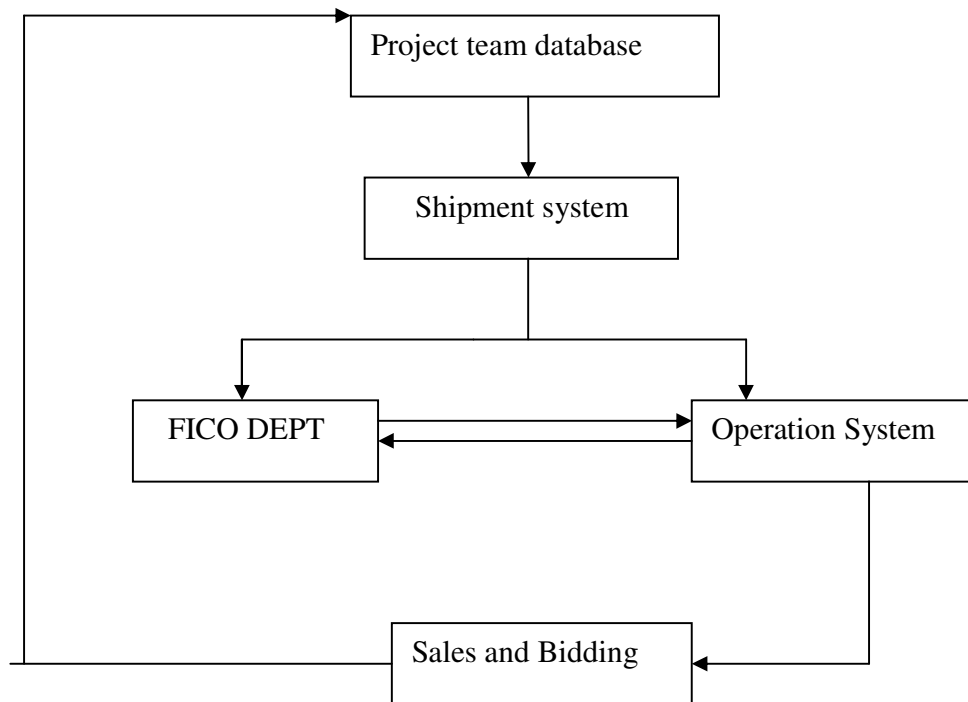
Figure; 5.1 -1 Whole system structure and the physical system layout.

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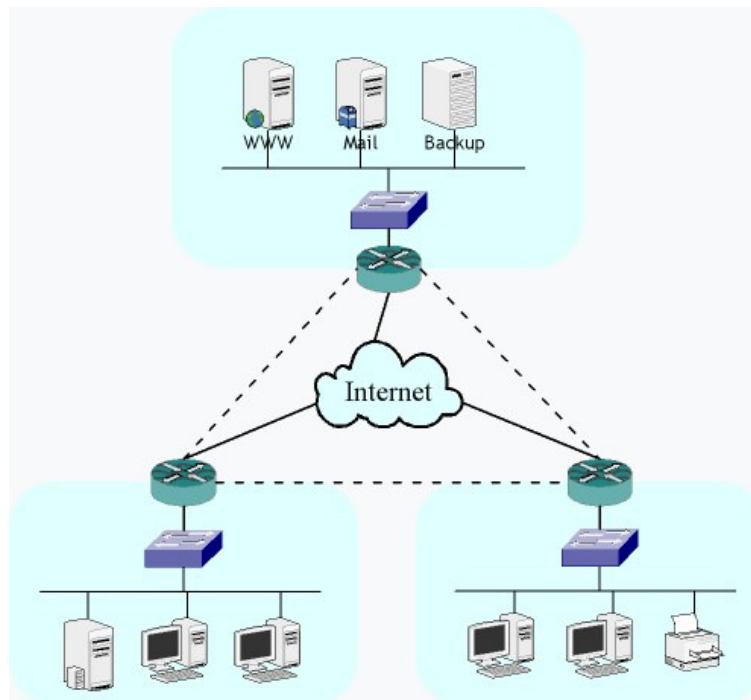
Figure: 5.1.-2   Network Design

5.2   DATABASE DESIGN

Database Design
Database design is another critical part of information technologies. First, all departments should be divided into different categories. The role of each category should be specified and clearly realized in information system. Finally each type are incorporated into the framework, which formed a database, she has a basic function of query, report and decision making.

