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A STUDY ON IMPROVING SUPPLY CHAIN USING BUSINESS INTELLIGENCE CONCERNING DHARA LOGISTICS

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Business intelligence (BI) is software that ingests business data and presents it in user-friendly views such as reports, dashboards, charts and graphs. BI tools enable business users to access different types of data — historical and current, third-party and in-house, as well as semi-structured data and unstructured data like social media. Users can analyze this information to gain insights into how the business is performing. According to CIO magazine: "Although business intelligence does not tell business users what to do or what will happen if they take a certain course, neither is BI only about generating reports. Rather, BI offers a way for people to examine data to understand trends and derive insights." Organizations can use the insights gained from business intelligence and data analysis to improve business decisions, identify problems or issues, spot market trends, and find new revenue or business opportunities.

BI platforms traditionally rely on data warehouses for their baseline information. A data warehouse aggregates data from multiple data sources into one central system to support business analytics and reporting. Business intelligence software queries the warehouse and presents the results to the user in the form of reports, charts and maps. Data warehouses can include an online analytical processing (OLAP) engine to support multidimensional queries. "OLAP provides powerful technology for data discovery, facilitating business intelligence, complex analytic calculations and predictive analytics," says IBM offering manager Doug Dailey in his data warehousing blog. "One of the main benefits of OLAP is the consistency of information and calculations it uses to drive data to improve product quality, customer interactions and process improvements." Some newer business intelligence solutions can extract and ingest raw data directly using technology such as Hadoop, but data warehouses are still the data source of choice in many cases.

Business Intelligence (BI) and the many analytics systems that support demand management, predictive analytics, revenue modelling and role-based intelligence within organizations are critical for any organization to survive in today's incredibly turbulent marketplace. The additional factor of the Internet in general and digital marketing specifically is the ability to capture behaviour and choices on the Web, as every Web-based application generates user data electronically. This alone has been responsible for an exceptional level of growth in BI adoption within marketing, sales, and service organizations globally. It is also redefining the functionally components of analytics, reporting and enterprise-wide use

of data intelligence and insight used for streamlining decision-making processes. The two areas of new product introduction and manufacturing, the latter is where BI's potential to create significant measurable value for organizations is being measured today. Adopting BI systems into role-based manufacturing systems is delivering quantifiable performance and higher Return on Investment (ROI) due to data-hungry processes being automated through the use of these techniques and technologies.

History of business intelligence

The term business intelligence was first used in 1865 by author Richard Millar Devens, when he cited a banker who collected intelligence on the market ahead of his competitors. In 1958, an IBM computer scientist named Hans Peter Luhn explored the potential of using technology to gather business intelligence. His research helped establish methods for creating some of IBM's early analytics platforms. In the 1960s and 70s, the first data management systems and decision support systems (DSS) were developed to store and organize growing volumes of data. "Many historians suggest the modern version of business intelligence evolved from the DSS database," says the IT education site Dataversity. "An assortment of tools was developed during this time, with the goal of accessing and organizing data in simpler ways. OLAP, executive information systems and data warehouses were some of the tools developed to work with DSS.

By the 1990s, business intelligence grew increasingly popular, but the technology was still complex. It usually required IT support — which often led to backlogs and delayed reports. Even without IT, business intelligence analysts and users needed extensive training to be able to successfully query and analyze their data. More recent development has focused on self-service BI applications, allowing non-expert users to benefit from their own reporting and analysis. Modern cloud-based platforms have also extended the reach of BI across geographies. Many solutions now handle big data and include real-time processing, enabling decision-making processes based on up-to-date information.

OBJECTIVES OF THE STUDY

PRIMARY OBJECTIVE

To study on improving supply chain effectively using business intelligence

SECONDARY OBJECTIVES

- To understand the various BI techniques used by the organization
- To analyse the impact of BI on each stage of the supply chain process (source, plan, make and deliver)
- To analyse how the use of decision-making analytical tool influences the supply chain capabilities

- To analyse and suggest the organization on how they can apply these tools to improve supply chain performance in order to reduce cost and increase profitability in today's dynamic market.

