

Higher Nationals

Internal verification of assessment decisions – BTEC (RQF)

INTERNAL VERIFICATION – ASSESSMENT DECISIONS			
Programme title	BTEC Higher National Diploma in Computing		
Assessor	Miss.Gayani Nisansala	Internal Verifier	Mr.Lakindu Premachandra
Unit(s)	Unit 14:Business Intelligence		
Assignment title	Applying BI solutions to enhance and improve business operations		
Student's name	Ranudi Gayathmie Kariyapperuma		
List which assessment criteria the Assessor has awarded.	Pass	Merit	Distinction
INTERNAL VERIFIER CHECKLIST			
Do the assessment criteria awarded match those shown in the assignment brief?	Y/N		
Is the Pass/Merit/Distinction grade awarded justified by the assessor's comments on the student work?	Y/N		
Has the work been assessed accurately?	Y/N		
Is the feedback to the student: Give details: <ul style="list-style-type: none"> • Constructive? • Linked to relevant assessment criteria? • Identifying opportunities for improved performance? • Agreeing actions? 	Y/N Y/N Y/N Y/N		
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Higher Nationals - Summative Assignment Feedback Form

Student Name/ID	Ranudi Gayathmie Kariyapperuma KIR/X -00104243		
Unit Title	Unit 14: Business Intelligence		
Assignment Number		Assessor	
Submission Date	31.12.2023	Date Received 1st submission	
Re-submission Date		Date Received 2nd submission	
Assessor Feedback: <p>LO1 Discuss business processes and the mechanisms used to support business decision-making.</p> <p>Pass, Merit & Distinction Descriptors P1 <input type="checkbox"/> M1 <input type="checkbox"/> D1 <input type="checkbox"/></p> <p>LO2 Compare the tools and technologies associated with business intelligence functionality.</p> <p>Pass, Merit & Distinction Descriptors P2 <input type="checkbox"/> M2 <input type="checkbox"/> D2 <input type="checkbox"/></p> <p>LO3 Demonstrate the use of business intelligence tools and technologies</p> <p>Pass, Merit & Distinction Descriptors P3 <input type="checkbox"/> P4 <input type="checkbox"/> M3 <input type="checkbox"/> D3 <input type="checkbox"/></p> <p>LO4 Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used.</p> <p>Pass, Merit & Distinction Descriptors P5 <input type="checkbox"/> P6 <input type="checkbox"/> M4 <input type="checkbox"/> D4 <input type="checkbox"/></p>			
Grade:	Assessor Signature:		Date:
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Internal Verifier's Comments:			
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* Please note that grade decisions are provisional. They are only confirmed once internal and external moderation has taken place and grades decisions have been agreed at the assessment board.

Pearson Higher Nationals in Computing

Unit 14: Business
Intelligence Assignment 01

General Guidelines

1. A Cover page or title page – You should always attach a title page to your assignment. Use previous page as your cover sheet and make sure all the details are accurately filled.
2. Attach this brief as the first section of your assignment.
3. All the assignments should be prepared using a word processing software.
4. All the assignments should be printed on A4 sized papers. Use single side printing.
5. Allow 1" for top, bottom , right margins and 1.25" for the left margin of each page.

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1. The font size should be **12** point, and should be in the style of **Time New Roman**.
2. **Use 1.5 line spacing**. Left justify all paragraphs.
3. Ensure that all the headings are consistent in terms of the font size and font style.
4. Use **footer function in the word processor to insert Your Name, Subject, Assignment No, and Page Number on each page**. This is useful if individual sheets become detached for any reason.
5. Use word processing application spell check and grammar check function to help editing your assignment.

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2. Avoid using page borders in your assignment body.
3. Carefully check the hand in date and the instructions given in the assignment. Late submissions will not be accepted.
4. Ensure that you give yourself enough time to complete the assignment by the due date.
5. Excuses of any nature will not be accepted for failure to hand in the work on time.
6. You must take responsibility for managing your own time effectively.
7. If you are unable to hand in your assignment on time and have valid reasons such as illness, you may apply (in writing) for an extension.
8. Failure to achieve at least PASS criteria will result in a REFERRAL grade .
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10. If you use other people's work or ideas in your assignment, reference them properly using HARVARD referencing system to avoid plagiarism. You have to provide both in-text citation and a reference list.
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ranudigk@gmail.com

Student's Signature:

(Provide E-mail ID)

Date:

31.12.2023

(Provide Submission Date)

Higher National Diploma in Business

Assignment Brief

Student Name /ID Number	Ranudi Gayathmie Kariyapperuma KIR/X – 00104243
Unit Number and Title	Unit 14 : Business Intelligence
Academic Year	2021/2022
Unit Tutor	Miss.Gayani Nisansala
Assignment Title	Business Process Support Mechanisms
Issue Date	19.12.2023
Submission Date	31.12.2023
IV Name & Date	

Submission format

The submission should be in the form of an individual written report. This should be written in a concise, formal business style using single spacing and font size 12. You are required to make use of headings, paragraphs and subsections as appropriate, and all work must be supported with research and referenced. Follow Harvard referencing system for in-text citations, reference list and the bibliography.. The recommended word limit is 4,000–4,500 words, although you will not be penalised for exceeding the total word limit.

Unit Learning Outcomes:

LO1 Discuss business processes and the mechanisms used to support business decision-making.

LO2 Compare the tools and technologies associated with business intelligence functionality

LO3 Demonstrate the use of business intelligence tools and technologies

LO4 Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used

Assignment Brief and Guidance:

Data and information are core to any organizational business process. Meaningful information is a necessity to drive profitable business actions. The concept of Business Intelligence (BI) has evolved through technologies such as Decision Support Systems (DSS) to a number of tools, technologies, architectures and methods which involves data cleaning, data integration, data mining, data evaluation and data representation. Hence BI can be identified as a software suite of software and services to transform data into actionable intelligence and knowledge.

Scenario

Yard of Ale is a large-scale brewery in Sri Lanka and well establish company control 20% market share of beer market which is the 2nd biggest market share from entire beer market. The company have automated production line include mills, Brewhouse and bottling plant and each control by separate embedded software system not allowed to access operational data stores but can be configured to generate CSV or excel operational data file at the end of each batch. The company consists of multiple departments responsible for each operations of the organization such as Production, Engineering, HR/Legal, finance, Sales and marketing, Procurement, Administration, Quality control, Research and development, IT and each and every department have its own operational systems to record keeping purposes and each operational application software developed by professionally. Each department manages by a department manager. For an example, production department manages by the production manager and he is responsible for manage all production related operations in sub departments. Mills ,Brewhouse ,Bottling plant, raw material and finish products stores and each sub department managed by operational manager. This hierarchical configuration replicates throughout most of the department. Upper management of brewery required to consolidate all these data in to one data warehouse with the data contain in the legacy system as well. Other than that upper management required to incorporate every external data about company and products from various data

collection and research agencies the business intelligent system. Those external data available as JSON/XML data files, plain text reports, social media comments/posts and all negative and positive online comments about organization and products.

Upper management of company believe more you know about organization and the external environment you have better complete advantage. Have potential to control bigger market share and effectively become number 1 beer in Sri Lanka

Task 1

Analyse the business processes and the supporting processes of the organization given in the scenario and differentiate between semi structured and unstructured data. Evaluate the benefits and drawbacks of using application software to handle the business processes in Yard of Ale.

Task 2

Compare how strategic, tactical and operational decisions are supported within the organization for business decision making process. You have to furthermore compare and contrast how various information systems (TPS,MIS,DSS) could be utilized to enhance those decisions with related to key features of BI framework . Justify your answer with relevant to the functionalities of business intelligence.

Task 3

Chief Engineer is the tactical manager of engineering department who oversees all repairs and maintenance of the total eight sectors of the factory that include water purification plant, Mill, Brewhouse, bottling plant, waste treatment plant, factory maintenance and repair/ fabrication shop. Each sector consists of two or more sub sectors and each subsector have 4- 10 of machines. Chief engineer requires to track the maintenance and repair all the machineries with minimal disruption to production and he must maintain

healthy inventory of spare parts which consist of over 5000s items, track the progress of every jobs, Identify problematic arias, Track engineers and mechanics work logs and efficiency and monitor system downtime.

3.1. Explain what business intelligence is and the tools and technologies associated with it by taking relevant examples to the organization given in the scenario.

3.2. Design a Managerial dash board for chief engineer using various data visualizations methodologies that includes 6-8 widgets to present required information. Apply appropriate customizations that can utilize to improve the managerial dashboard designed above . Critically evaluate how your Dashboard design and the suggested enhancement could optimize chief engineer's performance by delivering accurate and reliable information to increase his effectiveness.

Task 4

4.1. Discuss how organizational decision-making process can be improved by implementing business intelligence tools. Conduct a research to identify the organizations that have utilized new business intelligent innovations and trends to improve their performance and to extend BI systems to target audience, provide better competitive advantage within the market.

4.2. Sharing data within the organization through a BI tool can raise legal, ethical and professional concerns. Explore the legal issues that may result when using business intelligence tools (Eg: Data protection laws, Cyber security, etc.) and evaluate how the chosen organization and extend the target audience / gain a competitive advantage by securely exploiting Business Intelligence tools.

ACKKNOWLEDGEMENT

At last author would like to share the experience while doing the project. Author learns many new things about the projects. The best thing which author can share is that author developed more interest in this subject. This Module gave an interest to the author to find more information about it. .

A very special thanks to Miss Gayani who teach us this subject and Author thanks for who helped author to do this kind of project. Thank you!

Regards,

The author,

Ranudi Kariyapperuma.

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Business Process

An organization's business processes act as its strategic arteries, directing resources toward predetermined goals and optimal operational effectiveness. They provide a methodical road plan that directs the distribution of resources and work among different divisions and roles. These procedures serve as a unified framework by defining roles, responsibilities, and workflows, which guarantees that activities are in line with the overall objectives of the company.

Maintaining openness and consistency in these processes depends heavily on documentation and clarity, which enables stakeholders to comprehend their roles and duties in relation to the company's goals and mission. Furthermore, as companies work in ever-changing contexts, it is essential to be able to modify and improve these procedures. These workflows need to be continuously monitored, evaluated, and improved in order to spot bottlenecks, boost operational effectiveness, and react quickly to shifting market conditions.

Methods for business process management, or BPM, offer the framework for improving and streamlining these operations. They provide standardized methods that help firms be responsive and flexible while also streamlining operations. Companies might cultivate a continuous improvement culture by utilizing BPM approaches, which turn refinement into a regular practice instead of an intermittent endeavor. By identifying unnecessary steps, ineffective procedures, and areas for improvement, this systematic method promotes an innovative and efficient culture. Additionally, technology integration serves as a catalyst for these processes, enabling automation, data-driven insights, and improved decision-making that pushes enterprises toward greater agility and competitiveness. Methods for business process management, or BPM, offer the framework for improving and streamlining these operations. They provide standardized methods that help firms be responsive and flexible while also streamlining operations. Companies might cultivate a continuous improvement culture by utilizing BPM approaches, which turn refinement into a regular practice

instead of an intermittent endeavor. By identifying unnecessary steps, ineffective procedures, and areas for improvement, this systematic method promotes an innovative and efficient culture. Additionally, technology integration serves as a catalyst for these processes, enabling automation, data-driven insights, and improved decision-making that pushes enterprises toward greater agility and competitiveness.