Following is the sample of table structure design.

Table: 5.2-1   Sample of table structure design

Basic data base											
Company structure				Client basic information				Goods status and others			
Area	Client Type	Supplier Type	Good Type	Route	Client information	Pricing	Project Details	Shipment Type	Measurement type	Cargo status	Position

Further detailed explanation of above table:

PROJECT TEAM FUNCTION CHART

Classification of the company's organization
1, Area Category: Display Area classified information for customer and transportation enterprises.

2, customer classification: Display client information for the customer file.
3 Cargo category set up coding and classification of goods to develop rules for warehousing, container yard management, transportation and other departments.
4, storage Category: development of classification of information is mainly used for warehouse storage management file.

CLIENTS BASE INFORMATION

Customer's basic information
 1, the route: the schedule of the shipping lines and client's main cargo destination for the chartering, transport sector, traffic management
 2, customer profiles: information of customer profiles, customer complaints, orders and so on.
 3, pricing: development files for the quotation from shipping line and other service and transportation supplier.
 4, project details: the record of all projects performed and under going project details for archival information and for further business design and reference.

BASIC INFORMATION

Infrastructure Status
 1, A mode of transport: constitute transportation information for orders and shipping list, for transport management departments.
 2, charging unit: development of logistics and transport, billing, orders for transportation, transportation documents, etc., used for transport management.
 3, metering method: development of units of measurement information for orders and shipping list, for warehouse management departments.
 4, cargo status: development of the state table of goods for storage lists, stock ledger, for warehouse management, project status and transport management departments.
 5, position, information indicate the position of the cargo at the whole project logistics section, such as "cargo is ready, waiting at berth for loading, customs clearance and other clearance completed."

5.3   LOGIC PROCESS –SAMPLE

 In order to improve the company's performance, so assume a number of policies to attract new clients by upgrading team's performance, and   retain old customers. The following is based on the specific circumstances of the company's determination to develop the processing checking point to ensure company's financial safety for holding original Bill of Lading. . Judging table is used to describe the processing logic in tabular form.
This is an imitation of a computer language description of methods of processing logic. It is used by the "IF", "THEN", "ELSE" standardized language composed of words. The following is the process of handling orders by logical structure of English expression.
Table: 5.3-1 logic language .

IF client's whole overdue time ≤ 30 days
    IF freight payment status = "yes"
    THEN immediate release bill of landing
    ELSE
    Following the guarantee letter procedures and company internal censor ship
procedures
ELSE
    IF THEN arrears Time ≤ 100 days
        IF freight payment status = "yes"
        THEN settle payment and then release bill(s) of lading
    ELSE
    No release
ELSE
The first payment required
END

Process can be described by determine tree or decision tables and structured language also

Expressed in words such as multiple logical relations are not only very complicated and difficult to understand, the table can be used to judge expressed conditions, decision-making rules and actions to be taken for management and systems analysis staff to comprehend the logical relationship easily.