SCOPE OF THE STUDY

- This research was conducted to study how business intelligence (BI) techniques influence and improve supply chain performance.
- It was limited to companies in industries that commonly have four horizontal layers including manufacturer, supplier, wholesaler, and retailer. Companies with global supply chain and large amounts of capital were studied to evaluate the complexity and comprehensiveness of the global supply chain system.
- Companies were considered to be within scope if they used BI techniques to make decisions on their operational and supply chain related tasks by analyzing visualized real time data especially through key performance indicators (KPI) instead of analyzing traditional data such as annual or monthly reports for supply chain management.
- In this research, BI techniques within supply chain management were not limited, but focused on enterprise resource planning (ERP) system software and tools such as SAP, IBM and Dashboard. Other similar techniques that companies use to implement supply chain analytics were also considered as alternatives to represent BI techniques.

RESEARCH QUESTION

- How does the use of decision-making analytical tools during the supply chain processes influence supply chain capabilities?
- How should one apply these tools to improve supply chain performance of global companies in order to reduce cost and increase profitability in today's dynamic market?

LIMITATIONS

This study was constrained by the following limitations:

• The results of this study were limited by the responses of the survey and the permission of the companies.

• The study was limited by the cooperation and availability of the participants and their supervisors.

• The results of this study were limited by the use conditions of the business intelligence techniques.

REVIEW OF LITERATURE

Hwang et al. (2008) performed a questionnaire-based case study of an electronics manufacturing company in Taiwan by implementing regression analysis and analyzing key performance metrics at different levels of the SCOR model especially focusing on sourcing process. They also suggested following steps for the institutionalization of the SCOR model, such as establishing source planning project scope, using performance metrics to forecast and optimize supply chain to achieve best practices, and improving continuously by applying change management approaches. Although SCOR has been recognized as a benchmark for identifying, analyzing and examining supply chain performance, it still has some limitations: first, it's hard to trade off different performance measures and strategies for various users; second, the SCOR model does not identify cause-effect relationships among various key performance measures; and third, decision makers might not achieve performance goals due to the inefficiency of choosing or analyzing critical KPIs.

Sahay and Ranjan's (2008) paper on business intelligence in supply chain analytics, they mentioned it is critical to enhance the effectiveness and efficiency of supply chain analytics by using a BI approach in a company. In this way, the company could achieve a competitive advantage because such practices would support supplier management and reduce costs. Additionally, supply chain analytics could help generate other advantages including increased production efficiency, optimized logistics and a more balanced inventory level. They also found a lot of companies were planning to invest capital to establish their own business intelligence systems. However, the results of huge investments in enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM) are not always positive due to incomplete information and unsatisfactory forecasting. Thus, in order to survive in the dynamic global market and unpredictable market conditions, companies need to have accurate forecasting and timely information so they can collect and analyze real time data to make better and more correct decisions on their business activities.

Waller and Fawcett (2013) stated that big data predictive analytics involved in quantitative analysis, forecasting, optimization, expected values and uncertainty, patterns and relationships between a large amount of data and precise analyses based on hypothetical assumptions. In supply chain areas, predictive analysis by utilizing business intelligence techniques with big data could be applied to predict timely inventory quantity, mean time to product failure, new product failure rate, monthly customer demands and orders, stock on the road, relationships between different KPIs and supplier strategies. Supply chain management predictive analytics could use big data to conduct both quantitative and qualitative methods to improve supply chain

RESEARCH METHODOLOGY

INTRODUCTION

The methodology of study explains the systematic way of finding the answers to pre-determined questions. Moreover, this provides the clear path to accomplish and achieve the clear solution for the problem stated. The reliability strength and accuracy of the study mainly depend upon the methodology.

Methodology shall be considered as the methods used in this study in selecting samples, sample size, data collection and various tools for data analysis and interpretation. The present study is an empirical investigation and analytical in nature including field survey. The data collected has been analyzed and tabulated in suitable forms, keeping in view the objectives of the study.

