6.1 Introduction

The present chapter contains the findings, recommendations, and conclusion that emerged from the investigation and from various statistical analyses of the primary data collected through various department of CWC Pune.

There are following are the major findings, recommendations, and conclusion emerged from the study titled Data Warehousing – As a Creating Tool of Powerful Information- A Case Study on Central Warehousing Corporation (CWC). The survey was carried out to assess the infrastructure in different departments of CWC Pune especially data warehouse tools, oracle, and IT infrastructure and to study whether data warehouse and oracle tools has any influence on CWC Pune professionals with regard to their professional activities, departmental needs, and also to assess the awareness of CWC Pune professionals about developments in data warehouse module and oracle tools. *Major findings of the study are as follows:*

6.2 Infrastructure Facilities of CWC Pune

Professional Staff Strength of CWC Pune

1. In CWC Pune have several vacant position in different department including the top level manager. The Regional Manager does not have technical background and ICT knowledge. The 93 % staffs of CWC Pune are only graduate, they don’t have master degree or Ph. D. in any stream. The total number of master degree and Ph. D. holder is zero (0) percent. They take some training such as short term course (Training in ICT) approx 74 %. Mostly are graduate staffs in CWC Pune and they are not able to understand the importance and characteristics of new technology for the warehouse. The central government appoints the all staff of
CWC Pune and they have fixed the pay scale of different staff of CWC Pune. However, professional staff without Technical background and in depth knowledge of advance software such as Oracle 9i or SPSS and other analytical tool wills effects the function of CWC Pune. At the time of survey, there is not permanent EDP Manager in CWC Pune. Around 05 professionals were employed on temporary basis in the CWC Pune.

**Hardware Facilities of CWC Pune**

2. The Sufficient computer hardware’s (PC) are available in different department of CWC Pune. There is no Server Machine in the CWC Pune, they are working on stand along PC of different department and share all data from the secondary storage devices such as CD or Pen drives. They are always used Ink-Jet printer from the all department of CWC and Dot Matrix Printer and Laser Printer and Network Printers are not available in CWC Pune. CD-ROM drive is used mainly for providing access data from different department and send to other department. The CWC Pune has one LCD Projector in office for display information about the CWC Pune to the client. They have only one UPS which is used by EDP department, and it also provides backup only for PC of EDP department and not for others system. The CWC Pune has basic hardware facilities, but some of the facilities were not used suitably nor had no proper maintenance and some of the professional’s staff was mostly unaware of its functions.

**Software Facilities of CWC Pune**

3. The Central Warehousing Corporation (CWC) Pune use different software such as operating system, Ms-Office Software such as MS-Word, MS-Excel, MS-Power Point, MS-Access for different purposes. They used Windows XP Professional as a common operating system in the entire department. In CEC the systems for internet browsing they used Microsoft Internet Explorer.

4. Antivirus software is important to prevent virus attacks in a networked environment as well as stand along Personal computer. The CWC Pune use Symantec antivirus software for the same and they update the antivirus software from the internet on monthly basic instead of purchase of original software.
Networking Facilities of CWC Pune

5. All department of CWC Pune have Local Area Network facilities within the department but does not have an Intranet network. They share the data only through the local area network instead of intranet.

6. The CWC Pune installed only local area network instead of other network such as WAN, MAN etc they does not have any membership/link with other network, and all department of CWC. They share all information about the service or other only by LAN as well as secondary storage devices such as CD or Pen drives.

7. The Central Warehouse Corporation has own web site http://cewacor.nic.in but CWC Pune does not have own web site, if any customer want information about CWC Pune they have to make telephone call and get the information or the can take some information from the www.cewacor.nic.in web site which is over all CWC web site. The CWC Pune does not have WAN so they can display details information about the CWC Pune on the web site which is very useful the new customer as well as existing customer.

8. The CWC Pune has the 2.3 Mbps Leased line BSNL’s connectivity which is very less speed for access data from the internet and also download the data from the internet. This facilities is used by all department of CWC Pune, when all the user are access the internet it goes to very slow and they are not able to access information from the web site or internet.

Training for CWC Pune Staff

9. We found that the CWC Pune conduct training programmes for all staff of different department, they does not provide individual training by supervisors or colleagues and also EDP Manager does not provide any special training such Data Warehouse or SPSS tool. The in house training provide by the General Manager to the all staff of CWC Pune.
10. The CWC Pune arranges ISO training for all staff of all departments by the ISO consultancy, otherwise advance database management training does not provide to the any staff including the EDP department also. For database management system point of view the individual training is also require but CWC Pune does not give the individual training for any particular staff members. Training programmes are important to keep the professionals and other staff too aware of the developments in ICT and other new technology and tools and to give confidence to the professionals to use new the technological innovations.

**Problems in ICT/DW Tools**

11. The all staff members of CWC Pune were identify the problems faced in implementing ICT based services and advance database technology in the Central Warehouse Corporation Pune. Majority of the CWC Pune staff suggested that inadequate staff trained in ICT application is the main problem in ICT application. Second valid reason was lack of sufficient funds.

12. We found that the hardware and software facilities are available in Central Warehouse Corporation Pune are not satisfactory. The organization have only basic infrastructure to provide information services to the staff and end users, but it was observed that some of the hardware facilities were not utilized properly and there was no proper policy for periodical maintenance.

13. We also found that lack of support from authorities or Top Level Staff in the CWC Pune. Lack of initiative on the part of EDP staff was cited by an EDP Manager as another problem for ICT and Oracle 9i application. Lack of inadequate trained in Data Warehouse and Advance DBMS as well as lack of standard tool of data analysis such as SPSS etc were also pointed out as a barrier in ICT and Data Warehouse Module.

**Survey of Other Warehouse in Pune**

14. When we done survey in the other warehouse by face-to-face interview in Pune who has doing the same type of function, then we found that most of the warehouses in Pune using own software as well as oracle for database
management and produced the different types and levels of report for that organization. They are using LAN and WAN for data transfer and other purpose in the organization. Some Data warehouse in Pune such as Parekh Warehousing Corporation, Nutan Warehousing Company Private Limited, and Phoenix Warehousing (p) Ltd they are using Oracle and SPSS analytical tools for data analysis and database management for the organization.