The figure is a debt period of the client and freight payment judge tree. Determine tree is relatively easy to understand, but when the conditions increase it becomes not easy to articulate the identification process.

```
                    ┌─────────────────────────────────┐
                    │        Overdue time (days)       │
                    └─────────────────────────────────┘
                   ╱               │               ╲
              ◇ <30            ◇ >=30           ◇ >100
                dya             <=100             0
        ┌──────────┐      ┌──────────┐      ┌──────────┐
        │  FRIGHT  │      │  FRIGHT  │      │  FRIGHT  │
        └──────────┘      └──────────┘      └──────────┘
```

| ◇ Paid | ◇ Unpaidd | ◇ Paid | ◇ Unpaidd | ◇ Paid | ◇ Unpaidd |

| Release bill of lading | Require to pay freight | Require guarantee letter | Hold bill until freight paid | Required the settlement of overdue over 30 days | Required the freight payment first |

| | | Release bill of lading | | | Required the settlement of overdue over 30 days |

◇ Paid (under Hold bill until freight paid)

Require guarantee letter

Release bill of lading

◇ >=30 <=100 (under Required the settlement of overdue over 30 days)

Require guarantee letter

Release bill of lading

◇ >=30 <=100 (under Required the settlement of overdue over 30 days)

Require guarantee letter

Release bill of lading

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Figure: 5.3-2 judge tree
Table: 5.3-3 Decision rule

Decision Rule		1	2	3	4	5	6
Condition	Overdue≤30days	Y	Y	N	N	N	N
	Overdue>100days	N	N	Y	Y	N	N
	Freight paid	Y	N	Y	N	Y	N
Action	Release bill of lading	×					
	Issue guarantee letter		×				
	Freight paid and issue guarantee letter					×	
	Not releasing						×
	Pay overdue within 100days			×	×		

Above sets up a sample of how to establish the processing logic system. This is why business analysis is always the biggest task for system implementation. And it's the most time consuming and risky period. Some IT solution provider will send their senior consultant to investigate the business process and make proper business logic solutions.

6   SYSTEM DESIGN PROTOTYPE

6.1   SYSTEM DESIGN INTRODUCTION

After study of the background, business data storing, sorting, processing, business logic requirement, logic analysis, let's move further to see how to realize those need, and visualize those business requirement by establishing the prototype of the project logistics management system. We can call that "PLMS":

"PLMS" consists of two subsystems: internal logistics information management system (PLMS), e-Logistics System (e-LMS); She is an advanced management ideas and management thinking of the combination of modern, integrated large-scale information management systems, advanced distributed architecture system and mature B / S architecture;

The entire system structure requires clear, rigorous business processes;
PLMS system contains 10 sub-modules: commission orders, warehouse management (including inventory, customs clearance, commodity inspection, loading and unloading, and other logistics services, simple processing), Transport Management (container, general cargo, special cargo,), freight forwarding management (marine, rail , air), financial statements, the price system, the report center, cargo tracing system, data base, system configuration;