RESEARCH DESIGN:

The research design is the basic framework or a plan for a study that guides the collection of data and analysis of data. In this survey and the design used is Descriptive Research Design. It includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of state of affairs, as it exists at present. The survey used members of the population as the main source of data which it used in determining the effect of the variables on the population. The descriptive survey is designed to obtain precise information concerning the status of phenomenon.

3.3 TARGET POPULATION

The unit of study is what is referred to as a population in the study; it refers to all the characteristics which will be used in making some inferences while a sample population refers to the carefully selected members of the target population who serve as a representative section of that population. The target population in this study consisted of all employees in Dhara Logistics.

Data Collection

A comprehensive questionnaire was prepared to meet out the needs of the objective. In order to Facilitate data collection; the researcher introduced himself to the Dhara Logisticswhere the purpose of the study was explained and also request for permission to carry out the study made. Questionnaires for respondents were self-administered which was, therefore, dropped and later picked.

SOURCES OF DATA

Data collection method is the backbone of the research design. The source of data utilized for analysis and report preparation is both primary and secondary.

Primary data

Primary data was collected through the interview and the questionnaires filled. The questionnaire was given only to the employees who were willing to share their views.

Secondary data: The main source of secondary data was internet.

SAMPLING TECHNIQUE:

The Convenience Sampling Method is used for the survey. Convenience or opportunistic sampling is the crudest type of non-random sampling. This involves selecting the most convenient group available. Due to the small number of the entire study population and its easy accessibility, the census method was employed. The census method is designed to collect information from every member of the population. It enables the researcher to gather sufficient information to assist in analysis and arriving at accurate results.

Sampling Unit:

The employees who are working in Dhara Logisticswere met and the survey was made based on their response.

Sampling Area:

The sampling area considered for the current research was Dhara Logisticsin Chennai.

Sample Size:

110 employees were surveyed during the study period.

Questionnaire Design

Questionnaires were used as the main instruments of data collection in the study. The questionnaire was close-ended. As multi- option are given to the employees for their convenience. 5-point rating scale is used in the study. The use of the close ended question was aimed at controlling responses that gave rise for quantitative analysis. There were two main sections of questions; General information and Job information.

STATISTICAL TOOLS:

Simple percentage analysis and tabulation is used to analysis the data. Pie chart and bar diagram is used to give pictorial representation to the analysis. The following test was used for the study. SPSS software was used to conduct these tests.

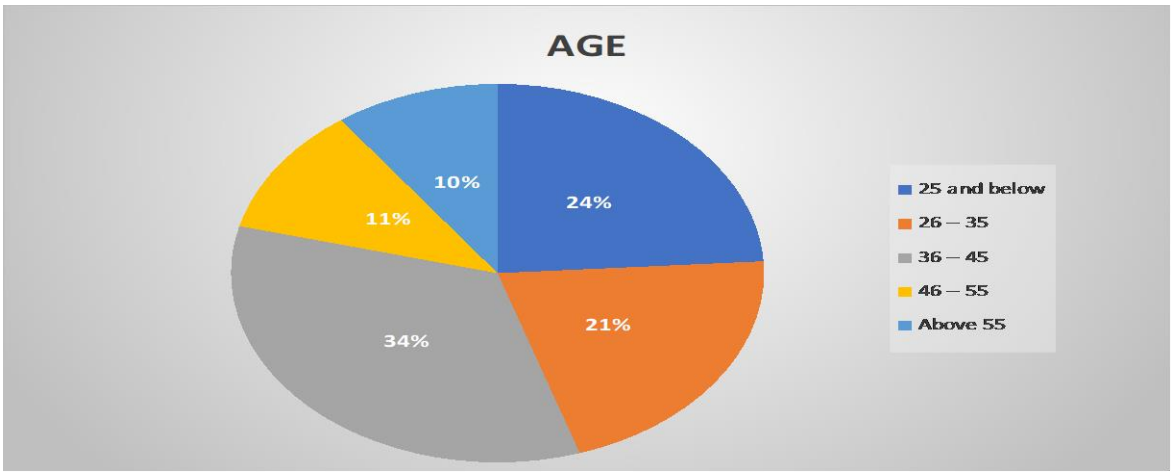
- Correlation
- Chi-square analysis
- One-way ANOVA