Navigating the difficulties of a competitive economy is made easier by the adaptability and flexibility embedded in these streamlined processes. Agile processes that can quickly adapt to suit changing needs are essential in a company environment where changes happen quickly and client preferences are always changing. Well-structured business processes are characterized by their ability to react quickly to changes in the market while maintaining operational integrity. In dynamic and competitive environments, this kind of adaptation not only helps firms keep their competitive advantage, but it also builds the foundation for long-term growth, resilience, and innovation.

Types of Business Process

Operational Processes

These are the routine tasks that make up an organization's primary business functions. This covers every aspect, including distribution, sales, marketing, customer service, and production (where appropriate). An example of an operational process in a manufacturing organization would be the production line, quality control, inventory management, and shipping procedures.

Management Processes

In order to accomplish an organization's objectives, management processes include planning, organizing, directing, and regulating resources. This includes resource allocation, performance management, budgeting, and strategic planning. These procedures are essential for making decisions and guaranteeing the smooth operation of the company.

Supporting Processes

These procedures offer the framework and assistance required for managerial and operational tasks. This include administrative work, accounting, IT support, procurement, and human resource management. The efficient operation of the main company operations is made possible by these procedures.

Continuous Improvement Processes

Continuous improvement processes focus on enhancing efficiency, reducing waste, and improving quality. Examples include methodologies like Six Sigma, Lean, and Total Quality Management. These processes involve ongoing evaluation, analysis, and implementation of improvements to optimize operations.

Innovation Processes

To keep ahead of the competition, new ideas must be generated, new products or services must be developed, and new tactics must be put into action. This covers product design, R&D, and the investigation of new markets or business prospects.

Customer-Facing Processes

These procedures communicate with clients directly. Examples include marketing campaigns, customer service procedures, sales procedures, and feedback gathering. By offering superior customer service and attending to their needs, the objective is to draw in, hold on to, and grow a clientele.

Supply Chain Processes

Supply chain procedures entail organizing tasks associated with obtaining raw materials, buying, producing, and distributing goods and services. This covers logistics, transportation, inventory control, and supplier relationship management.

Financial Processes

all of the operations involved in keeping an organization's finances under control. Financial reporting, accounting, auditing, budgeting, and financial planning are all included in this. These procedures guarantee both regulatory compliance and financial stability.

Compliance Processes

Procedures for compliance make ensuring that a company abides with applicable laws, rules, and industry standards. In order to do this, policies must be developed and put into effect. Audits must be carried out, and all corporate operations must guarantee legal and regulatory compliance.

Risk Management Processes

These procedures entail locating, evaluating, and reducing risks that might affect the goals of the company. This include determining protocols for risk monitoring and control, creating mitigation strategies, and assessing risks.

Examples of Business Process

Order Fulfillment Process

involves taking orders from customers, processing them, checking inventory, processing them, packing them, sending them, and tracking their deliveries.

Procurement Process

includes determining needs, choosing suppliers, negotiating, placing purchase orders, receiving items, and approving invoices in order to obtain the goods or services required for business operations.

Sales Process

consists of lead generation, lead qualification, closing sales, presentations or demos, discussions, and follow-ups to turn prospective clients into real customers

Employee Onboarding Process

The process of integrating new personnel into the firm that includes documentation, orientation, training, setting up workstations, and explaining company policies and culture is known as the employee onboarding process.

Project Management Process

Project scope definition, job scheduling, team assignments, progress monitoring, and project evaluation are all part of the project management process, which includes organizing, carrying out, overseeing, and wrapping up projects.

Customer Relationship Management (CRM) Process

The goal of the customer relationship management (CRM) process is to improve customer satisfaction and retention by managing client interactions through lead management, queries, sales follow-ups, and support.

Financial Reporting Process

The process of generating financial reports for stakeholders, including as balance sheets, income statements, and cash flow statements, involves obtaining, arranging, and evaluating financial data.

Quality Control Process

The process of quality control makes ensuring that goods and services live up to expectations by testing, inspecting, and making necessary corrections.

Content Creation Process

Content Creation process

The process of creating content involves coming up with ideas, writing, editing, reviewing, and publishing it for promotional or educational objectives.

Performance Appraisal Process

The process of evaluating an employee's performance in relation to predetermined standards or goals includes goal-setting, evaluations, feedback, and development talks.

Advantages of business process

Increased Efficiency:

Well-defined and streamlined procedures boost efficiency by eliminating needless stages and delays. This allows enterprises to meet their goals with less resources and in less time.

Savings on costs:

Efficient procedures frequently result in cost savings since they aid in the identification and elimination of superfluous tasks. Certain processes can be automated to save labor costs, eliminate mistakes, and maximize resource use.

Quality and consistency have been improved:

Standardized processes help to improve the quality and consistency of a product or service. Organizations may guarantee that each output satisfies established standards by defining and implementing best practices.

Customer Satisfaction Increased:

Better client experiences are aided by efficient company operations. Process simplification frequently results in shorter response times, faster delivery of products or services, and higher overall customer satisfaction.

Increased Agility and Flexibility:

Well-defined procedures enable organizations to better respond to changes in the business environment. This flexibility is critical when it comes to responding to market trends, consumer requests, and internal or external issues that may effect operations.

Better Decision-Making:

Structured procedures give a foundation for decision-making. Managers may use data gathered at different phases of a process to make educated and strategic decisions, resulting in enhanced overall organizational performance.

Compliance and Risk Management:

Defined processes aid in ensuring adherence to regulatory regulations and industry norms. Furthermore, they aid to good risk management by spotting possible problems and putting preventative measures in place.

Employee Empowerment and Satisfaction

Clear instructions for employees' duties and responsibilities are provided by well-documented processes. This clarity boosts job satisfaction and allows employees to confidently complete their jobs, knowing they are contributing to the organization's success.

Facilitates Continuous Improvement

Organizations may find opportunities for improvement by regularly monitoring and evaluating processes. This dedication to continual improvement stimulates innovation and assists the firm in remaining competitive in a volatile commercial environment.

Business processes can be strategically integrated with overall corporate strategy. This guarantees that all operational activities contribute to the attainment of strategic objectives, supporting a coherent and focused approach to organizational success

Business process of Yard of Ale Company

The Yard of Ale Brewery Company is a strong organization with a strong foundation in Sri Lanka's brewing sector. Its base is a highly automated production line that has been carefully designed to manage every aspect of beer production. This line includes the first milling procedures, the Brewhouse, and the last steps at the bottling facility. Different incorporated software systems carefully regulate each step, ensuring accuracy and effectiveness. These systems can produce extensive operational data files in CSV or Excel formats at the end of each batch, which is an essential source of information.

The business is divided into several departments, each of which is in charge of specific elements of the operation of the company. Every department, including IT, Sales and Marketing, Engineering, HR/Legal, Production, Purchasing, Administration, Quality Control, and Research and Development, is managed by a specific manager who is in charge of the day-to-day operations of the department. The organization is structured hierarchically, with operational supervisors managing sub-departments. For example, the Production Department is in charge of the management of raw material and completed product inventories in addition to important sectors like the mills, brewhouse, and bottling plant.

The top management sees a complete data concentration within this internal ecosystem. This means combining data from the several operational apps that each department uses, information from legacy systems, and—most importantly—external data sources. These external datasets come from a number of sources, including raw reports, social media opinions, JSON and XML data files, and internet reviews, both positive and bad, of the business and its goods.

The main objective is rather obvious: improving Yard of Ale Brewery's competitive edge by gaining a thorough grasp of both its changing internal operations and the dynamic external environment. Top management believes that a deeper knowledge of the company combined with information gathered from outside sources would lead to not only a bigger portion of

the market but also establish Yard of Ale Brewery as the leading beer supplier in Sri Lanka. The purpose of this data integration strategy is to support the brewery's leadership position in the Sri Lankan beer market, encourage innovation, and facilitate well-informed decision-making.

The main procedure and role of business process in Yard of Ale Company

At Yard of Ale Brewery Company, coordinating business procedures is important for balancing the various operations that contribute to the brewery's success. These procedures operate as the hidden thread that connects several divisions within the organization, including production, supply chain, sales and marketing, research and development, and more.

The production and manufacturing processes, which are closely overseen by operational managers to ensure that every stage, from raw materials to packaging, maintains the highest standards of quality and efficiency, are the beating heart of the brewery. At the same time, supply chain management maintains the routine of this life, supervising buying, maintaining stock, and transportation to ensure a smooth movement of materials and goods. Every operational system generates data, which is used in a centralized warehouse where it is combined and examined to produce ideas that are essential for making well-informed decisions. This study provides an in-depth analysis of the brewery's environment by incorporating external data, such as market trends and social media attitudes, in addition to internal company changes.

The brewery uses sales and marketing techniques that are based on thorough market research to get its products in front of and into the hearts and hands of customers. Research and development programs also inspire innovation, enabling the brewery to continuously improve its products and services and maintain its lead in a rapidly changing industry.

The comprehensive following of legal and regulatory frameworks, supervised by HR/Legal departments, is important for these processes and ensures moral and responsible operations.

While data security and integrity are protected, IT infrastructure makes sure embedded

software systems run smoothly. Financial management encourages economic constraint. The final aim of these complex processes is to provide decision-makers with the knowledge and resources they need to guide Yard of Ale Brewery toward its long-term goals. They are the definition of effectiveness, creativity, quality, and strategic alignment, driving the brewery closer to its goal of growing its market share and establishing itself as the leading supplier of beer in Sri Lanka.

Benefits of business process to the Yard of Ale Company

- Operations are improved using effective processes.
- Accuracy is ensured by quality processes.
- Processes that are economic reduce resources.
- Decisions are made easier by processes based on data.
- Processes that are adjustable inspire creativity.
- Processes that focus on the customer improve satisfaction.
- Risks are managed using legal processes.
- Employee engagement is improved by clear processes.
- Goals are supported by aligned processes.
- Advantages are secured by economic processes.

Supporting process

The foundation of any organization is its supporting procedures, which give vital supplemental assistance to the main operations. Administrative procedures handle paperwork and office work, but training and development procedures help workers become more flexible and capable. Technical operations run smoothly because of IT support, and equipment and spaces are kept in working order through maintenance procedures.

Employment and performance management are handled via human resources procedures, which guarantee a knowledgeable and driven staff. Legal and regulation procedures

guarantee that rules are followed and risks are reduced, while financial processes oversee strategies and budgets. Supply chain maintenance is ensured by procurement procedures, and

customer satisfaction guarantees a good rapport with customers. when combined, these additional procedures form a framework that facilitates and supports the efficient performance of essential business operations, enhancing overall effectiveness and efficiency.

Supporting process of Yard of Ale Company

The effective management of the Yard of Ale Brewery's supporting processes, which include office management and documentation, supports the business's main activities. Employee growth and ability are continuously encouraged by training and development activities. The facility management and maintenance team maintain the functionality of key areas and equipment, while the IT support team ensures efficient technical operations. Finance is in charge of the company's finances, legal compliance makes sure that rules are followed, and human resources handles hiring and retaining people. The structure is completed by purchasing, customer service, and risk management, each of which provides the brewery's foundation with specialized support and knowledge.