**Actual Database of CWC Pune**

15. The Central Warehouse Corporation Pune has stored all information into MS-Excel file according their years and month of data. They create a file such as export files, Customer_details, Report_file1 etc for stored the information or data according to the file name.

16. We found that the EDP manager or other staff of CWC Pune extract data or information for the actual database with the help filter or sort method of excel in sheet and stored into the desired report file instead of using the Oracle or SPSS analytical tools for the same.

**Use of Information Sources According to Department**

17. The 45% of the CWC Pune professional’s staffs of different department were used internet resource for access information about the data warehouses, while all print resources including Journals/Periodicals (11%), Books (33%) and Conference papers (11%) was preferred by the CWC Pune professionals staffs.

**Use of Information Sources According to Designation**

18. We found that the Regional Manager (37.5%) more depend of the internet resource then book, journal and conference paper for the access information about the data warehouse. The EDP Manager also prefer internet sources (44%) to journals/periodicals (14%), books (28%) and conference papers (14%) for access information about the different activities of the data warehouses.
Use of Information Sources According to Experience

19. The junior staffs of CWC Pune are more depend on different resource of access information about the data warehouse such as journals (23%) books (31%) etc that have 5 to 10 years experience. The CWC Pune professionals having experience greater than 10 years use internet resource (37%) books (27%) etc.

Willingness to Share E-Resources through the Local Network

20. We found that 69% of all staff who is working in CWC Pune has agreed to share e-journals with other staff through the local network. It is followed by e-books (62%) e-projects (59%) have agreed to share their resources with other department with the local network.

Willingness to Share Expertise within the CWC Staff

21. The 85% of CWC Pune staffs who are working in different department have agreed to participate in workshop and conferences activities with other CWC Pune staff. It is also found that the CWC Pune staff share training and development (80%), and expertise of other CWC Pune staff (83%).

Department wise Opinion about Develop New Model/System

22. We found the opinion about develops new modules/system from the different employee of CWC Pune. The CWC Pune professionals such as EDP Manager (47%), Admin staffs (46%), Office staffs (30%), and Marketing staffs (33%) had different opinion about that develops new modules/system which is helped to update skills to some extent.

Designation wise Opinion about Develop New Model/System

23. The different level of staff of CWC Pune has different opinion about the develop new modules/system. The Regional Manager (57%) noted that new model/system helped them to update skills to some extent while 43% indicated that new model/system helped to update their skills to a great extent.
24. Among the General Manager 40% and 60% indicated their positive opinion about new model/system and EDP Manager 47% and 53% had also their positive opinion for develop new model/system. Majority of all staff were of opinion that develop new model/system will helped them to update their skills to great extent (47%).

**Experience Wise Opinion about Develop New Model/System**

25. We also find the relation between respondents’ experience and opinion about develop new model/system. It was found that the results are approx similar as in the case of analysis by department, and designation of the CWC Pune professional’s staff. Majority of the experienced and less experienced indicated positive attitude towards develop new modules/system on updating skills.

**Opinion about Add New Feature in Existing System**

26. The different staff of different department of the CWC Pune has different opinion about add new features in existing system was analyzed and found that a less majority 17% were positive about add new feature in the existing system and more majority 62% pointed out that it was good for the organization. While 72% of the EDP department refused about adding new features in existing system where Admin department 60%, marketing department 58%, and Office department 50% does not support to add new features in existing system.

**Nature of Work in the Present Post**

27. It was find that the nature of work is diverse and that in some department due to the scarcity of qualified staff the junior professionals are assigned duties in different sections. A person responsible for marketing has additional duty in database development 10% and data entry work 23%.

28. The EDP professionals has given some extra charge of the data entry work 11% where has have electronic maintenance charge of the organization. The admin department has the duties to maintain the administrative work; they have allotted the data management work 11% which is showed that most of the professionals are allotted conventional duties.
29. It is find that most of the technical professionals are not directly linked with ICT based services. Technical processing jobs were managed by 22% of Admin Staff of CWC Pune professionals while other ICT based services like online services 19%, database development 11%.

30. In most of the department, a small group of trained CWC Pune professionals or computer professionals is providing ICT based services and the work arrangement is such that other CWC Pune professionals have no chance to work in those sections.

Awareness for DW Tools According to Department

31. The 37% the CWC Pune staff having awareness of various DW Tools, while 63% of different staff of different department of CWC Pune was unaware of the applications such as Operating systems, Database Management System, Software Installation, System administration. The office department 87% was unaware about these applications. Marketing department 20% was aware about the application such as Operating systems, Database Management System, Software Installation, System administration whereas 80% of marketing department was unaware about these applications.

Awareness for DW Tools According to Designation

32. It was found that EDP Manager 88% has comparatively better skills in the data warehouse tools and technique than other category of professionals. Manager General 40% had good skills in the data warehouse tools and technique, whereas in the case of Regional Manager and Manager CFS it was 14% and 20% respectively in the data warehouse tools and technique.

Awareness for DW Tools According to Experience

33. We found that the CWC Pune professionals with less experience are more skilled in the data warehouse tools and technique than the more experienced hands. The professionals having less than 5 years of experience 63% and 60% of professionals with 5 to 10 years of experience were found to have good skills in
the data warehouse tools and technique, whereas 40% professionals with experience of greater than 10 years had well in the data warehouse tools and technique.

**CWC Pune Professionals’ Attitude towards DW Tools**

34. The only 14% of the CWC Pune staff having negative aspects, that the data warehouse tools and technique disturbs routine work and majority 86% was against this concept. Similarly, the 24% of the CWC Pune staff are agreed that the data warehouse tools and technique affects regular budgeting provision, 24% agreed and majority 76% disagreed. It is evident that CWC Pune professionals have a highly positive attitude towards the application of the data warehouse tools and technique.

**Problems Faced in the Effective Utilization of DW Tools**

35. It is found that the insufficient training is the main problem in the effective utilization of the data warehouse tools and technique cited by majority of CWC Pune professionals 23%. Other major issues indicated by CWC Pune professionals are lack of infrastructure 17%, lack of support from Top Level Management for implementing the data warehouse tools and technique in CWC Pune 16% and lack of support from administration in training of CWC Pune professionals 12%.