DATA ANALYSIS AND INTERPRETATION

- **SIMPLE PERCENTAGE**
- **Age of the respondents**

S. No.	Age Group	No. of Respondents	% Of Respondents
1	25 and below	26	24
2	26 – 35	23	21
3	36 – 45	38	34
4	46 – 55	12	11
5	Above 55	11	10
	Total	110	100

Chart 4.1: Age

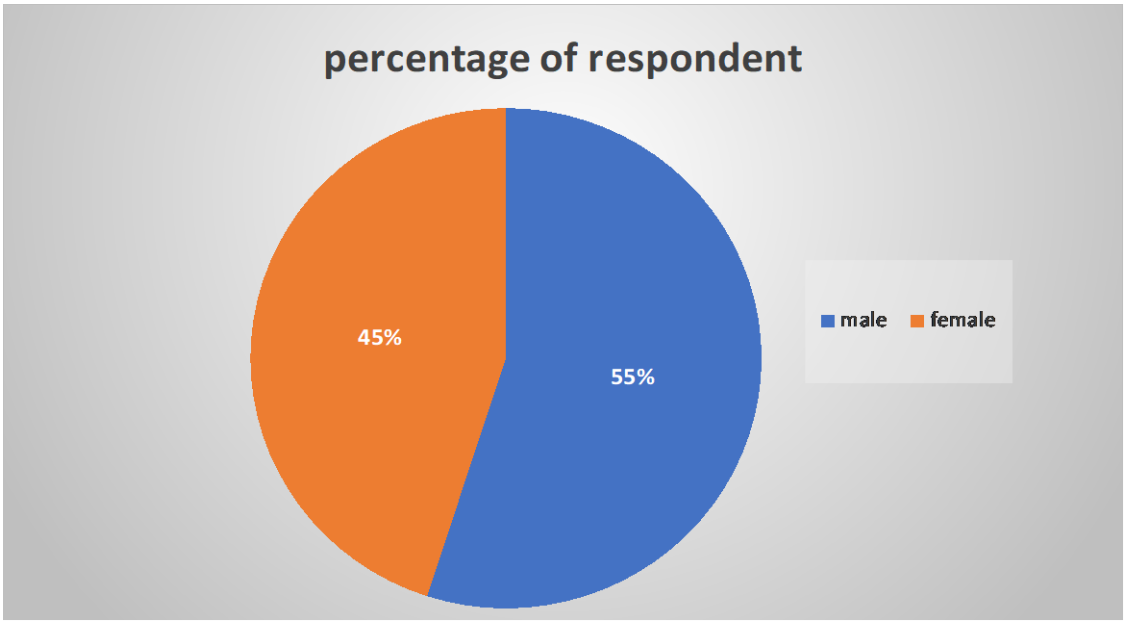


- **Interpretation**
- The above table shows the age group of the respondents. About 24 % of the respondents are below 25 years of age, about 21% of the respondent are between 26 to 35 years of age, 34% of the respondents are between 36 to 45 years of age, 11 % of the respondents are between 46 to 55 years of age and about 10% of the respondent are above 55 years of age.
- Thus, majority of the respondents are between 36 to 45 years of age.
- **Gender of the respondents**