E-LMS system mainly consists of online orders, customer inquiries goods inventory, transportation dynamic query, billing inquiries, virtual cargo tracing system (through the GPS, GIS system,   display the cargo status, auto alerts);

```
                                    ┌──────────────────────┐
                              ┌────►│ Land                 │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Sea Carriage         │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Air Cargo            │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Rail                 │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Customs clearance    │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Customs clearance    │
                              │     └──────────────────────┘
┌──────────────────────┐     │     ┌──────────────────────┐
│ Supporting business  │─────┼────►│ Lifting & security   │
└──────────────────────┘     │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Customs clearance    │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Cargo Tracing        │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Warehouse            │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              ├────►│ Consolidation        │
                              │     └──────────────────────┘
                              │     ┌──────────────────────┐
                              └────►│ Others               │
                                    └──────────────────────┘
```
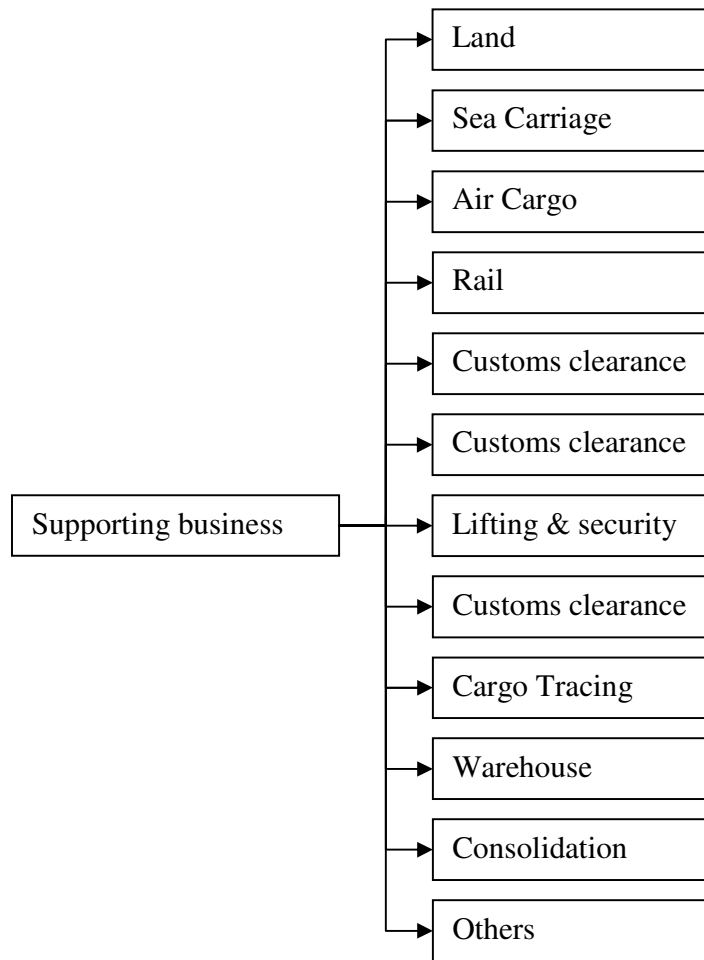
Figure 6.1-1 System covers the following business

Managers and decision makers without supervising on sport, can easily operate, and know pricing structure, customer contracts, project status (such as transportation condition, remaining jobs) inventory status (through the update three-dimensional computer dynamic image display, can easily understand each goods quantity, position, and direction etc.) from the system.

Project Logistics industry is a service industry, through the internet to provide more information to customers, and strengthen the competitiveness of enterprises, via e-LMS system deployment, system provides connection for customers to tender demand for logistics services. Part of operation jobs such as notify client of project or cargo status can be assigned to internet and GIS, GPS system. Customers can check cargo position, vessel position via the web. Furthermore, project logistics life span may over several years, smart FICO system can provide client connection for them to check the present project logistics cost on line.   the next one, we can trace the entire process through the network.

6.2   THE OBJECT OF THE SYSTEM

Second, the system's goal is to use the enterprise internal logistics information management systems and e-logistics system, full use of and full realize of computer network management
.
The nature of the project logistics industry is the service industry. The core idea of service management are: low cost target , efficient completion of services, provided to customers a full range of advice during the process of the service, supply feedback and other real-time information support to relevant parties. Via the Internet, the logistics industry can implement low-cost network marketing, multi-channel supply chain operations to achieve comprehensive, integrated, global service network

Project Logistics system will take part in the all aspects of project logistics activities, use of network link, and achieve the full realization of the integration of business information logistics solution, to reduce intermediate time and money cost,   links logistics activities, improve the speed of information flow and supply feedback to further improve and enhance enterprise resource management and customer management and reduce the logistics cost, to finalize the logistics business to maximize profits.

6.3   APPLICATION OF THE SYSTEM

A very important foundation for systems design is the use of the Internet, without that we can not convey good information on each sector. On the other hand, the system design is modular, (including an assessment module, statistics module, check module, customer service module, the transport module, etc.) a integrated system is decomposed into each other with a certain degree of independent, but also contain some linked components, these components called modules. Organic combination of these modules further designed into a powerful tool.

The system application: "PLMS" is applicable to storage, warehouse, transportation, freight forwarding, cargo trace, and other businesses.