36. The 11% of the CWC Pune staff had fear of the data warehouse tools and technique caused problems in effective use of data warehouse. Lack of scope for CWC Pune professionals due to the data warehouse tools and technique was cited as an issue by very few professionals 10%. It was also observed that some department of CWC Pune did not have adequate facilities for implement the data warehouse tools and technique. The few CWC Pune professionals also cited lack of career advancement opportunities as concern in the proper use of the data warehouse tools and technique.

**Suggestions for Updating Knowledge of CWC Professionals**

37. We found that the 16% of the CWC Pune professionals’ to give in-house
training and workshop for updating their knowledge, and the 15% of CWC Pune staff give preference to searching Internet for relevant professional information and 12% of CWC Pune staff give the preference to learner from the internet source.

6.3 Findings Based on Testing of the Hypotheses

38. It is also found that the CWC Pune professionals also agreed that the data warehouse tools and technique helps to improve Quality of CWC Function 83%, the data warehouse tools and technique increase job satisfaction of CWC Pune professionals 62%, its makes integration within the CWC 41%, and helps to reduce workload of CWC Pune professional 72%, all of which shows high positive responses. (Hypothesis 3) (Supported). (Table 5.18)

39. The EDP department of CWC Pune has maintained maximum number of records in its database and office department also maintain the database of CWC. The Export_details table stored all information about export and import of the CWC Pune. The report_files store the information according to the report created by the EDP department and store it; it is completely wastage of the memory space of the system which is only for report generation. (Hypothesis 1) (Supported). (Table 5.17)

40. Digital software does not used by CWC Pune which is used for digitizing documents, setting organizational information, dissertations, conference related information, import and export status, etc. The MS-Access is used for database management instead of Oracle 9i or SPSS tools. Apart from Oracle 9i or SPSS the CWC Pune does not used MYSQL which is also used for advance database management software. (Hypothesis 2) (Supported) (Table 5.16).

41. The most of the CWC Pune professionals agree with the positive aspects of the data warehouse tools and technique in the study. Majority of the CWC Pune professionals agreed that the data warehouse tools and technique facilitate quick access to current data, improve quality of CWC function, and helps to enhance
knowledge and skills of CWC Pune professional with more than 70% positive responses. (Hypothesis 5) (Not Supported). (Table 5.20)

42. It is found that the CWC Pune manages or stores all data into the MS-Excel software. They create folder and files according to the month of year and store all information/data into that folder. The all department of CWC Pune have created table such as Customer_details which is store all information about the all customers. (Hypothesis 4 ) (Supported). (Table 5.21)

6.4 Suggestions and Recommendations of the Study

6.4.1 Suggestion

Based on the different findings including finding based on testing of the hypotheses of the CWC Pune professionals the following suggestions are put forward to improve the Oracle and ICT based facilities of Central Warehouse Corporation and to enable the CWC Pune professionals to utilize the different tools and techniques of Oracle and ICT facilities more effectively, by improving their knowledge and skills in Oracle and ICT applications and services in the different department of CWC Pune.

The EDP department of CWC Pune have to utilize all hardware and software effectively, the available resources to improve the IT infrastructure of CWC Pune. All the departments have been functioning without proper hardware and software and without any updation for the past several years. There has not been any planning or continuous provision in the CWC Pune for the development of IT infrastructure and implement new software such as Oracle or any analytical tools in the CWC Pune to keep pace with developments in technology. The CWC Pune require generous funds under specific budget heads for the procurement of hardware and its maintenance, software, collection development of electronic resources such as e-books, online journals etc. In most department of CWC Pune, a negligible infrastructures is allocated for purchase of equipments and maintenance and it is barely enough for the purchase and repairs of all the existing hardware. The Top Level management of CWC Pune develops a strategy for the continuous development of different department of CWC’s infrastructure and resources. The EDP Manager of CWC Pune
on their responsibilities can also put forward to the top level management for
development of new projects or implement the Oracle to develop the working
infrastructure of the organization. They can also formulate news idea for the different
department for the data analysis and other software to improve the efficiency of the
organization. The CWC Pune must make a policy to conduct periodic client’s studies
to evaluate the services which are provided and the extent to which facilities are of
benefit to the client community. The feasibility of a consortium of EDP department of
CWC Pune is to be studied for the successful sharing of resources especially the
electronic resources and print journals which in turn will help in providing enhanced
services to the users.

At present, there are several departments in the CWC Pune where they work
differently such as EDP Manager doing data entry job, Marketing professional also
doing the data entry jobs etc instead of appointed specific staff. The Top Level
Management or authorities and various departments of the organizations must take
immediate action to end such precedence and appoint regular EDP professionals in
EDP department who have take the whole responsibilities of the organization or
particular departments.

At the entry level of the CWC Pune, a basic degree with degree in
art/science/commerce is the required qualification for a CWC professional. In the
changing electronic environment, additional qualification or training in information
technology related specific areas such as advance database; advance networking as
well as some analytical tools of data is also to be considered while recruiting CWC
professionals, they can also take master degree in the IT or Management in order to
serve the IT perceptive academic community.

The central government must take urgent steps to fill all the vacancies of
CWC professionals, by relaxing the existing basic requirements in the case of EDP
department and assign the leadership of CWC Pune to competent, qualified
professionals.

Some incentives provided to some CWC professional for career development
must be extended to all CWC professionals also, to encourage them to acquire higher qualifications such as master degree or Ph. D. in specific area. As short course or specific training courses and career advancement is mandatory for CWC professionals in the organization, the junior and middle level professionals of CWC Pune are mostly give the attend such programmes. The CWC Professionals such as junior and middle level have to attendance conferences and workshop in specific subject or training and the senior grades professional can attend the conferences and workshops. The number of CWC professionals who have attended such training programmes purely for attaining knowledge may be very few. A continuous development programme of CWC professional should be made mandatory for all CWC professionals. The IT training programmes such as Advance databases, or Advance Networking programme and orientation programmes to develop skills of CWC professionals are to be organized by the department wise in a regular manner and equal opportunities are to be provided to all department of CWC professionals irrespective of experience/designation to participate in workshops/seminars etc conducted by various other organization and other warehouse associations. The professional development activities ought to be encouraged from the junior most level to develop the competencies of all professionals in providing various technology based services.