Table 4.2: Gender

S. No.	Gender	No. of Respondents	% Of Respondents
1	Male	61	55
2	Female	49	45
	Total	110	100

Chart 4.2: Gender

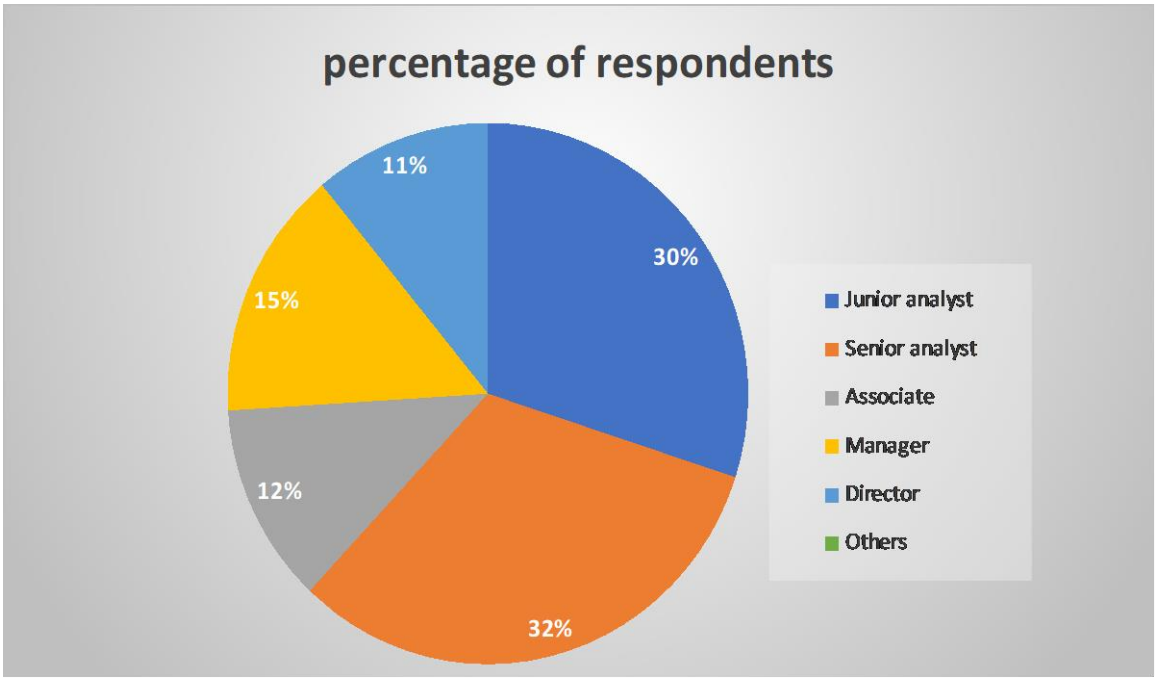


- **Interpretation**
- The above table shows the gender of the respondents. About 55% of the respondents are male and about 45% of the respondents are female.
- Thus, majority of the respondents are male.
- **4.3 Position of respondents in the organisation**

Your position in the organisation

S. No.	Your position in the organization	No. of Respondents	% Of Respondents
1	Junior analyst	33	30
2	Senior analyst	35	32
3	Associate	13	12
4	Manager	17	15
5	Director	12	11
6	Others	0	0
	Total	110	100