Following figure illustrate the physical layout of system internal and external connections.
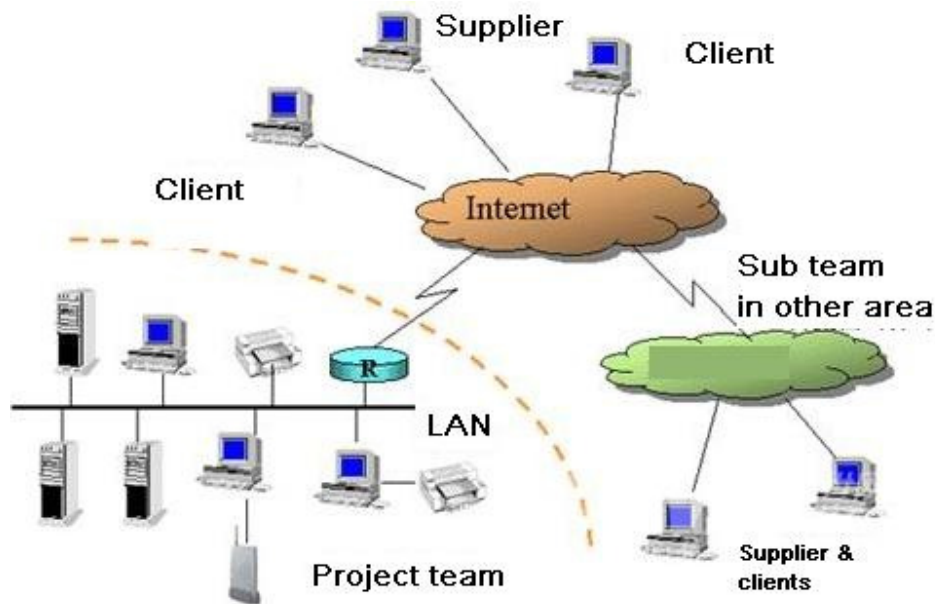
Figure 6.3-1 PLMS internet layout.

6.4   ADVANTAGES OF USING PROJECT LOGISTICS MANAGEMENT SYSTEM

6.4.1   OVERALL

Advantage of the deployment of PLMS, reflect the following four aspects:
1)   Overall: full realization of the project logistics business information integration, improve the competitiveness of enterprises;
2)   improve enterprise resource management and customer management and reduce logistics costs;
3)   easy to erect a bridge of communication with customers to achieve diversification of customer   consultation;
4)   multiple physical offices and   transnational sites to share information
5)   Avoid repetitive work in all sectors, reduce the complexity of inter-departmental co-ordination;
centralized management of project logistics service commission, to support operations within the distributed processing;
6) Scrutinize project logistics management in detailed processes, realize procedures under SOP supervision and guidance.

6.4.2   CLIENTS

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1. Full use the advantage of the Internet, more information to be widely shared;
2. communication with client and suppliers is no longer a single telephone fax, system, the new system provides more friendly interface with use the www service, email services;
Customers can order online tracking services, packaging, customs clearance, commodity inspection, transportation, booking, shipping and other services;
Customers can have on-line statistical report of goods, orders, transport conditions, and other historical records;

The system provides easy interface with customers for convenient access to current business expenses, or view the company's financial recognition of the monthly and quarterly billing.
Customers can check all the goods online for quantities, packaging, batch number with the latest status.

6.4.3   MANAGEMENT LEVEL

The system supply many benefits to management level. PLMS provides strict operational control and updated reports. So managers can easily monitor the customer service orders for every shipment. Further more, the smart system provide overall picture of the whole company movement, project status and shipment process.