6.4.2 Recommendations

The Oracle 9i must be implemented in such a way giving more importance to practical skills of CWC professionals not only in technology, but also in traditional database management, organizational and personnel management, public relations, communication, and marketing services. Inspite of traditional database management system, Oracle 9i can be used for database management, generating reports for different level of the organization etc. The warehouse programs will require constant improvement based on new advances in technological innovations. Here I will give detailed information about developing new system/module of data warehouse with help of Oracle 9i.
6.4.2.1 Build a High-Performance Data Warehouse

There are different techniques for development of data warehouse software compared to traditional database software. We can use Software Development Life Cycle (SDLC) for development of traditional database system which is based on requirements and analysis methods and then design, coding, testing, and implementation. Unlike that in data warehouse software we first find the requirements in advance, but end user of Decision Support System (DSS) does not the basic requirement of the data warehouse. They can find their requirement through trial and error method which is also called testing after delivery of software. It is completely different technique of development for data warehouse software.

6.4.2.2 Prerequisites - The Data Model

The programmer always thinks about data model when they are planning to design and development of data warehouse software. The data model plays the vital role for the development of data warehouse. The data model also provides the informational requirements for that organization and gives the basic factor of model in development of data warehouse software. They provide all informational requirements for the organization on time basis such as within one week for maximum six months so the developer can understand the all requirement of data model with in time. After collection of requirements the programmer can put all into the data warehouse model for testing and find the error before the implementation of the software.

There are six major components of the data warehouse data model - a high level model and a mid level model. The figure 6.1 below graphically depicts the data warehouse data model.
The high level data model is useful for the organization because it combines important subject namely entities for them. Apart from that they also make the relationship between subject areas into them. In the data warehouse the programmer gave first priority of high level data model in software development. But the development of high level data model for the data warehouse is time consuming as well as difficult for the programmer. We can combine different keys and attributes as well as we can do the grouping of them in the middle level data for the data warehouse software.

6.4.2.3 Prerequisites - Technology Selection

When designer make the plan to develop new model or system of data warehouse then the designer must select the proper and appropriate technology to develop data warehouse.
Figure 6.2 above show different hardware and software for data warehouse design. The selection of data warehouse technology such as hardware and software for CWC Pune which is depends on the following factors, such as:

- The history of the organization,
- How many users there will be,
- To store large data in it,
- Which level of data is being built,
- The speed with which data is needed,
- Types of analysis should be done,
- The minimum expenses on technology, etc.

When we want to develop new model/system of data warehouse for the CWC Pune we must select both hardware and software according to their basic requirement. We can select mainframe or client/server architecture environments for the Central Warehouse Corporation (CWC) Pune. We can also select the desire software as the requirement that can execute all database management software and also maintain all hardware platforms for the organization. The software can be Relational Database Management System (RDBMS) or we can choose specific software for data analysis such as Oracle 9i.

**6.4.2.4 Prerequisites - Size of the Data Warehouse**

The designer of data warehouse also take consideration about size of data warehouse when they make a plan to design the desired data warehouse for CWC Pune, the figure 6.3 below show to dimension of size.
The Figure 6.3 above shows basic requirement of data for the CWC Pune. When you select the database with proper size then the software can work properly. If you select the big size of data then extracting of data create the problem for the end user as well as programmer. When select the small size of data then it waste the memory space of the system. So before development of data warehouse for the organization we can think about the size of data or records. It could not a big size as well as less size because both have some disadvantage for the organization. You can select appropriate size of data or records for the data warehouse software. The appropriate size play the main function to fit data into data warehouse and it also built according to environment, they can same the time of processing and accessing of data into the data warehouse.

6.4.2.5 The First Iteration - How Much Data to Load

When you design and develop the data warehouse the first point will come that how much data is going to load in the data warehouse and also what type of data can be loaded in the software. The first time we are not going to load huge data into the data warehouse. There are some rules for loading of data into data warehouse at first time:
“The first iteration should contain data that is large enough to be meaningful and small enough to be quickly doable.”

The designer can use more than one method to specify the size of data to lose the data or information. Figure 6.4 shows the different way for the same.

**Figure 6.4 How Much of the Data Warehouse is to be Loaded**

The developer of data warehouse uses different techniques to subset data. They can specify the size of subset for the first user for the first iteration of data warehouse. The database administrator can solve some problems such as specify the first user of first iteration and meaningful information for the end users.

### 6.4.2.6 Dimension Table

Oracle 9i is a tool to reflect the completer architecture of multidimensional database management system and also give all the operation into multidimensional way. The Oracle itself multidimensional database management software which supports all features of language especially SQL and PL/SQL, and Report Writer to use for different queries, to do some programming job and also produce different level of reports of the organization. It supports all features of multidimensional technique. Through DDL we can capture all data into relational database management system.

The end user can use abstract for corporate model of data warehouse and produce the results.
The top level management wants data in their terms and they are quite happy to constrain their model to a very specific set of things. For example:

- They want all information according to a month or some time more than one month.
- The top level management information about geography way such as state level so they can make the plan for country level.
- They also want the data or information of employee according the designation, department and company wise.

According the top level management requirement the developer can design the data mart for the data warehouse. They can identify the entity of source and create the data marts. For example Sales has some attribute which is use full for the Central Warehouse Corporation (CWC) Pune, such as:

The attributes of sales are:

- Month
- State and country
- Division and company
- Type of Goods

The Figure 6.5 below shows the model of our data mart for the CWC Pune, In this model which is based on assertion. This model is differing from conceptual model and their different entities. The data warehouse shows the all attributes of original sales and it is show in some process such as person, employment etc. The developer can use foreign keys into table on different fields such as month, department or position. It also displays the some parent company of data warehouse and different attributes of DW.
Dimension tables consist different attributes which is used to provide all fact records of fact table. Few attributes gives details information in descriptive and other attributes gives selected information from the fact table which is used by top level manager as well as EDP manager. We can display all attributes of dimension table with summarize. For example, as a CWC Pune point of view all departments of organization make correlation with other in dimension way such as export, import, packaging etc, each department can also subdivided into time variant and service of the organization.
The end user can use columns of dimension table to categorize all information in hierarchical way. For example, the CUST_DETAILS table stores all information in dimension table and also show hierarchy level.