Your position in the organisation

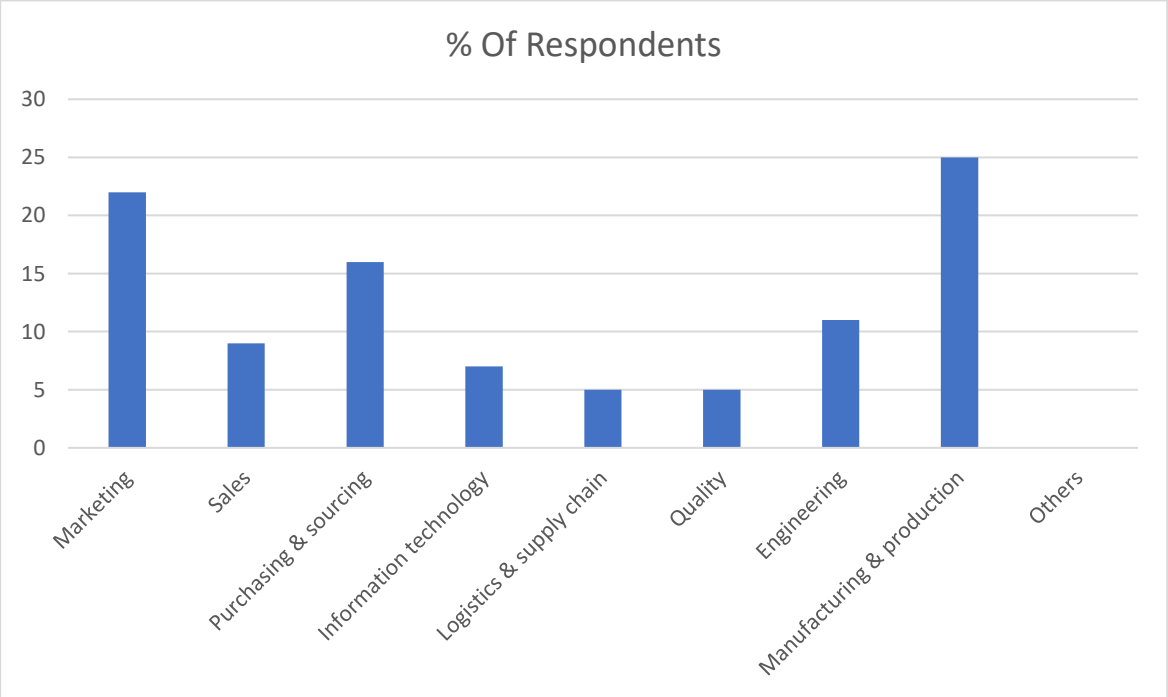


- **Interpretation**
- The above table shows the position details of the respondents in the organisation. About 30% of the respondent are junior analyst, about 32% of the respondents are senior analyst, about 12% of the respondent are associates,

about 15% of the respondents are managers, about 11% of the respondent are directors and about none of the respondents belongs to others category.

- Thus, majority of the respondents are senior analyst.
- **Department of the Respondents**

S. No.	Department	No. of Respondents	% Of Respondents
1	Marketing	24	22
2	Sales	10	9
3	Purchasing & sourcing	17	16
4	Information technology	8	7
5	Logistics & supply chain	6	5
6	Quality	6	5
7	Engineering	12	11
8	Manufacturing & production	27	25
9	Others	0	0
	Total	110	100



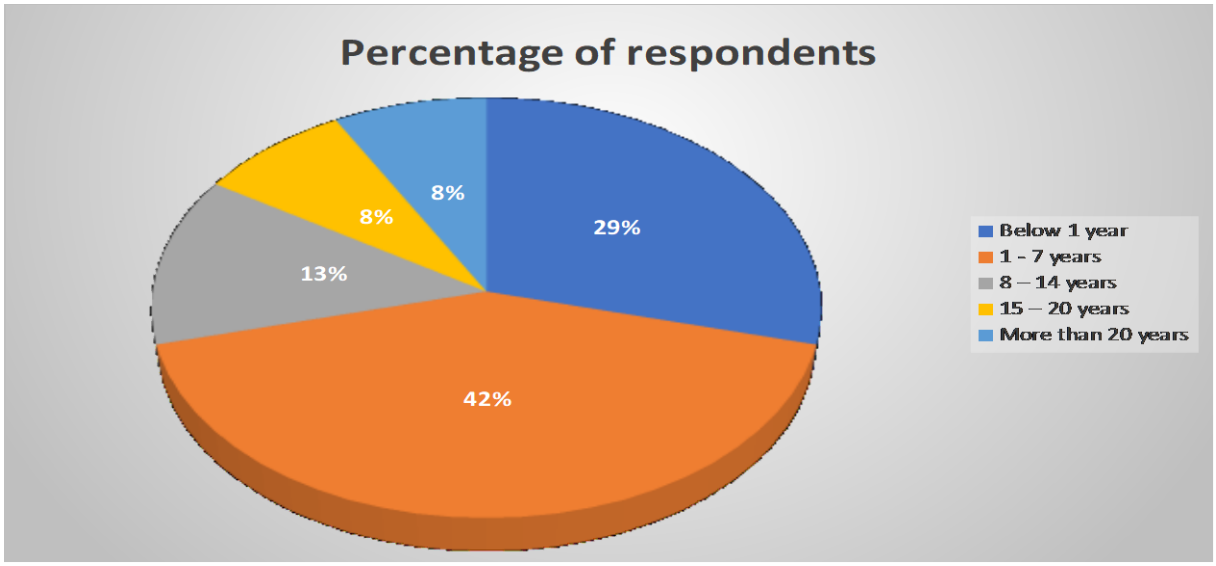
- **Interpretation**
- The above table shows which department each employee belong to in the organisation. About 22 % of the respondents belong to marketing department, about 9% of the respondents belong to sales department, about 16% of the respondents belong to purchasing & sourcing department, about 7% of the respondents belong to information technology department, about 5% of the respondents belong to logistics & supply chain department, about 5% of the respondents belong to quality department, about 11% of the respondents belong to engineering department, about 25% of the respondents belong to manufacturing & production department and none of the respondents belong to others category.
- Thus, majority of the respondents belong to manufacturing & production department.