Powerful analysis can help managers to make better decision-making upon timely and accurate information. Through graphics display, managers can visually investigate into the cargo position, vehicles' movement, storage usage, the overall flow of goods and frequency. Furthermore, the system monitor the entire process of each shipment under project logistics and customer orders for every service of packaging, customs clearance, commodity inspection, transportation, booking, shipping and other operating conditions; Evaluate the workload of each individual worker or group, such as the amount of customs clearance volume handled by operating officer, the dispatching drivers, , etc.;

6.4.4   OPERATIONAL LEVEL

PLMS makes operating personnel, managers, and customers, operations personnel of different departments to communicate more easily and avoid the tedious and repetitive work; make logistics information share between different departments in real time

By two-dimensional graphics, you can visually see the current state of vehicles, cargo, scheduling, situation, order tracking packaging, customs clearance, commodity inspection, transportation, booking, shipping and other operating conditions which also dynamically reported to operator, and part information can be forward to client via web or email.
Daily operation plan designated to remind the operator to conduct business operations.

6.5 INTRODUCTION OF SYSTEM PROTOTYPE

First, the overall process of business systems
System is divided into four levels: order level, operating level, management, decision-making.

Following figure illustrate how the business model the system is supporting:

All jobs are based on the projects, which constitute the whole project team work. Each project can be broken up into several individual and integrated shipment,. And shipment can also be broken down into various jobs, and those jobs have internal logic connections with each other – working sop or procedures.
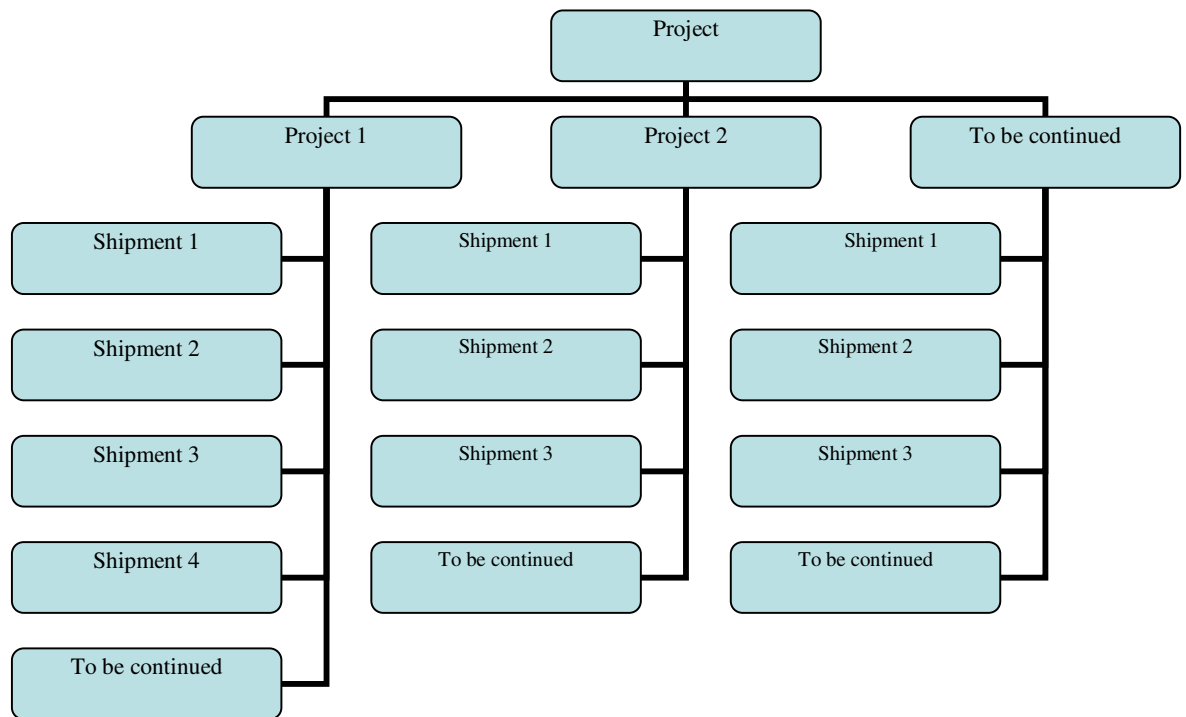