Supporting processes flow of Yard of Ale

Sector	Support process
Production	In charge of running the mills, brewhouse, and bottling plant at Yard of Ale , the production department is in charge of the main brewing procedures. Ensuring effective production processes, from raw material milling to fermentation and packing, is its main priority. Here, quality control is crucial in making sure that every batch satisfies strict requirements prior to bottling. A seamless manufacturing flow is ensured by close interaction with

	other departments, including Procurement for raw material purchasing and Engineering for maintenance.
Engineering	The Yard of Ale Brewery's engineering responsibilities include maintaining and repairing vital equipment and infrastructure. This division makes sure that all of the machinery in the bottling plant, brewhouse, and mills is operating at maximum effectiveness. While communication with IT guarantees that embedded software systems function flawlessly, preventing production disruptions, cooperation with production guarantees that equipment stays functioning during brewing operations.
HR/Legal	This division handles hiring, employee relations, and legal compliance for the brewery. It is in charge of hiring, training, and keeping up a positive work culture. This department also makes sure that legal regulations are followed, which reduces employment law concerns and protects the company's interests
Finance	The management of budgets, financial reporting, and strategic financial planning are all greatly helped by the finance department. It works with several departments, offering financial information to help in decision-making. Procurement cooperation guarantees budget compatibility with the purchase of resources, while partnerships in sales and marketing improve financial strategies for revenue growth.

Sales and Marketing	To advertise Yard of Ale Brewery's goods, the sales and marketing teams collaborate closely. While the sales team concentrates on distribution and customer involvement, marketing plans are established using market research and feedback from customers. Effective resource allocation is facilitated by collaboration with finance, and ongoing input from R&D and quality control helps develop products and place them in the market.
Procurement	Procurement is in charge of finding the essential raw ingredients for the brewing process. Working closely with production guarantees a smooth supply chain and the availability of high-quality ingredients. In order to maintain the standard of raw materials, the department also communicates with Quality Control and Finance over budget alignment.
Administration	Office management duties such as internal communication, coordination, and recordkeeping are under the purview of administration functions. In order to serve other departments' operational needs, this department makes sure that workflows are efficient across the board. Working together with IT ensures that the administrative tools and systems used throughout the brewery run well.
Quality Control	Quality Control is in charge of the thorough testing and evaluation of the brewing procedure and the final goods. It works closely with Production to ensure that quality requirements are consistently met. Working together with

	Research and Development and Sales and Marketing allows for process improvement to improve product quality and the communication of quality differences to customers.
Research and development	R&D is centered on innovation, investigating new product combinations and brewing methods. Working closely with Sales and Marketing helps detect market trends and consumer preferences, while collaboration with Production and Quality Control facilitates the testing of new procedures.
IT	The Yard of Ale IT department is in charge of overseeing and maintaining the software and hardware systems. Working together with engineering guarantees that incorporated software systems in production equipment operate as intended. Working together with administration facilitates the management of internal communication tools, which supports the operational requirements of different departments.

Table 1 : Supporting processes flow of Yard of Ale

Objectives of supporting system

Enhancement of Efficiency: Supporting systems are designed to reduce redundancies, optimize workflows, and raise departmental operating efficiency as a whole.

Resource Optimization: These systems aim to allocate resources as efficiently as possible, making sure that resources—including money, labor, and assets—are used to support key processes.

Risk Mitigation: Supporting systems work to reduce threats to security, operational interruptions, and legal compliance, among other risks and vulnerabilities.

Quality Assurance: By guaranteeing uniformity and conformity to predetermined criteria, the systems seek to maintain and improve the quality standards of goods, services, or internal operations.

Operational Continuity: Supporting systems are made to keep things running smoothly, minimizing interruptions, and bolstering the company's resilience in the face of difficulties.

Information management systems support the efficient management and use of data, ensuring that pertinent information is accessible to facilitate decision-making across all organizational levels.

Adaptability and Innovation: By creating an atmosphere that encourages creativity, supporting systems help the company adjust to shifting consumer demands, market shifts, and technology breakthroughs.

Management & Compliance: Upholding moral corporate conduct, minimizing the risks associated with non-compliance, and guaranteeing conformity to legal and regulatory frameworks are all important goals.

customer Satisfaction: Supporting systems, especially in departments that interact with customers, strive to improve client experiences, promptly handle inquiries, and uphold favorable connections.

Employee Development and Engagement: HR and training departments implement systems to make employees feel involved, providing possibilities for professional development and a positive work atmosphere.

Examples for business process and supporting process

Business process	Supporting process
Processing Sales Orders	Support for IT Help Desk.
Stage of Product Development Supply Chain Movement	Administrative Jobs.
Execution of Marketing Campaigns	HR Hiring.
Induction of Employees	Management of Legal Compliance.
Assurance of Quality Testing	Upkeep of Facilities.
Accounting Statements	Programs for Training.
Implementing Projects	The analysis of finances.
Methodical Scheduling	Client support.
Relationship Management with Customers	Data Protection.

Table 2 : Examples for business process and supporting process

Advantages and disadvantages of business process and supporting process

Business process	
Advantages	Disadvantages
<ul style="list-style-type: none"> Organizations can gain a competitive advantage in the market by streamlining operations, increasing 	<ul style="list-style-type: none"> Stiff corporate procedures can impede agility and creativity by making it more

efficiency, and providing consistent quality in goods or services.	difficult to respond and adjust to shifting market conditions.
<ul style="list-style-type: none"> • By offering formal frameworks for evaluating facts and information, they promote better decision-making by enabling well-informed and well-thought-out choices. 	<ul style="list-style-type: none"> • Bureaucratic barriers brought up by intricate corporate procedures may hinder operational flexibility and decision-making.
<ul style="list-style-type: none"> • Effective company processes help to improve customer happiness, efficiently address their demands, and cultivate enduring loyalty. 	<ul style="list-style-type: none"> • Business process implementation entails a large initial financial outlay due to the substantial time, resource, and technological commitment needed.
<ul style="list-style-type: none"> • Efficient business process implementation facilitates improved resource allocation and workflow coordination by fostering organizational transparency. 	<ul style="list-style-type: none"> • Employee initiative and creativity may be suppressed by overly regimented procedures, which would prevent innovation.
<ul style="list-style-type: none"> • Standardized procedures and a culture of accountability are fostered by business processes, which also set clear expectations for team members. 	<ul style="list-style-type: none"> • Processes that lack flexibility may cause bottlenecks, delays, and inefficiencies, which lowers operational effectiveness as a whole.
<ul style="list-style-type: none"> • They support the organization's ongoing innovation and progress by helping to spot and address inefficiencies. 	<ul style="list-style-type: none"> • An excessive focus on following the procedure could cause one to overlook personal abilities and discretion, which would affect output as a whole.

<ul style="list-style-type: none"> Business procedures minimize waste and maximize resource usage, which lowers operating costs. 	<ul style="list-style-type: none"> Siloed processes can lead to ineffective departmental collaboration and communication, which hinders organizational synergy.
<ul style="list-style-type: none"> Robust risk management strategies benefit from well-defined processes, which reduce mistakes and operational interruptions. 	<ul style="list-style-type: none"> If business processes are not routinely evaluated and updated, they may become antiquated, which could result in inefficiencies and a decline in competitiveness.
<ul style="list-style-type: none"> Scalability is improved by efficient business processes, which enable firms to expand and adjust to shifting market conditions. 	<ul style="list-style-type: none"> Highly standardized procedures may not be able to handle special or unusual circumstances, making it difficult to deal with unforeseen events.
<ul style="list-style-type: none"> By ensuring that the company complies with legal requirements, they help to ensure regulatory compliance and reduce the risks of non-compliance. 	<ul style="list-style-type: none"> Over-reliance on procedures could lead to a delusion of security and the propensity to miss new possibilities or risks.
Supporting Process	
Advantages	Disadvantages
<ul style="list-style-type: none"> Core functions are strengthened by supporting procedures, which also maximize operational effectiveness and guarantee smooth workflows throughout the company. 	<ul style="list-style-type: none"> The company's financial resources may be impacted by higher overhead expenses resulting from the adoption of supporting processes.

<ul style="list-style-type: none"> • They provide specialist knowledge that helps the business handle complicated tasks and reduce risk inside its operational framework. 	<ul style="list-style-type: none"> • If supporting procedures are given too much attention, attention may be drawn away from key tasks and main operating areas may be neglected.
<ul style="list-style-type: none"> • Supporting processes make resource optimization easier and guarantee efficient use in a variety of operational fields. 	<ul style="list-style-type: none"> • Supporting processes can occasionally add complexity to integration, making it more difficult for the business to operate smoothly.
<ul style="list-style-type: none"> • These procedures support the upkeep of the infrastructure and provide an environment that is favorable to productive work. 	<ul style="list-style-type: none"> • Reliance on backend systems could lead to bureaucracy, which would hinder flexibility and slow down decision-making.
<ul style="list-style-type: none"> • By offering crucial support services, they raise employee happiness and foster a healthy workplace culture. 	<ul style="list-style-type: none"> • Certain auxiliary procedures could take a lot of time, taking resources and focus away from core corporate operations.
<ul style="list-style-type: none"> • Supporting procedures help manage compliance, guaranteeing that laws and industry norms are followed. 	<ul style="list-style-type: none"> • Being overly dependent on supporting procedures may make it more difficult to adjust and respond to shifting market conditions.
<ul style="list-style-type: none"> • They provide effective data security solutions, protecting private data and reducing hazards. 	<ul style="list-style-type: none"> • The implementation and upkeep of supporting procedures may call for certain knowledge and abilities, which could make hiring difficult.

<ul style="list-style-type: none"> • Partner and vendor relationship management is made possible by effective supporting processes, which guarantee seamless cooperation and on-time delivery. 	<ul style="list-style-type: none"> • If some supporting procedures aren't updated on a regular basis, they could become antiquated and cause inefficiencies inside the company.
<ul style="list-style-type: none"> • These procedures support ongoing efforts for staff growth and skill development through training and development. 	<ul style="list-style-type: none"> • Supporting procedures should not be overly structured since this could reduce their adaptability and reactivity when handling odd or unexpected circumstances.
<ul style="list-style-type: none"> • Operational assistance is greatly aided by supporting processes, which help the company retain operational resilience and consistency. 	<ul style="list-style-type: none"> • Organizational synergy and collaboration may be impacted by operational silos caused by inefficient coordination among supporting activities.

Table 3 : Advantages and disadvantages of business process and supporting process

Organizational data structure

A complicated system managing the arrangement, management, and storage of data inside an organization is referred to as organizational data structure. It is the blueprint that regulates data processing between systems and departments, guaranteeing security, accessibility, and coordination. Data architecture, storage systems, processing tools, metadata management, integration solutions, governance policies, and security measures are some of the parts that make up this framework. Data models, databases, and infrastructure are all included in data architecture, which specifies how data is designed and moved within the company. Structured, semi-structured, and unstructured data can be stored in many kinds of storage systems, from conventional databases to contemporary data lakes and cloud-based solutions. Data integrity and quality are ensured by management policies, which establish guidelines for data usage, security, and compliance.

Organizations can gain useful knowledge, make well-informed decisions, and improve operational efficiency by using data processing and analysis tools. Understanding data links and continuity is made easier with the help of metadata management, which maintains information about data assets. Connectivity solutions promote data consistency and accessibility by enabling smooth data flow between various systems. Access controls and security measures play a crucial role in protecting sensitive data by limiting access and modification to authorized persons and averting data loss and thefts. Effective data utilization is made possible by a well-structured data environment, which enables businesses to use their data resources for operational excellence, innovation, and strategic planning.