Table 6.1: Example of CWC Pune Dimension Table

<table>
<thead>
<tr>
<th>Column / Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container_No</td>
<td>Specifies the desired container no which is used for transfer / dispatch good/products from one place to another place.</td>
</tr>
<tr>
<td>Dispatch_port</td>
<td>Specifies the port name from where the CWC Pune can send the product/goods to the country or region in which the receiver is located. This is the country level of the hierarchy.</td>
</tr>
<tr>
<td>Exporter_Name</td>
<td>This show the details information about exporter which is bottom level of hierarchy in dimension table and also join with other table.</td>
</tr>
</tbody>
</table>

6.4.2.6.1 Creating Warehousing Table

After define the different attributes of the table you can create the CUST_DETAIL and EXPORT_DETAIL table in oracle 9i with the following structure, such as:

```
CREATE TABLE CUST_DETAIL(SR_NO NUMBER(8), TRACK_NO NUMBER(9), SHIP_BILL_NO NUMBER(9) PRIMARY KEY, D_O_D DATE, CONTAINER_NO NUMBER(9), CONT_TYPE CHAR(7), QTY NUMBER(9), GROSS_WEIGHT NUMBER(9), FOB_VALUE NUMBER(9), CUST_SEAT_NO NUMBER(9), SHIP_LINE_NO NUMBER(9), DESP_PORT CHAR(25), EXPORT_NAME CHAR(25), CHA CHAR(35));
```

Figure 6.6 Structure of CUST_DETAIL Table
Figure 6.7 Structure of EXPORT_DETAIL Table

```sql
CREATE TABLE EXPORT_DETAIL(SR_NO NUMBER(7), CONTAIN_NO NUMBER(9), LR_NO NUMBER(9), GATE_PASS_NO NUMBER(9), FROM_DATE DATE, TO_DATE DATE, GATE_OUT_DATE DATE, DESCRIP CHAR(35), PACKAGE_NO NUMBER(9) PRIMARY KEY, QTY NUMBER(9), WEIGHT NUMBER(9), VALUE NUMBER(9), OCTRY_NO NUMBER(9), ESCORT_NO NUMBER(9), ESCORT_TYPE CHAR(35), CUST_SEAL_NO NUMBER(9), LINE_SEAT_NO NUMBER(9));
```

6.4.2.6.2 Insert Value in Warehouse Table

After creating the warehousing table you can insert the desired value (Row) into the CUST_DETAIL and EXPORT_DETAIL table such as:

**INSERT INTO CUST_DETAIL VALUES** (1, 2083363, 196473, '12-AUG-11', 324535, 'HIGH', 350, 760, 765, 57484, 5364, 'JNP T MUMBAI', 'B GULRAJANI AND CO', 'BIPIN KULKARNI');

**INSERT INTO CUST_DETAIL VALUES** (2, 2083364, 196474, '17-AUG-11', 635378, 'CUBE', 789, 876, 578, 5487, 5427, 'NAVI MUMBAI', 'B M T JUTE EXPORT LTD', 'NAGESH');

**INSERT INTO CUST_DETAIL VALUES** (3, 210546, 54875, '18-AUG-11', 568574, 'HIGH', 352, 547, 542, 6857, 1547, 'JN PT MUMBAI', 'CADILA PHARMACEUTICALS', 'IYAR');

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INSERT INTO EXPORT_DETAIL VALUES (1, 324533, 196474, 54784, '02-11-12', '02-11-12', '02-11-12', 'BONDING GOODS', 57847, 547, 265, 784, 658, 2568, 'REGULAR', 646376, 63523);

INSERT INTO EXPORT_DETAIL VALUES (1, 23598, 48754, 6373, '05-11-12', '05-11-12', '05-11-12', 'ELECTRICAL GOODS', 57454, 878, 985, 235, 564, 7854, 'REGULAR', 74543, 8574);

In Oracle 9i used different tables as well as partition with PARALLEL attributes for the data dictionary. They provide parallelism with INSERT, UPDATE as well as DELETE command. There are two types of PARALLEL attributes such as explicit and implicit attributes, the explicit PARALLEL attributes used override all statement on the desired table with data dictionary.

6.4.2.6.3 Parallelizing INSERT ... SELECT Statement

The INSERT command can be used with SELECT command to specify PARALLEL attributes and with SELECT command the end user can add records into the table. The PARALLEL command can be used before the INSERT command and also before SELECT command to implement all operation on the desired table and partitions of table. End user can also used INSERT and SELECT command independently for parallelism for each other into the database.

Example:

INSERT /*+ PARALLEL(CHA_Name)
SELECT /*+ PARALLEL(Export_Name)
FROM Cust_detail;

6.4.2.6.4 Parallelizing UPDATE and DELETE Statement

The end user can use PARALLEL attributes for scan operation but they can use UPDATE and DELETE command for that. They can implement UPDATE and DELETE with PARALLEL attributes for define the dimension table for the organization and modify the tables.
The end user can implement explicitly parallel DML command for all transaction with the help of UPDATE and DELETE command and also implement all query operation on the paralleled database. They can also create separate PARALLEL attributes on any sub queries DML commands without any affect on parallelize of UPDATE and DELETE command.

**Example 1:**

```
UPDATE /*+ PARALLEL (escort_type)
SET value = value * 1.1
WHERE escort_type = 'Regular' AND DEPT_name IN
(SELECT DEPT_name FROM cust_Detail WHERE depart_name = 'EDP');
```

**Example 2:**

```
DELETE /*+ PARALLEL(value)
WHERE qty < 500;
```

The following statement is a straightforward SQL implementation of the update using sub queries:

```
UPDATE export_Detail
SET(export_name, export_Add) = (SELECT Cust_name, cust_add FROM
Cust_detail WHERE export_detail.cust_name =
cust_Detail.cust_name)
WHERE city IN(SELECT city FROM temp_cust_detail);
```

Now you can run the different OLAP query. With the multidimensional and cube loaded and the data aggregated such as:

```
SELECT c.track_no, ship_bill_no, d_o_d, gross_weight, desp_port, expo_name, cha,
e.cont_no, lr_no, from_date, to_date, descript, package_no, qty, octry_no,
SUM(c.qty) qty
```
FROM cust_detail c,

    Export_detail e,

WHERE c.qty = e.qty

AND c.d_o_d = e.d_o_d

GROUP BY c.d_o_d,

    e.shipp_bill_no,

ORDER BY c.cont_type,

    e.gate_out_date;

Cube provides the facilities for end user to group more than one column and also they can do the subtotals for their different attributes. The cube provides all subtotals and also provides mathematical calculation on the different fields on desired dimensions. The ROLLUP command can be user as substitute of cube (time, region, and department) and also provides additional combination of attributes.

