

LCBB5014: Data Handling & Business Intelligence

Component 1: Coursework: Individual Report

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Executive Summary

A business can use advanced technology to make strategic decisions using business intelligence, data warehousing, and data mining. These technologies can easily provide a competitive advantage and help the organisation achieve its goals. Data warehousing is used to store data, and organisations use clustering methods to understand customer behaviour and association rule mining to make predictive predictions about any situation. Tools like SPSS can also be used to help with business intelligence through artificial intelligence. This report discusses these three types of technical intelligence, including the use of artificial intelligence dashboards, data security requirements, and GDPR and compliance requirements. This report highlights the need to create a good interface to make data accessible to general customers.

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Introduction

Various intelligences are used on online platforms to easily manage the activities of various types of medium-sized retail organisations in a technological way, among which business intelligence data warehousing is a significant technological support. With the help of which an organisation can easily manage challenging activities such as forecasting sales of their customer location, or properly managing customers and managing the inventory of the organisation. In this report, how an organisation can apply BL, DW and DM techniques to transform its objectives into reality will be discussed. The needs of a medium-sized retail organisation to get predictive forecasts or reporting dashboards will be considered. To prepare this report, first, business intelligence and its effective applications will be discussed, and later, the trends of data warehousing and data mining will also be highlighted. In addition, the ethical protection framework behind the proper management of an organisation and its needs will also be analysed.

Business Intelligence, Warehousing, and Data Mining Trends

Business intelligence is the process of converting raw, or incomplete, information of a business into meaningful decisions by applying various techniques and technologies. This business intelligence improves the performance of an organisation. In addition, the collection, preparation of reports, analysis of data, data visualisation, etc., are associated with this organisational efficiency (Shah, 2024). On the other hand, data warehousing is a method where data coming from different sources is collected together and managed for analysis, and the data is stored in a central repository, while mining is a statistical method where relationships and patterns are discovered in each data set using various types of machine learning. Nowadays, both business intelligence data mining and data warehousing play a related role in managing a business or analysing the market, and various organisations use them to transform their data-driven decisions. This BL provides immediate analysis and response to make a decision or access real-time data.

Organisations that run their cloud-based operations use this type of intelligence, especially organisations like Snowflake and Amazon use this type of data to store their online-based data and keep flexibility in processing it. On the other hand, BL tools can analyse various types of predictive information (Kumar, Mishra and Kumar, 2023). Kimble's data warehousing theory can be applied to make data properly searchable, analysable and accessible to the user. On the other hand, the CRISP-DM model offers a systematic method for data mining, which plays an important role in identifying the main objectives of a business, evaluating their various strategic modelling approaches, and maintaining the alignment of strategy with goals.

Data Warehousing of Enterprise Applications

A large part of the data is collected from different areas or operational systems and then managed by processing it. This data warehousing system is designed in such a way that it is processed correctly in an analytical way, and this activity is designed to support business decisions correctly. Data management in the warehouse is processed in a subject-based and variable way. To retrieve data from multiple transactions in an organisation, all the data providers stored by the user can be searched, which are stored in the data warehouse. This saves time and ensures the accuracy and confidentiality of the information. For example, in a retail organisation, various types of information and financial transactions are carried out, which can be stored in a single warehouse (Qureshi and Sharif, 2022). Through this, analysts can create reports of information without having to access all types of systems for any information. In addition, this platform has various data optimisation systems which can be retrieved by the manager within a few seconds if it comes to determining or measuring performance.

In this DW analysis, various historical data are analysed and strategic decisions are made, especially when developing a company's marketing strategy or managing inventory or making sales decisions (Shah Neha K, 2022). This data warehouse is used to understand customer behaviour, to know about the measurement of assets. One of the UK's retail companies, Tesco, uses such warehouses to determine all the strategies and analyse the types of their seasonal products, and also to identify bad products or poor performers or to determine the competitive price of the product. The issues involved in applying this DW in a company are:

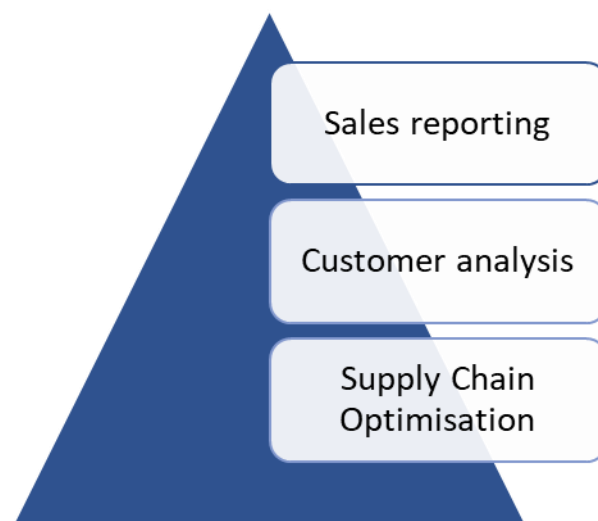


Figure 1: Key applications of Data Warehousing

Source: (Minelli and Chambers, 2021)

Sales reporting: If there are multiple branches of the company, DW is used to consolidate data, know about the performance of their products, determine prices and know about revenue trends.

Customer analysis: This DW is used to know the purchase history of the company's customers, their buying habits, their personal preferences, etc (Ramkumar, Hariharan and Selvamuthukumar, 2020). It is also used to know about the marketing and loyalty programs for their customers.

Supply Chain Optimisation: This DW plays an important role in getting accurate information and making decisions to analyse and predict future trends in the supply chain of the product-selling organisation, suppliers, inventory, logistics, etc.

DW plays an important role in transforming a simple raw data into a good asset for the organisation. It not only retrieves information but also strengthens analysis and decision-making.

Data Mining Techniques

Data mining is a process where a business decision can be made by exploring various types of large data sets. Of course, those data sets have a meaningful pattern and are related to each other (Mattison, 2017). In the management of a medium-sized retail company, this data mining plays an effective role where it helps in determining customer demand targets, managing the company's inventory and providing future forecasts that help improve the company's sales. Data mining techniques are

Clustering: This is a type of method where data objects are grouped based on their own characteristics. Retailers who are in the business of understanding the buying behaviour of their customers and segmenting products according to their preferences use clustering methods (Herschel, 2020). For example, customers who are wealthy or who buy products at high prices often receive premium products and services, and this clustering is used to separate them from their product services. Clustering uses Python or IBM SPSS models, where the data is optimised and divided based on similarities in features.

Association Rule Mining: This method is used to identify relationships or co-occurrences between data according to their types. For example, market basket analysis, where similar products within a company's product line are aligned according to their types. For example, coffee and sugar can be identified as two similar products in the same line. The tools that support this method are Weka or Google Data Analytics Extension and Microsoft Power BI.

Predictive Analysis

This is a statistical model where any historical data is analysed using various algorithms to predict what kind of results will come in the future. In this case, analytics tools are used. Especially for a medium-sized company, a trend can be predicted to provide future results of their revenue and product sales, where inventory can be optimised. Recommended predictive analysis tools:

IBM SPSS model: With the help of this model, advanced statistics can be obtained about all the data in an organisation (Rasmussen et al., 2019). In addition, a good prediction can be obtained for customer behaviour needs, etc., using machine learning. This model provides an advanced interface through which the use of all the programming activities of the organisation is reduced and costs are reduced.

With Excel add-in: This tool can analyse small-scale forecasts by using various types of data regression or trade line functions. It is less powerful than other tools, but its use is practical and takes up limited space in all cases.

Microsoft Power BI: Creates visualisation dashboards in the form of spreadsheets that automatically make predictions and quickly update real-time data to make decisions.

Comparison and Power

- These tools are integrated and offer good integration through a cloud database.
- Provides a rich interface with minimal coding services like SPSS that are accessible to any user (Kumari and Tripathy, 2019).
- A real-time dashboard is available through this tool that is automatically updated and easily monitored by the manager.