Organizational Data Classification

Structured Data

A well-structured form is embodied by structured data, which conforms to a strict and predetermined framework that can be found in databases or structured file formats. This data is arranged in a methodical manner because it follows an unchanging template, which is frequently shown as rows and columns. Customer profiles, inventory logs, and databases containing financial transactions are a few examples. Because of its natural organization, data can be stored, retrieved, and altered more quickly, which makes it easier to analyze data using SQL queries. Because structured data is predictable and dependable, it can be processed using traditional methods with great speed and accuracy. It also supports well-informed decision-making and eases ordinary organizational processes.

Because structured data is organized, it is easier to comprehend the connections between various data points, resulting in a well-defined hierarchy. Because of its clear format, which makes management and analysis easy, organizations are able to use this data effectively. Its rigidity, however, can make it more difficult to handle various kinds of or changing data formats. Any structural changes to the schema will need to be made, which could make managing dynamic data requirements more difficult.

Advantages and Disadvantages of Structured Data

Advantages	Disadvantages
Analytical ease: Facilitates simple querying and analysis, facilitating prompt decision-making.	Rigidity: Without major alterations, it can be difficult to adjust to new data types or schema changes.
Data Consistency: Accuracy and consistency are guaranteed by defined schema, which lowers processing errors.	Managing dynamic or developing data structures presents challenges due to its complexity.
Efficient Storage: Enhances retrieval and storage operations, seamlessly integrating with relational databases.	Expensive upkeep: Needs resources to maintain intricate databases and structures.
Scalability: The ability to easily scale new data volumes inside pre-existing database architecture.	Data Silos: Isolated datasets caused by a lack of integration with other sources or types of data.
Data security: Because it is structured, it is simpler to put in place stringent access restrictions and security measures.	Limited Data investigation: Predefined structures may limit the investigation of novel insights.
Compatibility: Provides good reporting and visualisation capabilities when used with conventional business intelligence tools.	Possibility of Data Redundancy: Data redundancy or duplication problems could result from rigidity.

Table 4 : Advantages and Disadvantages of Structured Data

Semi structured Data

Between structured and unstructured data types lies a middle ground occupied by semi-structured data. Although it doesn't have the strict schema of structured data, it nonetheless has some organizing characteristics. This type of data is frequently found in forms such as JSON, XML files, or NoSQL databases, and it includes tags, labels, or attributes. Because of

its adaptability to different data formats, semi-structured data is useful in situations where data structures change over time. This flexibility is useful for handling data that is changing quickly and offers resilience when unexpected changes to data models occur.

Nonetheless, continuous querying and analysis of semi-structured data is made harder by its lack of a set format. Its various components can make normal tasks more difficult and require special handling or processing methods. Despite these difficulties, semi-structured data's intrinsic adaptability enables it to handle a variety of data kinds and adapt to changing needs for data without requiring significant structural changes.

Advantages and Disadvantages of semi-structured Data

Advantages	Disadvantages
Flexibility: Provides the capacity to handle different kinds of data without being constrained by rigid schemas.	Query Complexity: Processing queries and analyses might become more difficult when there is no set schema.
Scalability: Suitable for dynamic modifications and changing data structures.	Data Inconsistencies: Different structures might lead to problems with data quality and inconsistencies.
Simplified Storage: Because it is changeable, it is easier to store than structured data.	Particular Processing Requirements: May need certain instruments or methods for efficient handling.
Versatility: Provides a more flexible framework for gathering a variety of data items.	Potential for Misinterpretation: Data items may be misinterpreted as a result of a lack of standardization.
Improved Cooperation: Makes data sharing between systems with various topologies easier.	Integration challenges include the inability to integrate with current systems that are intended for structured data.

Table 5 : Advantages and Disadvantages of semi-structured Data

Unstructured Data

Unstructured data is a wide and unstructured domain of information that is not arranged according to a predefined framework. It includes a broad range of data formats, such as multimedia files, social media information, and free-form text. There is a wealth of unstructured data available in sources such as papers, emails, photos, and videos. Unstructured data is generally unstructured and disorganized, which makes it difficult to handle and analyze conventionally.

But thanks to contemporary technology, such natural language processing and machine learning algorithms, businesses can now extract insightful information from this kind of data. These developments enable the extraction of meaningful information, attitudes, and patterns from unstructured data sources, discovering hidden value and offering enterprises a better comprehension and practical insights.

Advantages and Disadvantages of Unstructured Data

Advantages	Disadvantages
Diverse Information: Provides thorough insights by containing a variety of data formats, including text, photos, audio, and video.	Complex analysis: Because of its chaotic character, it is challenging to handle and analyze using conventional approaches.
Possibility for Innovation: Cutting-edge technology gather insightful data that stimulates creativity and learning.	Data Quality Challenges: Inadequate organization might result in poor data quality, necessitating cautious curation.
Versatility: Able to record a variety of information sources without being constrained by strict formatting guidelines.	Security Issues: It could be more difficult to safeguard and secure sensitive data found in unstructured data.

Real-time insights: Makes it easier to analyze social media feeds and streaming data sources in real-time.	Complexity of Storage and Retrieval: Non-standard formats might make storage and retrieval ineffective.
Provides context-rich data from sources such as emails, documents, and social media. This is valuable contextual information.	Problems with Interoperability: There may be difficulties integrating with currently in place structured systems.

Table 6 : Advantages and Disadvantages of Structured Data

Comparison between structured data, semi-structured data and unstructured data

Parameters	Structured	Semi-structured	Unstructured
Formatting	<ul style="list-style-type: none"> Follows a uniform and consistent format. Predetermined formats for data storage. 	<ul style="list-style-type: none"> Moderately organized with some flexible formatting. May adhere to certain patterns but allows variations. 	<ul style="list-style-type: none"> No specific formatting or structure. Highly variable and lacks any standardized format.
Storage Methods	<ul style="list-style-type: none"> Typically stored in relational databases. Utilizes tables and indexes for storage. 	<ul style="list-style-type: none"> Often stored in NoSQL databases. May use various file formats for storage 	<ul style="list-style-type: none"> Stored in various repositories or file systems. Utilizes file-based storage without strict organization.
Data Analysis Tools	<ul style="list-style-type: none"> Well-suited for traditional BI tools and SQL queries. Easily handled by standard analytics software. 	<ul style="list-style-type: none"> Requires specialized tools for effective analysis. Might need custom scripts or parsing tools. 	<ul style="list-style-type: none"> Necessitates advanced analytics tools like NLP or ML. Challenging for traditional BI and requires specialized algorithms.
Ease of Understanding	<ul style="list-style-type: none"> Clearly defined and easily understandable. 	<ul style="list-style-type: none"> Moderately understandable due to some structure. 	<ul style="list-style-type: none"> Difficult to interpret without

	<ul style="list-style-type: none"> Follows a consistent structure, making it intuitive. 	<ul style="list-style-type: none"> May vary in comprehensibility depending on format. 	<ul style="list-style-type: none"> context or processing. Requires substantial effort for meaningful interpretation.
Processing Speed	<ul style="list-style-type: none"> Faster processing due to organized structures. Efficient for transactional and analytical operations. 	<ul style="list-style-type: none"> Moderately fast processing depending on structure. Processing speed varies based on complexity. 	<ul style="list-style-type: none"> Slower processing due to lack of organization. Requires advanced algorithms and longer processing times.

Table 7 : Comparison between structured data, semi-structured data and unstructured data

Comparison between structured data, semi-structured data and unstructured data relevant to Yard of Ale

Structured Data	Semi Structures Data	Unstructured Data
<ul style="list-style-type: none"> SQL Database Data Rows and Columns 	<ul style="list-style-type: none"> XML Data 	<ul style="list-style-type: none"> Word Files
Yard of Ale likely maintains structured data in SQL databases for recording sales transactions, inventory management, and customer	Brewing recipes, equipment specifications, or procedural details might be stored in XML format, offering a semi-structured layout that	Brewery documentation, policies, or memos might be stored in Word files, containing unstructured text

details. This structured data ensures organized storage, allowing for efficient querying and reporting.	accommodates diverse brewing parameters.	data that lacks a predefined schema.
• Excel Data Rows	• Excel Data	• Images
Certain structured information, like financial records or inventory logs, might be stored in Excel spreadsheets, providing a familiar format for data entry and basic analysis.	Yard of Ale might use Excel files to store semi-structured data, such as equipment maintenance logs or production schedules, which require a more flexible structure than typical tabular data.	Product images, logos, or marketing materials stored as image files are unstructured data, not inherently organized for database-style analysis.
• Boolean Data	• JSON, HTML, CSV Files	• Text Files and Audio Files
Boolean data, perhaps used for quality control checks or equipment status, is structured, offering binary responses (true/false) that can be utilized for decision-making processes at the brewery.	These files might contain various data, such as supplier information (CSV), web content (HTML), or configuration settings (JSON), providing a degree of structure while allowing some flexibility in data representation and storage.	Customer feedback transcripts, marketing scripts, or podcast recordings might represent unstructured text or audio data, requiring specialized tools for meaningful analysis due to their lack of predefined structure.

Table 8 : Comparison between structured data, semi-structured data and unstructured data relevant to Yard of Ale

Application Software

Application software is a broad category that includes a wide range of computer programs created to carry out particular operations or provide users with specific features. These software programs include industry-specific apps, communication platforms, entertainment software, and productivity aids. Their purpose is to meet different demands in the personal, professional, and organizational realms by giving users interfaces through which they can interact with computers and accomplish predetermined goals. Depending on its function, target market, and goal, application software can be divided into several types.

Application Software for Business Processing

Systems and tools created to simplify and improve a range of organizational processes are included in application software specifically for business processing. These programs are intended to increase productivity in various corporate operations, automate tasks, and optimize workflow efficiency. These comprise Human Resource Management Systems (HRMS) for handling employee data and payroll, Accounting software for financial management, Project Management software for effective project execution, Enterprise Resource Planning (ERP) systems that integrate core business processes, Customer Relationship Management (CRM) software for managing customer interactions, Supply Chain Management (SCM) tools for optimizing supply chain processes, and Business Intelligence (BI) tools for data analysis and decision-making. These systems are the backbone of an organization's operations, offering specialized features to various divisions and boosting overall competitiveness and operational excellence.

Types of business application software

- **Enterprise Resource Planning (ERP) Software**

ERP software unifies supply chain, finance, human resources, inventory, and customer relationship management into a single system. Centralizing data, optimizing processes, and

guaranteeing smooth departmental communication all contribute to increased productivity and teamwork, as well as deep insights into the workings of the business.

- Customer Relationship Management (CRM) Software

CRM software is used to track leads, manage marketing campaigns, monitor sales procedures, and manage customer contacts. Businesses may cultivate relationships, personalize interactions, and maximize sales and marketing efforts by centralizing consumer data.

- Supply Chain Management (SCM) Software

SCM software streamlines the flow, storage, and handling of inventory, completed commodities, and raw materials. It helps ensure effective operations throughout the supply chain by supporting supply chain planning, inventory control, logistics, and supplier relationship management.