SELECT ship_bill_no, D_O_D, Contain_no, Wty, FOB_Value Lr_no,

    Gate_pass_no, Date_from, date_to, country_id,

TO_CHAR(SUM(amount_sold), '9,999,999,999') SALES$ FROM
cust_detail, export_detail

WHERE export_detail.from_date=cust_detail.D_O_D AND

    Export_details.cust_id=cust_detail.cust_id AND

    Export_detail.excort_type= cust_detail.cont_type AND

    Export_detail.desp_post IN ('Navi Mumbai', 'JNPT') AND

    Export_detail.from_date IN ('2011-12', '2012-13')

    AND country_id IN ('USA', 'UK')

GROUP BY CUBE (CHA_Name, Export_name, todate, country_id);
Example 3 Partial CUBE

Using the Export_Detail database, we can issue the following statement:

```
SELECT export_name, Lr_no, from_date, to_date, Descrip, CHA_name,
     Cont_type, Qty, Groww_weight, country_id,
     TO_CHAR(SUM(amount_sold), '9,999,999,999') SALES$
FROM export_detail, cust_detail
WHERE export_detail.to_date=cust_detail.d_o_d AND
     Export_detail.cust_id=cust_detail.cust_id AND
     Export_detail.channel_id= cust_detail.CHA_Name AND
     Cust_detail.desp_port IN ('Export', 'Import') AND
     Export_detail.from_date IN ('2011-11', '2012-13')
     AND country_id IN ('India', 'Japan')
GROUP BY cust_detail, CUBE(from_date, country_id);
```

6.4.2.6.5 Controlling Query Rewrite

In Oracle 9i the end user can use ENABLE QUERY REWRITE command for materialized view to rewrite query on the database. They can also use for creating and subsequently operation with help of ALTER MATERILIZED VIEW command.

The end user can able to pass initialization arguments with the help of ALTER SYSTEM SET command. They can also disable or enable rewrite query for other user session with help of ALTER SESSION command.

For example:

```
ALTER SESSION SET QUERY_REWRITE_ENABLED = TRUE;
```

The DBA can rewrite query session for different user with different integrity levels of different users, such as:

```
ALTER SESSION SET QUERY_REWRITE_INTEGRITY = stale_tolerated;
ALTER SESSION SET QUERY_REWRITE_INTEGRITY = trusted;
ALTER SESSION SET QUERY_REWRITE_INTEGRITY = enforced;
```
To prevent a rewrite, you can use the following statement:

```
SELECT /*+ NOREWRITE */ c.fob_value, SUM (e.value)
FROM   export_detail e, cust_detail c
WHERE  e.export_name=c.cust_name
GROUP BY e.export_name;
```

### 6.4.2.6.6 Common Joins

In oracle 9i if you want to implement the joins feature then the common join pairs between the two must be of the same type. For example, the DBA or EDP manager of Central Warehouse Corporation (CWC) Pune can use materialized view as a outer join on Cust_detail and Export_Detail and also they can use query contains as a outer join Cust_detail and Export_Detail to produce the result of inner join and sort the data as per their query if a materialized view contains an outer join of table Cust_detail with table Export_Detail, and a query contains an inner join of table Cust_detail with table Export_Detail, the result of the inner join can be produced of sort for all level of the organization.

**For example:**

```
SELECT c.fob_value, e.from_date,
SUM (amount_sold)
FROM   export_detail e, cust_detail c
WHERE  e.from_date =c.d_o_d
AND    e.prod_id = c.prod_id
AND    e.to_date BETWEEN TO_DATE('01-JUN-2011', 'DD-MON-YYYY') AND     TO_DATE('10-AUG-1999', 'DD-MON-YY YYYY')
GROUP BY export_name, CHA_name;
```

They match exactly and the query can be rewritten as follows:

```
SELECT export_name, CHA_name,
SUM(amount_sold)
FROM   export_detail, cust_detail
```
WHERE to_Date BETWEEN TO_DATE('01-JUN-2011','DD-MON-YYYY') AND TO_DATE('31-MAR-2013','DD-MON-YYYY')
GROUP BY export name, CHA_Name;

6.4.2.6.6.1 The Invisible Join

When we implement different queries on data warehouses, particularly on different model of data warehouses with help of star schema, we often have the different structure: Restrict the set of column in the master table using selection redicates on one or many dimension tables. Then, we can perform some aggregation query on the restricted master table, often grouping by other dimension table attributes.

Thus, joins between the master table and different dimension tables required to be performed for each selection predicate and for each aggregate grouping. Here we are giving one example with the help of Star Schema Benchmark.

SELECT export_details, customer_details, report1_file, sum(qty) as revenue
FROM customer_details, export_details, report_file1
WHERE contain_no = e_container_no
    AND e_qty = c_qty
    AND e_orderdate = c_datekey
    AND e_region = 'ASIA'
    AND s_region = 'ASIA'
    AND d_year >= 2012 and d_year <= 2013
GROUP BY e_nation, c_nation, e_year
ORDER BY e_year asc, qty desc;

The above query extract the information or data from customers_details file who live in Asia and who purchase a product supplied by an Asian supplier between the years 2012 and 2013 grouped by each unique combination of the nation of the customer, the nation of the supplier, and the year of the transaction.