Experience of the respondents

Experience

S. No.	Experience	No. of Respondents	% Of Respondents
1	Below 1 year	32	29
2	1 - 7 years	46	42
3	8 – 14 years	14	13
4	15 – 20 years	9	8
5	More than 20 years	9	8
	Total	110	100

- **Chart 4.5: Experience**



- **Interpretation**
- The above table shows the experience details of the respondents. About 29% of the respondents have an experience of below 1 year, about 42% of the respondents have an experience between 1 – 7 years, about 13% of the respondents have an experience between 8 – 14 years, about 8% of the respondents have an experience between 15 – 20 years and about 8% of the respondents have an experience above 20 years.
- Thus, majority of the respondents have an experience between 1 – 7 years.

SUGGESTIONS AND CONCLUSION

SUGGESTION

- The respondents feel that the BI techniques impacted only minor improvements in supply chain management. This show that the company should make an optimum use of the BI techniques through conducting proper training programme to its employees.
- Majority of the employees report that the suppliers inter-relationships are not documented. This may result in miscommunication and affect long-term relationship with suppliers. The company should maintain this document for maintaining cordial relationship with its suppliers
- The company should regularly review the plan's strategies on supply chain performance measures to improve its effectiveness and see to that it adheres to the plan's strategies
- The demand management process should make efficient use of customer's information to forecast the sales, to evaluate the customer and modelling. This helps the company in maximizing its profitability

- The company should regularly conduct inspection whether the process is adhere to plan in order to find out the deviations, from the plan, at an early stage. Early stage rectification can be made easily when compared to later stages.
- Too much constraints in planning methodologies may hinder effective performance. Therefore, the company can avoid certain constraints to improve efficiency.
- The company has to keep a track on the percentage of completed customers order delivered on time. This may help the company in analyzing its performance and it acts as future reference

CONCLUSION

BI helps key decision-makers monitor internal inefficiencies and gives them the metric-driven insight to take appropriate actions to overcome these inefficiencies. BI tools, such as scorecards and dashboards, provide detailed breakdowns of reports on your company's performance with many available metrics and KPIs. These help you monitor the progress of your company growth, like whether quarterly goals are achieved or not, as well as forecast future results based on your previous performance data. Since supply chain management involves many departments, there is a lack of visibility and lots of data spread across the departments. BI collects all of your company's data into a single platform. With the detailed and specific data from every step of production, you can go through the process from transporting raw materials to delivering your final products to customers and strategically enhance each part.

This research aims to study on improving supply chain effectively by using business intelligence in Dhara Logistics. It is a descriptive study. The survey was conducted using a structured questionnaire with a sample size of 110. The collected data was analysed using percentage analysis and various tests were conducted on the data using SPSS software.The results show that

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