- Accounting Software

Accounting software keeps track of spending, creates reports, and makes sure that accounting rules are followed. It also handles financial transactions. It streamlines bookkeeping, automates financial procedures, and delivers precise financial data that is essential for making decisions.

- Human Resource Management Systems (HRMS/HRIS)

HRMS software manages hiring procedures, payroll processing, benefits administration, tracking attendance, and performance reviews. It guarantees adherence to HR regulations, enhances staff management, and streamlines HR processes.

- Project Management Software

This software makes it easier to organize, arrange, and monitor the resources and tasks needed to complete a project. In order to ensure project success, it helps manage team member collaboration, budgets, schedules, and resources.

- Business Intelligence (BI) and Analytics Tools

BI tools gather, examine, and present data from various sources to provide useful information for strategic decision-making. They facilitate data-driven insights-based business planning, predictive modeling, and performance analysis.

- Document Management Systems (DMS)

DMS software manages, saves, and arranges documents so that they can be efficiently retrieved, version controlled, and shared among team members. It guarantees compliance, document security, and quick access to important data.

- Enterprise Asset Management (EAM) Software

EAM software manages the physical assets of a company, including asset tracking, lifecycle management, and maintenance plans. It guarantees asset optimization, lowers downtime, and increases asset longevity.

- Workflow Automation Software

By automating repetitive tasks and procedures, workflow automation software boosts productivity, lowers mistake rates, and guarantees uniformity throughout the enterprise. It improves productivity, simplifies operations, and makes better use of available resources.

Popular application software in business processing

- SAP ERP - Supply chain management, sales, procurement, finance, and human resources are all integrated into one powerful enterprise resource planning tool. It provides modules tailored to individual industries, optimizing departmental data flow and operations. The cost of SAP ERP varies greatly depending on the size of the organization, the modules chosen, and the extent of installation. Generally speaking, annual costs per user can range from \$1500 to \$3000, however depending on implementation and customisation, these numbers can change dramatically.

- **Salesforce CRM** - With an emphasis on sales automation, customer support, marketing, and analytics, Salesforce CRM is a top cloud-based platform for managing customer relationships. It helps companies build relationships and maximize sales tactics by centralizing consumer data and interactions. Basic functionality of Salesforce CRM start at about \$25 per user per month. Higher-tier plans include more complex features, which can cost up to \$300 per user per month.
- **Oracle NetSuite** - This cloud-based ERP and CRM system includes inventory management, e-commerce, financial management, and CRM. It offers expandable functionalities and serves a variety of businesses. For small organizations, pricing usually starts at \$999 per month and can go up depending on the number of users and modules chosen.
- **QuickBooks Online** - Designed for handling financial transactions, invoicing, spending, and reporting, QuickBooks Online is a popular accounting program. It is best suited for small and medium-sized enterprises and comes at various pricing tiers, ranging from about \$25 to \$80 a month depending on the plan and features needed.
- **Workday HCM** - Workday Human Capital Management (HCM) is a cloud-based HR software that manages a range of HR tasks, including workforce planning, payroll, benefits administration, and talent acquisition. Workday is well-known for its intuitive interface. Its monthly pricing, which starts at nearly \$100 per person, is based on the size of the organization and its unique HR requirements.
- **Asana** - Asana is a project management application that facilitates teamwork, task management, and project tracking. It facilitates task organization and efficient execution. The premium version, which offers greater capabilities, starts at about \$10.99 per user each month, while the basic version is free.
- **Tableau** - Tableau is a potent analytics and data visualization tool that lets users build interactive dashboards out of intricate information. It provides a variety of choices for

visualizing and analyzing data. Tableau Creator is priced at approximately \$70 per user per month; higher-tiered enterprise editions are available for additional features and support.

Benefits of Application Software for Yard of Ale Brewery

- **Enhanced Operational Efficiency:** Application software optimizes operations and resource usage by streamlining a variety of brewing activities, including production management and inventory tracking.
- **Better Decision-Making:** Software helps with production planning, inventory management, and marketing strategies by gathering and evaluating data from many departments.
- **Streamlined Communication:** In a brewery setting with many facets, it promotes smooth departmental communication, making information sharing and teamwork swift and easy.
- **CRM stands for customer relationship management.** By helping businesses manage client information, preferences, and feedback, CRM software enables more individualized marketing campaigns and better customer support.
- **Consistent Quality Control:** Software for quality control makes sure that industry rules are followed, brewing standards are followed, and product quality is consistently maintained.
- **Financial Management:** Accounting software assists in keeping track of spending, managing funds, and producing reports that are essential for the brewery's fiscal analysis and decision-making.

Drawbacks of Application Software for Yard of Ale Brewery

- Budgets may be impacted by the initial investment and implementation costs associated with purchasing and deploying application software, which often include staff training and customization.
- Integration Challenges: Compatibility problems might arise when integrating disparate software systems across departments, necessitating extra work and resources to ensure a smooth integration.
- Dependency on Technology: Relying too much on software might limit manual intervention and innovative solutions, which can impede flexibility in problem-solving and decision-making.
- Security Concerns: Sensitive brewery data is under risk from cyber threats and data breaches, particularly if software systems are not kept up to date or sufficiently secured.
- Possible Downtime: Software updates or technical issues could lead to system outages, which would disrupt brewery operations and perhaps delay output.
- Learning Curve: Employee resistance to new software systems may need time and effort to adjust, which will affect productivity throughout the transition period.

Different viewpoints of using AS in the Yard of Ale

- Management Viewpoint

The management of Yard of Ale Brewery views application software (AS) as a strategically important tool for enhancing operational effectiveness and expansion. They anticipate using AS to increase decision-making, simplify processes, and obtain a competitive edge in the marketplace. Although they accept that an initial investment is necessary, they see it as a

critical long-term investment, one that will likely result in higher productivity, better resource allocation, and possibly even a larger market share. The brewery's management highlights the potential of AS to improve overall performance and market position.

- Employees' Perspective

At first, the implementation of AS may be seen as disturbing by the workers. The learning curve, possible increases in workload as a result of modifications, or position changes as a result of process automation could all be causes for concern. But many workers appreciate AS because it makes repetitive activities easier, cuts down on human error, and gives them access to information that helps them with their everyday work. Over time, they come to appreciate the advantages it offers for their jobs.

- IT Department's Perspective

At Yard of Ale Brewery, the IT department primarily concentrates on the technical viability and functional integration of AS. System integration, data security, and making sure that different software systems operate seamlessly across departments are their top priorities. To preserve the integrity and security of AS and make sure it is in line with the brewery's technology infrastructure and objectives, they place a strong emphasis on routine maintenance, updates, and support.

- Customers' Experience

The application of AS has a significant impact on the customers' experiences with Yard of Ale Brewery. They recognize how AS affects more responsiveness, individualized experiences, and service quality. Better inventory control with AS's help ensures that products are consistently available, which boosts customer satisfaction and loyalty.

- Supplier Relations

Improving supplier relations is another important function of AS. It helps to enhance collaboration, communication, and transparency throughout the supply chain. Suppliers gain

from expedited procedures and on-time delivery, which builds stronger bonds and mutual confidence.

- Financial Viewpoint

The Yard of Ale Brewery's finance division carefully considers AS from a cost-benefit analysis perspective. They compare the expected long-term returns in cost savings and operational efficiency with the initial investment. The department makes that the price of obtaining, putting into use, and maintaining AS is within the budget that has been set out. To estimate future financial gains from using AS and to justify expenses, they keep a careful eye on the return on investment (ROI).

- Legal and Compliance viewpoint

The legal division highlights how important it is for AS to make sure that industry rules and guidelines are followed. They carefully examine AS systems to make sure they comply with regulatory requirements, paying special attention to data security and privacy to reduce the dangers related to sensitive data. The department takes a proactive approach to guaranteeing that the implementation of AS conforms to the relevant legislative frameworks.

- Viewpoint of Marketing and Sales

To collect and evaluate client data, the marketing and sales divisions use AS. Targeted marketing strategies are made possible by AS, which offers insights into consumer preferences and behavior. With the ultimate goal of enhancing customer connection and raising sales efficiency, it helps to refine sales tactics by offering insights into sales patterns and customer interactions.

- Quality Control and Production viewpoint

By streamlining the brewing process, AS has a major impact on the departments of production and quality control. It closely monitors brewing activities in real time to guarantee constant quality. By quickly detecting and correcting irregularities, AS helps to uphold brewing standards and reduce production interruptions.

- Employee Support and Training

The HR division is aware that in order to ensure that staff accept AS with ease, extensive training programs are required. Their main objective is to provide staff members with the skills they need to use AS tools effectively. In order to ensure that staff members are at ease and skilled in utilizing the AS systems, HR also places a strong emphasis on continuing support to handle any issues encountered throughout the adoption phase.

Information systems

An organization's management structure typically breaks down into several tiers, each in charge of particular tasks and decision-making procedures. An overview of these management tiers is provided below:

- Strategic Management

Long-term planning and direction are the purview of strategic management, which sits at the top of an organizational hierarchy. These leaders create a thorough plan for the organization's future by examining market trends, consumer behavior, and industry landscapes. Crucial choices on market positioning, diversification, expansion plans, large investments, and overarching corporate objectives are their main areas of concentration. They formulate the organization's goals and objectives, making sure they are in line with changes in the market and looking for chances for sustained expansion.

- Tactical Management

Located in the middle management tier, tactical managers convert the higher management's high-level strategic goals into workable strategies. They serve as a link between daily operations and strategic decisions. By concentrating on budgeting, departmental goals, resource allocation, and operational plans, they make sure that these activities are in line with more comprehensive strategy. In order to ensure that strategies like marketing campaigns, process enhancements, and departmental collaboration effectively contribute to the

achievement of the organization's strategic goals, tactical managers supervise the implementation of these initiatives.

- **Operational Management**

At the bottom of the management hierarchy, operational management is responsible for directing the day-to-day operations of the organization. They are in charge of putting plans created by tactical and strategic managers into action. Routine tasks including production schedules, inventory control, quality assurance, and staff supervision are the main focuses of operational managers. Their main goal is to guarantee that everyday operations run smoothly, upholding quality standards, honoring deadlines, and promptly addressing any urgent problems that crop up in the operational workflow.