The basic plan for executing this query is to implement joins ins such as order of predicate selectively. For example, if c_region = 'ASIA' is the most selective
predicate, the join on container no between the line order and customer_details tables is performed first, after filtering the customer_details table so that only orders from customers who live in Asia remain. In this join the nation of these customer as joined from customer_details table. And result put into the pipeline of join with help of export_details table where e_reging = 'ASIA' predicated and c_nation column extracted, with the export_details tale and the year is predicated form the master table. We always used grouped and aggregated and the result also sorted according to our ORDER BY clause so report will be generated properly.

Other way is to late materialized different join method with the help of different key or attributes. In this way a predicate is applied on e_region attributes such as e_region = 'ASIA', and the customer key of the customer_details table is extracted as per the requirement of data or information from the same table. These attributes can be joined with the qty column from the master table and from the customer_details table of matching column. The report form the country column at the query are extracted with the value from the other information from the master table’s column such as qty, container_no, d_o_d etc. We can also implement similar joins on the export_details and customer_details tables.

When we implement this type of joins then have some disadvantages. In the traditional case the different column of export_details table are before join precludes all the late materialization which is usedful for the end user. Second values form the different dimension table always group by columns required for extracted in out of position order and it increase the cost of the organization.

In this section we introduce the alternative methods such as called invisible join which is always used column-oriented database with the help of foreign-key and primary key attributes with the help of star schema methods on the master tables. It support late materialized join but also minimizes the values which is extracted from the master table and remove the disadvantages which is in traditional join methods. We rewrite joins into the predicates on the different key attributes such as foreign key or primary key on the master table.
This predicates always extract the value by using hash lookup or by using other advance methods.

By rewriting the different join as selection predicates on master table with the different columns we can extract the information according to requirement at the same time from the master table and also predicate different application algorithms which are useful for extract the data. For example, each predicate can be implemented to merge all columns using fast bit map operation in parallel applied in parallel and the results merged together using fast bit-map operations. Other way the extracted information of a predicate application can be put into pipeline into the other module of the system and reduce the times into second which is implemented in different algorithms When we implement all predicated then we can extract appropriate columns with the different relevant dimensions on the master table.

When we have implement different predicates before extracting the data or information the out of order extractions is automatically minimized. The invisible joins always used with star schema joins methods and provide the different advantages of the column oriented reports for the different level of the organization and also used hash-lookups method.

### 6.4.2.6.7 Materialized View Delta Joins

In oracle 9i the end user can be use delta join on materialized view instead of query. The delta joins provide the facility for materialized view without loss of result in common joins operation. They can use lossless join operation which provides without restriction of access any data. Before implement of lossless join the end user can use FOREIGN KEY, PRIMARY KEY and NOT NULL constraints of desired fields.

```sql
SELECT e. from_date,
       SUM (e.amount_sold)
FROM export_detail e, cust_detail c
```
WHERE  e.from_date = c.d_o_d
    AND  e.from_date BETWEEN TO_DATE('01-JUN-2011', 'DD-MON-YYYY') AND TO_DATE('31-MAR-2013', 'DD-MON-YYYY')
GROUP BY from_date;

Example: Loading Partitions in Parallel

For this approach, all partitions must be in the same table space in the system. You need to have the same number of input files as data files in the table space, but you do not need to partition the input the same way in which the table is partitioned.

For example:

SQLLDR DATA=file1.dat DIRECT=TRUE PARALLEL=TRUE
FILE=/dev/D1. . .

SQLLDR DATA=file30.dat DIRECT=TRUE PARALLEL=TRUE
FILE=/dev/D30

Example: Loading External Data

Once the external table is created, data can be converted, moved and loaded into the database using either a PARALLEL CREATE TABLE AS SELECT or a PARALLEL INSERT statement.

For Example:

CREATE TABLE products_ext (prod_id NUMBER, prod_name
    VARCHAR2(50), price NUMBER(6.2), discount NUMBER(6.2))
ORGANIZATION EXTERNAL
DEFAULT DIRECTORY (stage_dir)
ACCESS PARAMETERS
(RECORDS FIXED 30
BADFILE 'bad/bad_products_ext'
LOGFILE 'log/log_products_ext'
(prod_id POSITION (1:8) CHAR, prod_name POSITION (*,+50) CHAR,
You can use cubes in Oracle OLAP 9i as a summary report management solution. Oracle OLAP can perform many calculations that can be difficult to express in MS_EXCEL and it is time-consuming to perform with the standard relational engine.

The numerical fields such as qty, weight etc are good examples of calculations that perform better with Oracle OLAP. Once defined in the analytic workspace as calculated measures, these measures are exposed as extra columns in a view that is automatically created for a cube. You can then query these measures just as you would query any base measure from the cube view.

The paragraph no 5.5.1 “Actual Database of CWC Pune” and Table no 5.12 “Sorted Report as Qty > 500 on April 2013 database of CWC Pune” show the details information from the EXPORT_DETAIL table with the help of sort and filter methods from MS-EXCEL. Same reports can be generated from Oracle OLAP with the help of DDL command, such as:

```
SELECT contain_no, lr_no, from_date, to_date, export_name, qty, weight, value, octory_no, cust_seal_no FROM export_details WHERE qty>500;
```

When working with cube views, bear in mind that the view contains pre-aggregated data at multiple levels. As a result, you do not need to include any aggregation functions such as SUM, and you generally do not need GROUP BY clauses. But you must also specify the level of data you want to select via the appropriate WHERE clause.
6.4.2.7 Implementing a Data Warehouse with Oracle

After creating the data warehouse table and inserting or uploading the data into the table the EDP manager have to decide about types of object which is used in data warehouse and they can design and create it. The EDP manager can design or create with help of Oracle Warehouse Builder application software which is providing by the Oracle database. For this purpose there are following preliminary operation is require for them.

First they unlock database schemas by help of Oracle Warehouse Builder application, the Oracle provide OWBSYS and OWBSYS_AUDIT statement for this purpose for the EDP manager. This statement resides in OWB metadata at runtime or design time for them.

This can be done with the following commands, connecting to SQL*Plus as SYS or SYSDBA:

```
ALTER USER OWBSYS IDENTIFIED BY cwcsyspwd ACCOUNT UNLOCK;

ALTER USER OWBSYS_AUDIT IDENTIFIED BY cwcsys_auditpwd ACCOUNT UNLOCK;
```

Finally the EDP manager should create workspace with help of Warehouse Builder which provide the space to store many data warehouse project and their objects in it. For any complex requirement the EDP manager can also create more than one workspaces for the organization. The EDP manager user warehouse builder design center for creating graphical user interface of oracle warehouse builder and specify the name of host for them.