Policy and Data Security Considerations

Systems like BL, DW or DM play a very important role for an organisation as they protect the confidentiality and security of both the organisation and its customers' information in a very serious way. Also, complying with data security controls is very important in running an organisation, and these methods ensure that all the data of the organisation is stored through processing and complies with all legal frameworks (Bacardit and Llorà, 2019). It is necessary to obtain the consent of the customers to use the customer data for warehousing or business intelligence. In this case, it is important to maintain transparency in the use of customer data. And to obtain customer permission, the interface of the company's software or websites should be set up to accept the consent of the customers. From the technical aspects, it can be seen that the data that is used for business intelligence or warehousing should be provided access only to the employees of the company (Saoud and Boubetra, 2017). If this limitation is not created, there is a chance of theft or violation. In addition, it is important to have an encryption system for data transit, regularly monitor it, and ensure data security through multi-sector authentication so that employees can never misuse it.

In order not to face external risks like phishing or cyber attacks, systems like antivirus and firewall should be used; only then can these tools like BL, DW and DM be managed properly in the company.

Reporting and Dashboard Solutions

Business Intelligence plays a very important role in running a business to transform raw data into better insights. Especially for medium-sized companies, using tools like BI to consolidate their data and create a good interface for users. These dashboards monitor real-time data and also provide an opportunity to know about the company's sales forecast, available inventory, and track changing customer behaviour (Janert, 2018). Through this, the company can make any kind of decision immediately. Dashboards provide easy insight into each location in the form of charts or visualisations. This data visualisation makes it easy to understand for those who have employees who are not skilled in technology.

According to the context of a retail company, the metrics that can be used to make this dashboard acceptable to their employees include different metrics for sales performance, customer metrics, and inventory supply chain (Sinha, 2017). For example, sales performance is measured in each store of an organisation, revenue management tools include customer

retention rates in customer metrics, and inventory management includes daily turnover or stock ratios.

Conclusion

A medium-sized organisation that sells retail products plays a very important role in improving various types of strategic decisions of its business intelligence or data mining technologies. This report discusses the method of storing various types of data from multiple sources through technologies like BL, DW and DM and then creating a good interface for employees and customers based on the characteristics of the data. Two methods of data warehousing, namely clustering and association rules, are explored to understand how an organisation can understand their customer behaviour and get predictive insights for its sales. This report considers the effectiveness of monitoring real-time data through business intelligence in a proactive manner and in making decisions easily for the management department. Also, all types of ethics and security should be considered for maintaining and managing all the data of an organisation so that all types of privacy and GDPR compliance are protected.

References

- Bacardit, J. and Llorà, X. (2019). Large-scale data mining using genetics-based machine learning. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 3(1), pp.37–61.
- Herschel, R.T. (2020). *Organisational Applications of Business Intelligence Management: Emerging Trends*. IGI Global.
- Janert, P. (2018). *Data Analysis with Open-Source Tools*. Sebastopol: O'Reilly Media, Inc.
- Kumar, A., Mishra, A. and Kumar, S. (2023). *Architecting a Modern Data Warehouse for Large Enterprises*. Apress.
- Kumari, S. and Tripathy, K.K. (2019). *Data Science & Business Analytics*. Emerald Group Publishing.
- Mattison, R. (2017). *Data warehousing: strategies, technologies, and techniques*. New York: McGraw-Hill.
- Minelli, M. and Chambers, M. (2021). *Big Data, Big Analytics*. John Wiley & Sons.
- Qureshi, H.M. and Sharif, H. (2022). *Snowflake Cookbook: Techniques for Building Modern Cloud Data Warehousing Solutions*. Birmingham: Packt Publishing, Limited.
- Ramkumar, T., Hariharan, S. and Selvamuthukumaran, S. (2020). A survey on mining multiple data sources. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 3(1), pp.1–11.
- Rasmussen, N., Goldy, P.S., Solli, P.O. and Netlibrary, I. (2019). *Financial business intelligence: trends, technology, software selection, and implementation*. New York: Wiley.
- Saoud, M.S. and Boubetra, A. (2017). How Data Mining Techniques Can Improve Simulation Studies. *International Journal of Computer Theory and Engineering*, 13(16), pp.15–19.
- Shah Neha K, S.N.K. (2022). Introduction of Data mining and an Analysis of Data mining Techniques. *Indian Journal of Applied Research*, 3(5), pp.137–139.

Shah, I.A. (2024). *Cybersecurity Issues and Challenges in the Drone Industry*. IGI Global.

Sinha, A.K. (2017). *Data warehousing*. Indianapolis, IN: Prompt, Cop.