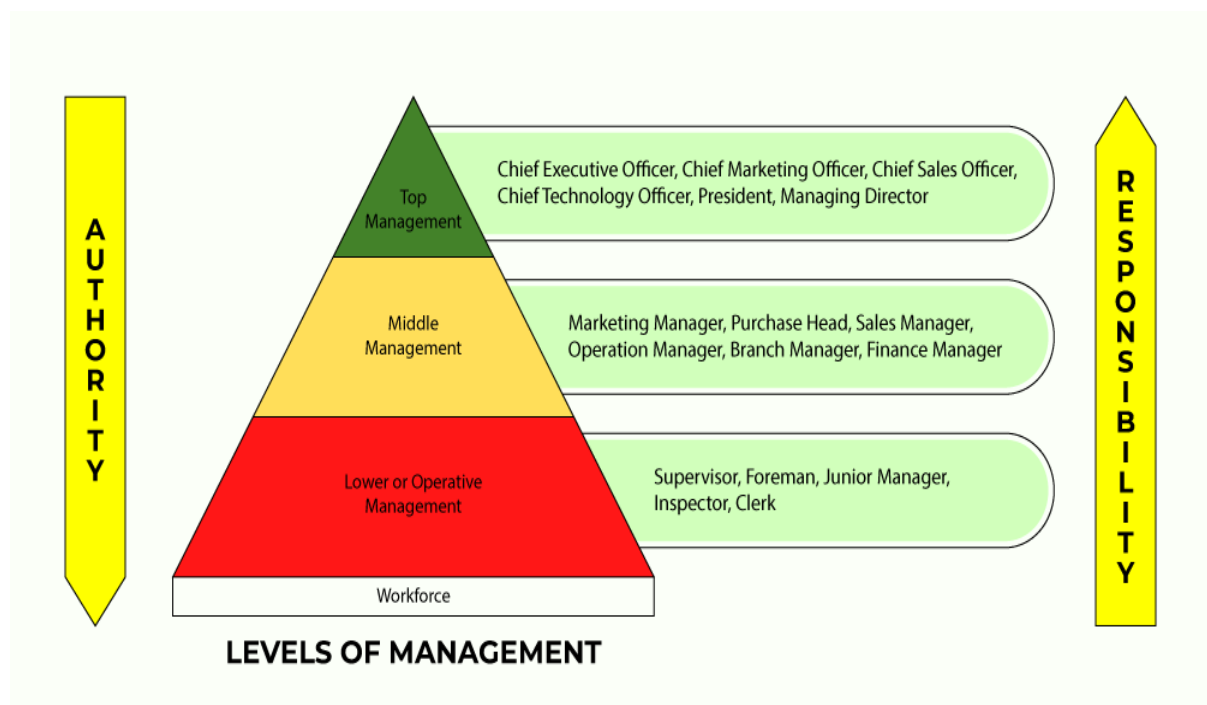


Figure 1: Management Levels

Information system in Yard of Ale

- Strategic Management

At Yard of Ale Brewery, senior executives oversee strategic management. Their main concern is the brewery's long-term planning and direction. To create a plan for the brewery's future, strategic managers examine consumer behavior, competitive environments, and market developments. They take important decisions that affect growth, big investments, market positioning, expansion initiatives, and overall organizational objectives. Their responsibility is to mold the brewery's overarching vision and mission and guarantee that it remains in step with changes in the industry and prospects for continuous expansion.

- Tactical Management

At the center of the organizational structure, tactical management serves as a link between everyday operations and strategic choices. These managers convert the top management's strategic goals into workable plans. They concentrate on operational plans that complement the overarching strategies, budgeting, departmental goals, and resource allocation. In order to make sure that tactics like marketing campaigns, process enhancements, and departmental collaboration are carried out in a way that effectively advances the brewery's strategic objectives, tactical managers supervise their implementation.

- Operational Management

Operational management is in charge of the brewery's daily operations and is positioned at the bottom of the management hierarchy. They are in charge of carrying out the strategies developed by the tactical and strategic managers. Production schedules, inventory control, quality assurance, and staff supervision are just a few of the regular activities and procedures that operational managers concentrate on. Their main goal is to guarantee that the brewery runs efficiently every day, fulfilling quality requirements, keeping to timetables, and promptly addressing any problems that crop up in the daily process.

The current support available for different level managers for decision making of Yard of Ale.

At Yard of Ale Brewery, decision-making support is customized to meet the unique requirements and responsibilities of tactical, operational, and strategic managers at different management levels.

- **Strategic Management**

High-level strategic managers use strategic dashboards and sophisticated data analytics tools to obtain a thorough understanding of customer behavior, market trends, and industry environments. In order to determine the brewery's future course, these tools are essential for long-term planning and decision-making. Furthermore, professional advice is available through external consultants and advisory services, which helps with important choices about big investments, expansion plans, and market positioning. These tools are used by the strategic management team to develop the brewery's overarching vision and guarantee that it is in line with changes in the industry for long-term growth and market leadership.

- **Tactical Management**

Middle management makes use of department-specific business intelligence technologies. These technologies facilitate resource allocation, operational plans, and marketing strategies that are in line with overarching goals by providing data visualization, KPI tracking, and comprehensive reports. Managers are able to make more targeted decisions thanks to department-specific insights obtained from reports and analytics. To ensure efficient use of resources, the marketing department, for example, uses consumer behavior analytics to fine-tune campaigns that align with strategic goals.

- **Operational Management**

The lowest level of operation managers relies on inventory management tools and real-time operational data platforms like ERP. At the conclusion of each batch, these systems create operational data files in CSV or Excel that offer insights into production schedules, inventory

levels, and quality control. Fast decision-making is made possible by the instant feedback loops from manufacturing lines and quality control systems, ensuring seamless daily operations. Operational managers can solve urgent problems in the operational process and preserve efficiency with the aid of this support structure.

Key features of Business intelligence functionalities

- **Outlay Analysis**

Outlay analysis is a critical facet of Business Intelligence, involving a detailed examination of expenditure patterns to optimize costs and enhance financial strategies. Within the context of Yard of Ale Brewery, utilizing BI tools for outlay analysis entails a comprehensive scrutiny of expenses incurred across various operational domains. This includes diving into raw material procurement costs, production line expenditures, operational overheads, and distribution expenses. By leveraging these tools, Yard of Ale can uncover inefficiencies or disproportionate spending in certain areas, such as excessive procurement costs due to vendor contracts or inefficiencies in the production process. This analysis enables the brewery to streamline expenses, negotiate better deals with suppliers, and improve operational efficiency. Ultimately, optimizing expenditures through BI-powered outlay analysis contributes to bolstering the brewery's financial health and resource utilization.

- **Outlay Analysis of Yard of Ale**

For Yard of Ale Brewery, conducting outlay analysis involves a meticulous examination of its expenditure landscape using Business Intelligence tools. By dissecting costs across departments, production units, and supply chain activities, Yard of Ale gains a granular understanding of its financial outlay. For instance, the analysis might reveal higher-than-anticipated production costs attributed to inefficiencies in the brewing process. Furthermore, it might highlight areas where operational expenses exceed projections, providing insights into potential cost-saving measures. With this data-driven approach, Yard of Ale can identify opportunities for optimization, whether through renegotiating procurement contracts, enhancing production efficiency, or streamlining operational processes. This facilitates better

budgeting, resource allocation, and financial decision-making, ultimately contributing to improved profitability and operational efficacy for the brewery.

- Comparative Analysis

Comparative analysis in Business Intelligence involves evaluating an organization's performance metrics against industry standards or competitors' benchmarks. This methodology provides insights into where a company stands in relation to its peers within the market. Utilizing this approach, businesses can gauge their strengths and weaknesses across various facets such as sales, operational efficiency, and market share. By comparing Yard of Ale Brewery's performance indicators against industry standards, this analysis aids in identifying areas of competitive advantage and potential improvement.

- Comparative Analysis of Yard of Ale

For Yard of Ale Brewery, conducting comparative analysis entails benchmarking its sales figures, market share, and operational efficiency against industry standards and rival breweries. This approach allows the brewery to assess its market positioning and performance. For instance, such analysis might uncover that Yard of Ale holds a significant market share in a specific beer segment but might lag behind competitors in terms of distribution efficiency. By leveraging these insights, the brewery can fine-tune strategies to capitalize on its strengths and address operational weaknesses, facilitating a more competitive stance in the industry. Ultimately, this data-driven comparison aids Yard of Ale in making informed decisions, guiding its efforts to reinforce strengths and enhance competitiveness within the beer market.

- Diversification

Diversification, within the realm of Business Intelligence, involves exploring opportunities for expanding or diversifying an organization's products, services, or market reach. For Yard of Ale Brewery, leveraging BI tools for diversification means analyzing market trends, consumer preferences, and demand patterns to identify potential areas for expansion. By examining these insights, the brewery can strategize new beer variants, explore new market segments, or even consider innovative approaches to cater to evolving consumer tastes. Utilizing data-driven

insights through BI facilitates Yard of Ale Brewery's ability to make informed decisions regarding diversification strategies, thereby enhancing its portfolio and potentially capturing new market shares.

- **Diversification of Yard of Ale**

Diversification analysis for Yard of Ale Brewery involves using Business Intelligence tools to evaluate opportunities for expanding its product offerings or venturing into new market segments. This approach includes a detailed examination of market dynamics, consumer behavior, and emerging trends within the beer industry. For example, the analysis might reveal a rising demand for craft beers among specific demographics, presenting an opportunity for Yard of Ale to diversify its product line. By leveraging these insights, Yard of Ale can strategically introduce new beer variants or explore untapped market niches, driving growth and market penetration. Ultimately, BI-driven diversification analysis empowers Yard of Ale Brewery to make informed decisions, facilitating agility and innovation in responding to market demands.

- **Risk Analysis**

Risk analysis, within the context of Business Intelligence, involves identifying, assessing, and mitigating potential risks that may impact an organization's operations or objectives. For Yard of Ale Brewery, utilizing BI tools for risk analysis includes evaluating various factors like market volatility, regulatory changes, supply chain disruptions, or changes in consumer preferences. By employing predictive models and data analytics, Yard of Ale can foresee potential risks, enabling the development of proactive risk management strategies. For instance, BI-powered risk analysis might indicate vulnerabilities in the supply chain due to dependencies on specific suppliers. This insight prompts the brewery to diversify its supplier base, reducing the risk of disruptions. Effective risk analysis through BI empowers Yard of Ale to anticipate challenges and implement strategies to minimize their impact, ensuring business continuity and resilience.

- Risk Analysis of Yard of Ale Company

Risk analysis for Yard of Ale Brewery involves using Business Intelligence tools to assess potential risks that could affect its operations and market position. This analysis encompasses evaluating market dynamics, regulatory changes, and supply chain vulnerabilities. For example, the analysis might reveal that fluctuations in raw material prices pose a risk to production costs. By leveraging these insights, Yard of Ale can devise risk mitigation strategies, such as hedging strategies for raw material procurement or flexible pricing mechanisms. This data-driven approach enables Yard of Ale to proactively address risks, enhancing its ability to navigate uncertainties and maintain operational stability in a dynamic market environment.

Comparison of decision support systems, management levels and their benefits

Advantages and Disadvantages of different information support systems

Information system	Advantages	Disadvantages
Executive support system (ESS)	<ul style="list-style-type: none"> • Facilitation of strategic decision-making. • high-level knowledge for senior executives. • Integration of external data. • Effective exchange of information among executives. • Efficiency of time when making decisions. • versatility in terms of data formats. • Don't lose sight of the KPIs. 	<ul style="list-style-type: none"> • high implementation start-up expenses. • System complexity calls for knowledgeable staff. • worries about data security. • reliance on high-quality data. • opposition to changes within the organization. • Requirements for training to utilize effectively.

	<ul style="list-style-type: none"> • interface design that is easy to use. • planning scenarios and forecasting. • Gain a competitive edge with real-time intelligence. 	<ul style="list-style-type: none"> • Difficulties in integrating different data sources. • restricted adaptability in some systems. • Possibility of information overload. • Updates and ongoing maintenance are necessary.
Decision support system (DSS)	<ul style="list-style-type: none"> • Better judgment. • flexibility in a variety of situations. • instantaneous access to information. • thorough investigation of the scenarios. • increased decision-making process efficiency. • assistance for team collaboration. • comprehensive understanding using both internal and external data. • Facilitation of strategic planning. • help for problem solving with data. 	<ul style="list-style-type: none"> • high costs of implementation. • complexity of system operation. • Dependency on data quality. • issues related to integration from several sources. • opposition to changes within the organization. • sensitive data security issues. • An excessive focus on technology. • Requirements for maintenance to ensure peak performance. • Possibility of information overload.