Figure 6.5-1: Project work structure

```
                                    ┌──────────────┐
                                    │   Project    │
                                    └──────┬───────┘
          ┌────────────────────────────────┼────────────────────────────────┐
┌──────────────────┐            ┌──────────────────┐            ┌──────────────────┐
│  Operation Level │            │   Management     │            │  Decision Level  │
└─────────┬────────┘            └─────────┬────────┘            └─────────┬────────┘
```

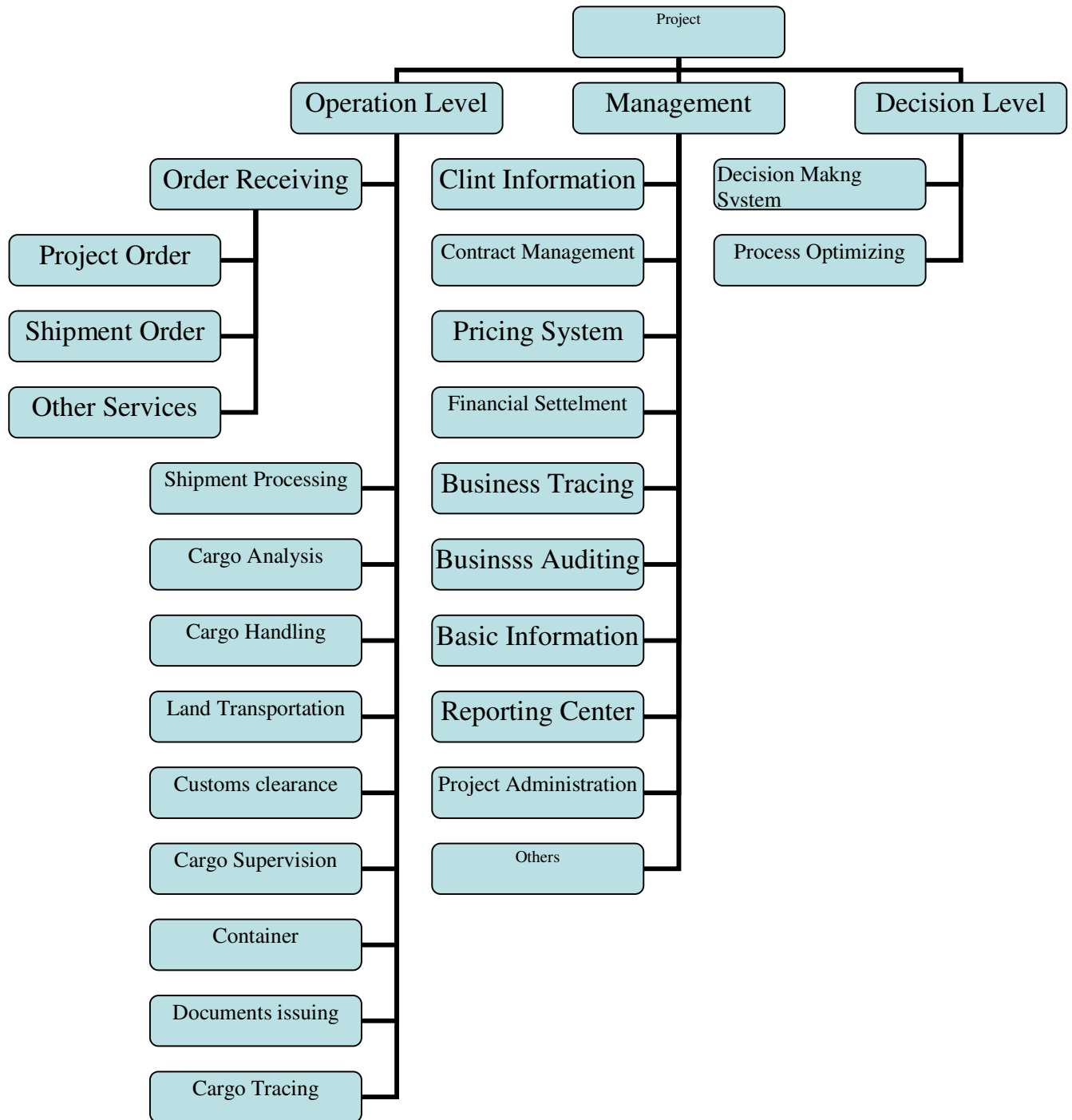| Operation Level	Management	Decision Level
Order Receiving	Clint Information	Decision Makng Svstem
Project Order	Contract Management	Process Optimizing
Shipment Order	Pricing System	
Other Services	Financial Settelment	
Shipment Processing	Business Tracing	
Cargo Analysis	Businsss Auditing	
Cargo Handling	Basic Information	
Land Transportation	Reporting Center	
Customs clearance	Project Administration	
Cargo Supervision	Others	
Container		
Documents issuing		
Cargo Tracing		