6.4.2.8 Importing External Tables/Data into Oracle

If you want to import external data or tables from other database management system or other application program such as MS-EXCEL, dBASE etc then in oracle you can import it.
Oracle support different data loading technique for the EDP manager, such as:

- SQL*Loader application.
- Import and Export operation.
- Data collection and finding technique.
- Gateways of open systems and mainframes environment.
- Different Connectivity methods such as ODBC and JDBC.

Which format or application should you take? Obviously it is completely depend on the source and format of the data you receive. If you have large volumes of data then you can used flat files format.

If you are loading data/information from other application program or other database management system into Oracle you have two options, SQL*Loader or external tables.

I am strongly recommends that you can load data or information using external tables rather than SQL*Loader. Because there are following characteristics of external table:

- The external tables which provide the facility to parallelize all data into inside of the database. The EDP manager can use SQL and PL/SQL command for accessing data from the external database.
- The EDP manager can also use SQL *Loader for paralyze load for space management on external database.

After creating external table using the CREATE TABLE command then the most common approach when loading data from an external table is to do a CREATE TABLE AS SELECT (STATEMENTS) statement or an INSERT AS SELECT (STATEMENTS) statement into an existing table. For example the simple SQL statement below will insert all of the rows in an EXPORT_DETAILS into partition p2 of the CUSTDETAILS.
6.4.2.9 Directly Loading Data into Oracle

The improvement of accessing and extracting data into the oracle to use direct path loads wherever possible in the SQL statements. The EDP manager can use direct path pares for accessing external table for input data into corresponding column. They provide to access all filed one by one and according to location of fields of other table. The EDP manager can also create column array structure for database and also data structure to directly write data into the desired database with help of SQL processing engine and buffer cache.

The CREATE TABLE AS SELECT will always use direct path load but INSERT AS SELECT statement will not. In order to achieve direct path load with an INSERT AS SELECT statement you must add the APPEND hint to the command.

Example:

SQL> INSERT /*+ APPEND*/ INTO EXPORTDETAILS PARTITION(P2) SELECT * FROM CUSTDETAIL;

6.4.2.10 Information Delivery System

The information delivery systems is basically used for reports creation with help of structured queries format from OLAP tools and also used to develop data warehouse for the end user. The reports which is create by queries predefined time such as daily, weekly as well as monthly and are required for decision making process for the organization.

The organization require reports that are traditionally needed daily basis such as daily export and import of container, client wise details for export and import etc. Monthly wise report required by department or executive of the organization for the decision making process. These report range from the total number of container sent and receive by the particular client and total amount of container receive and sent to the particular port.
Information or row data is critical to success of a CWC Pune function. In the emergency period the data warehouse play the vital role in development of the organization especially in decision making process. The report could be generated to establish the proper information about the organization such as supplier details, customer details, port details, current location of containers etc for the CWC Pune. The number of reports or queries requested by a different department of CWC Pune is unlimited; however, each requires a significant amount of resources.

6.4.2.11 Data Administration and Maintenance

For the organization point of view data administration and maintenance are main important part when we are creating the data warehouse environment. Data administrators always manage the quality of information or data and their main responsibilities are identifying, administering, and establishing data management standards, policies and procedures for the organization, and coordinating the requirement and approval of data models by the executive of the organization they develop the model.

When the administrator wants to create the data warehouse they face two critical challenges in the organization such as preparation for potentially disastrous events that may affect the database system for the organization and anticipate and adequately prepare for requests from the different department of the organization that require changes in either the database system existing model or the database system procedures in the new developed model.

Database administrators try to establish guidelines for different department of the organization and according to requirement of different department they can manage data resources for them. The database administrator always reviews data models which is developed according to requirement of the organization and fulfill the basic requirement such as data management standards, policies and procedures. Unlike operational database the responsibility of administration of a data warehouse has more complex for specific department of organization.
The data warehouse administrator take the responsibility about design, development, structure as well as documentation of the database but they also have to ensure that data retrieved from other information systems remain in the same format to support data transfer and extraction processes.

For example, suppose the database administrator of the marketing department change the field type size of filed then if this data field is used in the data warehouse to determine the average length of stay in particular area for marketing then this filed and information must be updated in the data warehouse database schema. The data warehouse database administrator always remember about the environment of the organization and surrounding different resource of data and information, again maintenance of data warehouse is always done according to the requirement of the database and organization.

6.5 Conclusion

The results of the study based on opinions from the CWC Pune professionals of different department listed here are applicable to CWC Pune profession in general. Most of the CWC Pune professionals have an optimistic approach towards the implement Oracle and new module/system as well as application of IT based services in different departments. The professionals do not seem content with the opportunities in their work environment as suggested by the study. It may be mainly because of lack of adequate IT infrastructure in some department of CWC Pune.

Majority of the CWC Pune professionals irrespective of their experience or qualifications have suggested the need for more IT knowledge for all staff of different department. To develop competitive personnel in a technologically advanced world, the EDP department must provide opportunities to develop skills in oracle data warehouse builder and IT applications.

The proposed models developed using the oracle 9i and different finding into the research and can be able to implement into other country of Asia. These models
were successful in bringing out several applications and solved the different query of different level of the employee of CWC Pune and it can be relevant to both practitioner and other area. The study shows that with appropriate measures taken by warehouse in Pune, technology-enabled warehousing and the potential to revolutionize the way warehousing company in all over India.

6.6 Recommendations for Future Research

Evaluation of oracle 9i and its tools as well as IT based applications, services in CWC Pune can be studied from a particular user’s point of view, and it would be helpful to improve the services in all Central Warehousing Corporation in India. A networking model of marketing department of CWC Pune which is used to improve the services in marketing department can be a subject for research.

Impact of Information technology on Lower level staff in CWC Pune and all over India can be taken as a topic of study to evaluate the changes in human behavior of warehouse organization. The models developed in the study could be utilized to capture insights into the adoption of technology solutions in other sectors such as retailing, insurance services, and tourism and so on.