	<ul style="list-style-type: none"> • Gaining a competitive edge by taking initiative. 	<ul style="list-style-type: none"> • Danger of misinterpreting the information
Transaction processing system(TPS)	<ul style="list-style-type: none"> • regular transactions are automated. • Guaranteed precision of data. • Transaction processing speed. • the capacity to handle high amounts scalable. • monitoring and auditing of transactions. • uniformity in the processing. • processing transactions in real time. • improved assistance to customers. • improvements in operational efficiency. • dependability when managing transactional data. 	<ul style="list-style-type: none"> • Possible outage of the system. • susceptibility to threats to security. • restricted ability to analyze. • reliance on the infrastructure. • rigidity in handling intricacy. • high implementation start-up expenses. • restricted capacity for decision support. • Redundant data can have risks. • requirements for user training. • Problems integrating with different systems.

Table 9: Advantages and Disadvantages of different information support systems

New suggestion of information system for Yard of Ale From Author

The systems that Yard of Ale now has in place to support executives, handle transactions, and aid in decision-making are performing admirably. However, picture a brand-new tool, a Management Support Information System (MSIS), that functions as a wizard-like mentor for their managers. This new system would be more than simply a monitoring tool; it would act as a crystal ball, identifying future client needs and assisting managers in making informed decisions.

Consider it as a useful dashboard that displays what is in stock, what is selling, and what customers have to say about. Yard of Ale's secret weapon would be this MSS, which would enable them better serve their clients by informing them to trends.

This proposal is about changing Yard of Ale's operations, rather than just about getting new technology. It allows them to stay ahead of the trend and provide customers with what they want in an ever-changing world.

Introduction of Management Support Information Systems(MSIS)

Management Support Information Systems (MSIS) are the designers of strategic strength and operational efficiency in the complex web of contemporary corporate operations. These systems are a subset of information systems that have been carefully created to support managerial decision-making and optimize organizational procedures. MSIS is a sophisticated fusion of technology, analytics, and managerial acumen that goes well beyond the domain of conventional data tracking or transactional processing. This concerto enables executives to navigate the complicated corporate landscape with accuracy and vision.

Fundamentally, MSIS is the key to converting unprocessed data into useful intelligence. It's more than just a data bank; it's the catalyst for well-informed choices, creativity, and coordinating the coordination of various organizational aspects. Through the seamless integration of data analytics, forecasting tools, and collaboration platforms, MSIS serves as

the compass for management activities, empowering companies to quickly adapt, flourish in changing marketplaces, and create experiences that have a lasting impact on their customer base.

The importance of MSIS goes beyond the simple application of technology; it represents a paradigm change—a cultural development in which strategic goals and data-driven insights coexist harmoniously, and where the union of managerial skill with technology creates a world full of opportunities. In an era characterized by rapid change and unmatched connectedness, MSIS's role as businesses traverse the always changing landscape of global commerce emerges not only as an enabler but also as a transformative force, a catalyst that drives enterprises towards lasting success.

Advantages and Disadvantages of Management Support Information Systems(MSIS)

Advantages of MSIS	Disadvantages of MSIS
<ul style="list-style-type: none"> • helps in making well-informed decisions. • increases the effectiveness of operations. • improves data integration and teamwork. • utilizes analytics to deliver important insights. • provides adaptability to changing requirements. • permits a speedier reaction to changes in the market. • improves departmental communication. • simplifies difficult procedures. 	<ul style="list-style-type: none"> • high maintenance and implementation costs. • Complexities could call for specific education. • vulnerability to cybersecurity threats has increased. • reliance on uptime and system dependability. • Possible opposition to change from the workforce. • Potential incompatibilities with current systems. • Information overload resulting in disarray.

<ul style="list-style-type: none"> • encourages creativity and problem-solving. • maximizes the distribution of resources. 	<ul style="list-style-type: none"> • Continuous upgrades and updates are required. • Potential hiccups when integrating the systems. • difficulties in preserving the quality and accuracy of data.
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Table 10 : Advantages and Disadvantages of Management Support Information Systems(MSIS)

Comparison of IS in different levels of organization

Facts	Strategic Level	Tactic Level	Operational Level
Description	Comprehensive, analytical systems that support long-term planning and strategic decision-making are described as the strategic level.	Systems designed to keep an eye on, manage and improve departmental activities	Systems that are geared toward everyday tasks and daily transaction processing.
Usages	High-level decision-making, market analysis, forecasting, and strategic planning.	Medium-term decision-making, performance monitoring, resource allocation, and budgeting.	Processing orders, managing inventories, making decisions instantly.
Usable software	Executive information systems (EIS) and decision support systems (DSS)	DSS and some management information systems (MIS).	Basic reporting tools, Transaction Processing Systems (TPS).

Workers	Board members and senior executives	Department leaders and middle managers.	Front-line employees, operational staff.
Duties	Responsibilities include goal-setting, defining corporate direction, and assessing market trends.	Responsibilities include managing teams and making sure departmental objectives line up with strategic goals.	Task execution, transaction management, and smooth operation are among the responsibilities.
Human relationship	High	Moderate	Low
Conceptual decision making	High	Moderate	Low
Technical supports gaining	High	Moderate	Low
How IS effect	Has an impact on the organization's long-term goals and strategic orientation.	Boosts departmental activities' efficacy and efficiency.	Makes everyday tasks easier to carry out precisely and without error

Table 11 : Different Management Levels

Business intelligence

A changing combination of technology, data analytics, and strategic decision-making, business intelligence (BI) represents an opportunity for corporations. In its most basic form, business intelligence (BI) is the methodical process of gathering, evaluating, and turning raw data into usable insights. This process gives organizations the ability to make wise decisions and obtain a competitive advantage in a changing marketplace.

BI is the foundation of the data-driven age we live in today, acting as a compass to help us navigate a maze of information overload. It makes use of cutting-edge technologies to turn massive amounts of data into interesting patterns and trends, such as data warehousing, analytics tools, and visualization approaches. This makes it possible for stakeholders at different organizational levels to quickly understand complicated facts and identify potential hazards as well as hidden opportunities.

With basic data manipulation, business intelligence (BI) is a mentality that views information as a strategic advantage. By offering real-time data, encouraging active initiatives, and encouraging a forward-thinking approach to corporate operations, it gives decision-makers more authority.

Organizations are guided toward operational excellence, agility, and innovation by BI, which acts as a catalyst. It gives businesses the insight to quickly adjust to changes in the market, maximize operational effectiveness, and create products and services that truly appeal to their customers. BI is essentially the driving force behind the transformation of unprocessed data into priceless knowledge, enabling firms to accurately and strategically navigate the intricacies of the contemporary business environment.

Business intelligent tools

- SAP Business Objects

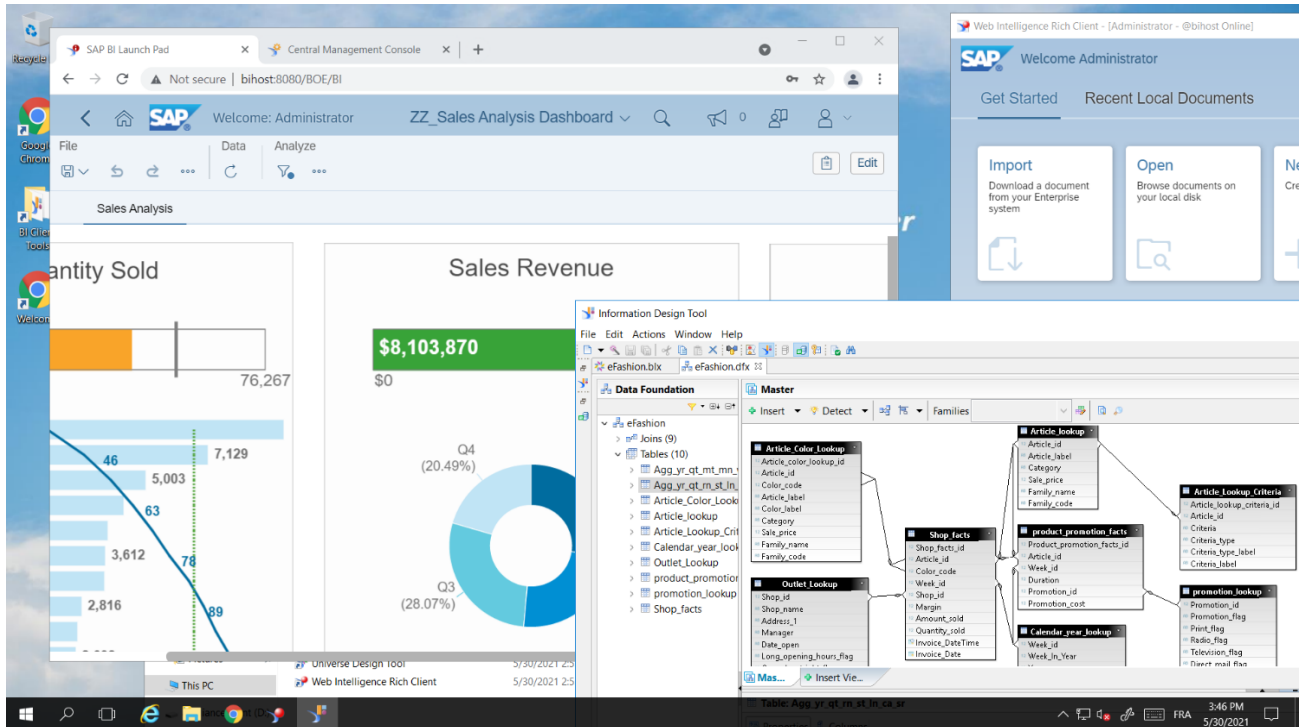


Figure 2 : SAP business Objects

SAP Business Objects is defined by its wide range of business intelligence solutions that encompass reporting, analytics, and visualization. It enables users to retrieve, examine, and disseminate insights from many data sources, promoting improved decision-making within the company. Because of its scalability, which allows it to effectively manage massive volumes of data, it is robust. Its smooth interaction with SAP systems further increases its allure for companies using SAP infrastructure by providing a unified analytics solution inside their current setting.

- Data pine

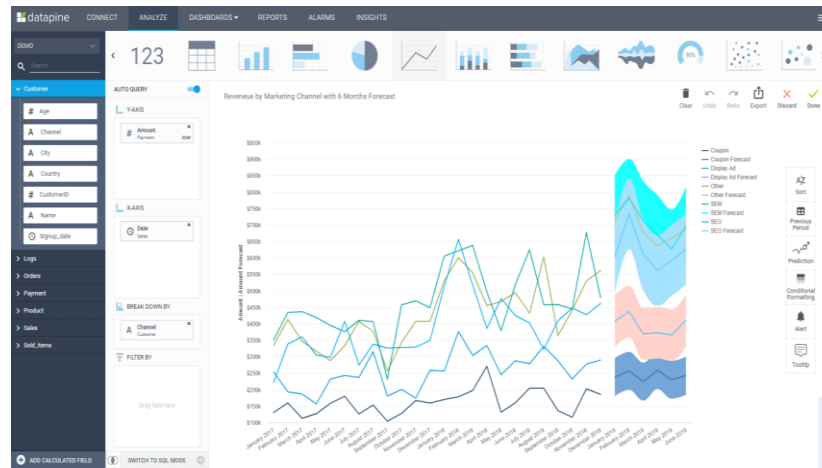


Figure 3: Data pine

Data pine's intuitive data exploration and visualization platform is cloud-based and user-friendly. It gives customers the ability to generate interactive reports and dashboards without requiring a lot of technical expertise. It is the perfect option for small to mid-sized enterprises looking for robust analytics capabilities without the complexity because of its accessibility and simplicity. Due to its cloud-based architecture, teams may quickly obtain actionable insights and enjoy ease of access and communication.