Figure:6.5-2 Supported functions for different levels.

Figure 6.5.2 illustrate the functions the system is supporting for the operation, management, and decision making levels.

Let's move on to investigate the detailed design of the system through: order form, operation management and strategic levels.

6.5.1   ORDERING FORM

Order layer: responsible for logistics services to clients' commission, which is an important window of communication with customers There are two basic functions: 1st: provide connections with the clients' side, and enable the clients to log on, and input the required information into the system. 2nd, the system will connect with different function module and sometimes will required to process the data (it may need certain sort of calculation, logic decision etc.) for searching the database, and return the data to client via web, email, short message etc.

6.5.2   OPERATION

Operating Layer: responsible to provide specific logistics services, such as sop control, transport, handling, customs, etc. Actually this part may be the key section of the whole system. The most of the routine tasks and main documentary jobs are handled by this section. Furthermore, the system design itself requires much more detailed investigation and research works.

6.5.3   MANAGEMENT

Management: responsible for the management of logistics services important information and basic information, such as managing customer information, contract information, the price system, while the operation of logistics services, tracking, auditing, etc.; This section will be key jobs assigned to management level, the system designer should possess profound understanding and knowledge of project management, project logistics, logistics management, and marketing etc.

6.5.4   STRATEGIC DECISION

Strategic decision-making: provides the process control and provides operational strategies, such as system operation process optimization, route solutions, value added information provided to clients, settlement strategy of customer cost, and so on.
Data or documents in the transfer layer when they are a "review" and "abandoning audit" concept of operations, general, data or documents has been through "audit" can not be modified, unless the implementation of the "abandoning audit" operation.
In between layers of data or documents, system introduces "ordered" and "return" concept of operations, a data or documents need to flow from one level to the next level, to go through, " ordered" in the operation, which requires return to the previous layer from the bottom layer, need to "return" operation.
From the layer point of view, need to "ordered" data or documents, it must first undergo a "review" and need to "bounce" the data or documents, it must be in the "no audit" or have "abandoned review" status.

CHAPTER 7. SUMARY

7.1 SUMARY

After several months of research, evaluation and system design participation, the initial system research, requirement and prototype was finally completed. This system involves a wide range of technologies such as project management, logistics, web, multimedia, system, coding, etc. I use these technologies to achieve system functionality, there are many problems. I am in the process of solving these problems, taking many detours, but also learn a lot of knowledge.

This paper mainly discusses the IT solutions on project logistics management. The author firstly illustrates the business background. And then bring the real problems which are facing by this line of industry. The second section focuses on the key methodology that must clarified before designing – how to sort and store standard and qualified data, and the design principle of business logic. In paper's third section, it gives samples of design data, table structure, and real case of standard table structure and sample of data changes. Also the writer gives a sample of logic design, and wish the readers have an intuitionistic impression over the data and logic process. Finally the author visualizes a sample system with sample structure and logic design.

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