- MicroStrategy

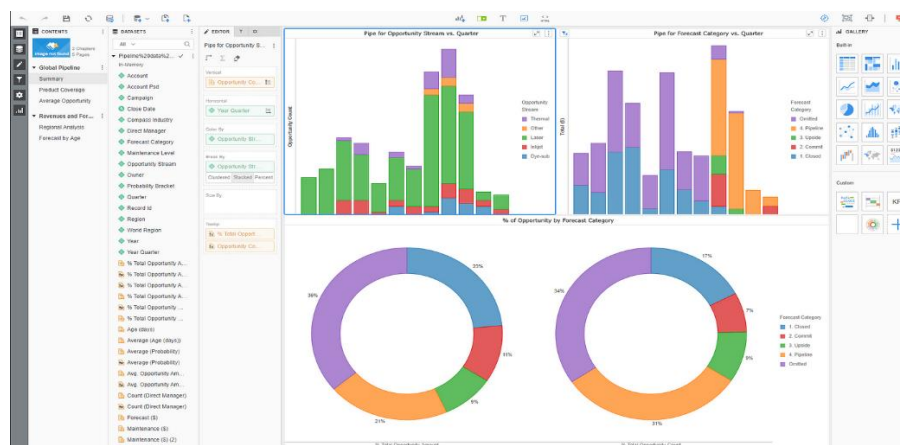


Figure 4 : MicroStrategy

Known for its wide analytics features and scalability, MicroStrategy is a highly regarded provider of enterprise-grade BI platforms. With features for mobile analytics, predictive analytics, and data discovery, it meets the demands of major businesses managing enormous and intricate datasets. Because of its depth of analysis and ability to handle a variety of data sources, it is the go-to option for businesses looking for strong analytics skills.

- SAS Business Intelligence



Figure 5 : SAS Business Intelligence

The quantitative strength and statistical capabilities of SAS BI's package of tools for data visualization, analytics, and reporting make it stand out. It enables users to glean valuable insights from complicated data, which promotes well-informed decision-making. Because of its strength in handling complex statistical analysis, SAS BI is a useful tool for businesses whose strategic decision-making processes depend on in-depth data analysis.

- Yellowfin BI

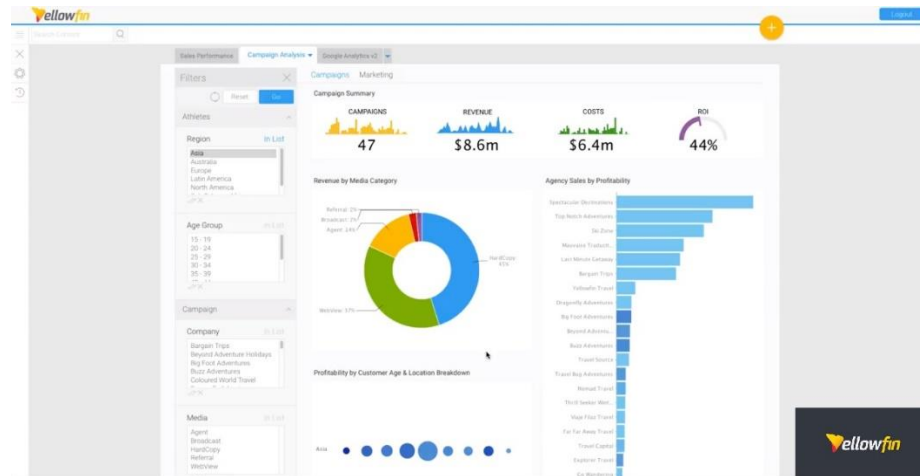


Figure 6 : Yellofin BI

Promoting a culture of data-driven decision-making, Yellowfin BI places a high priority on user-friendliness and collaboration. Users throughout an organization may easily access and utilize it because of its focus on narrating stories through data visualization. The goal of Yellowfin BI's interactive and aesthetically pleasing dashboards is to successfully engage users with data, improving their comprehension and ability to make decisions.

- Qlik Sense



Figure 7 :Qilk Sense

Interactive data exploration and visualization are at the heart of QlikSense's self-service BI solution. Because of its associative model, users can instantly discover ideas by exploring data correlations in real-time. QlikSense emphasizes user-driven exploration, which makes it possible for users to quickly and simply browse through data and find hidden insights.

- Zoho Analytics

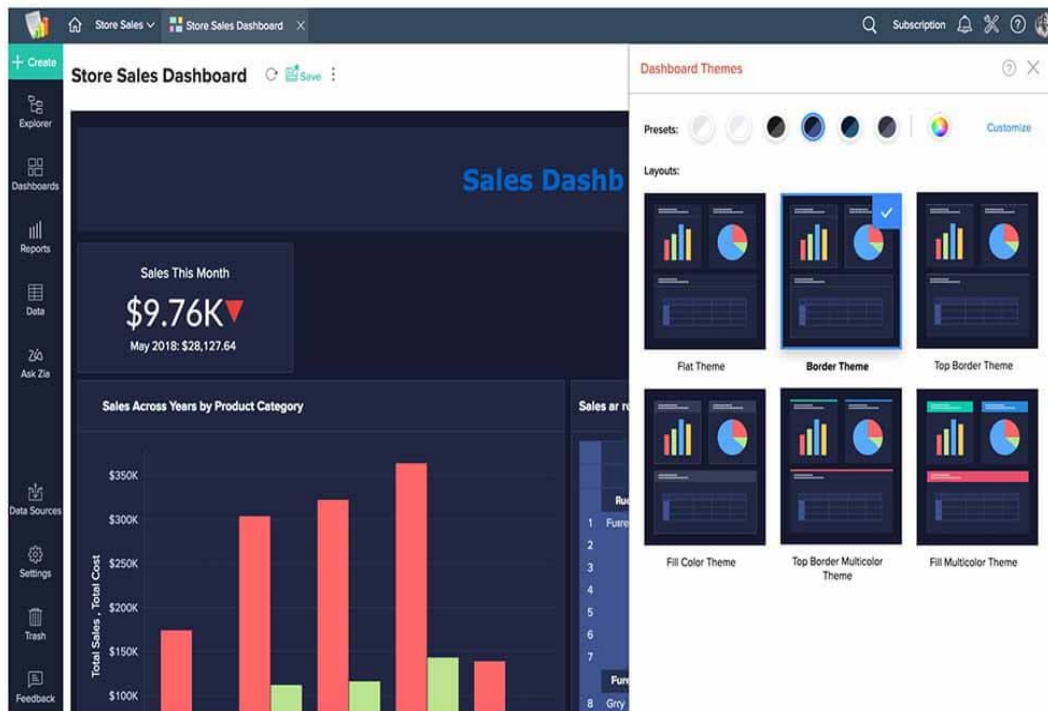


Figure 8 : Zobo Analytics

With a large selection of data visualization choices, Zoho Analytics' adaptability makes it suitable for enterprises of all sizes. Users may easily generate and share analytical reports and dashboards with others thanks to its user-friendly interface. Because of its versatility, Zoho Analytics is a good option for businesses looking for a BI product that is both adaptable and customized.

- Sisense

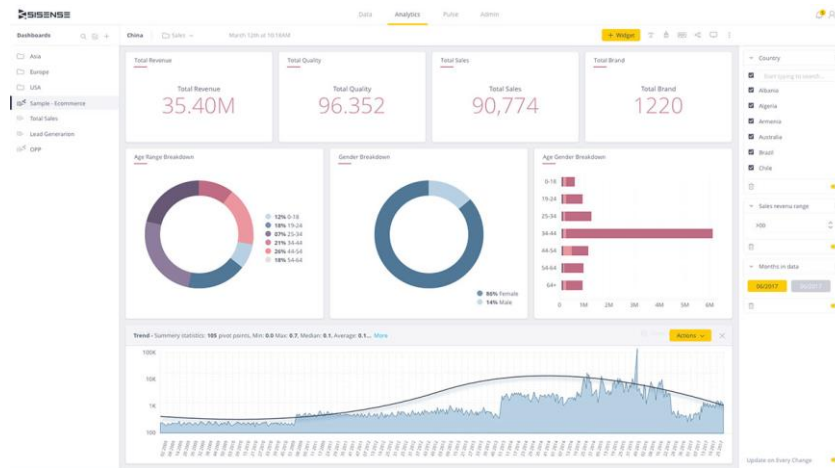


Figure 9: Sisense

Sisense allows users to mix different data sources for thorough analysis and visualization thanks to its scalability, strong analytics, and data preparation tools. It makes complicated data structures simpler, enabling users to quickly get useful insights. Sisense is useful for companies needing a consolidated picture of their data because of its emphasis on managing many data sources effectively.

- Microsoft Power BI

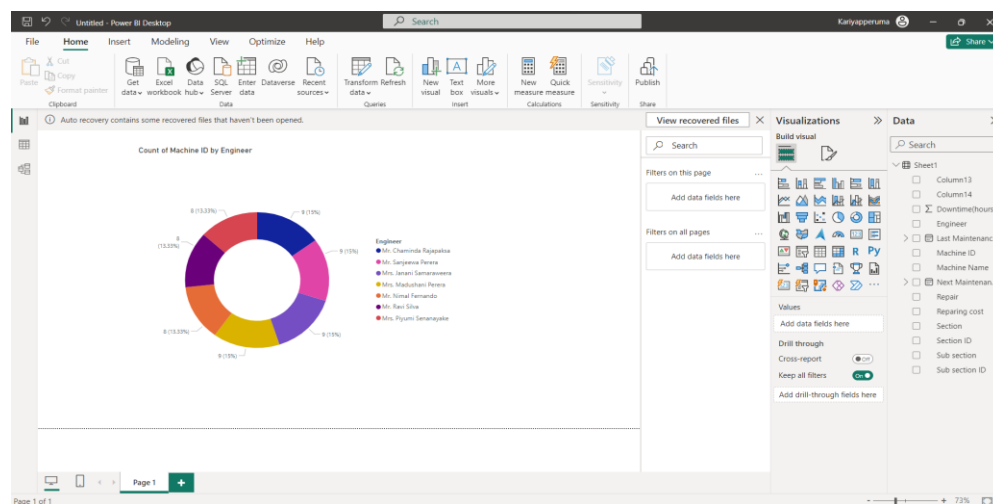


Figure 10 : Microsoft Power BI

Powerful data visualization, interactive dashboards, and AI-powered analytics are ensured by Microsoft Power BI's connectivity within the Microsoft environment. It provides a smooth and comfortable environment for data analysis to a wide range of businesses, from startups to major multinationals. Businesses that depend on Microsoft products often use it because of its accessibility and integration opportunities within the Microsoft suite.

- Looker

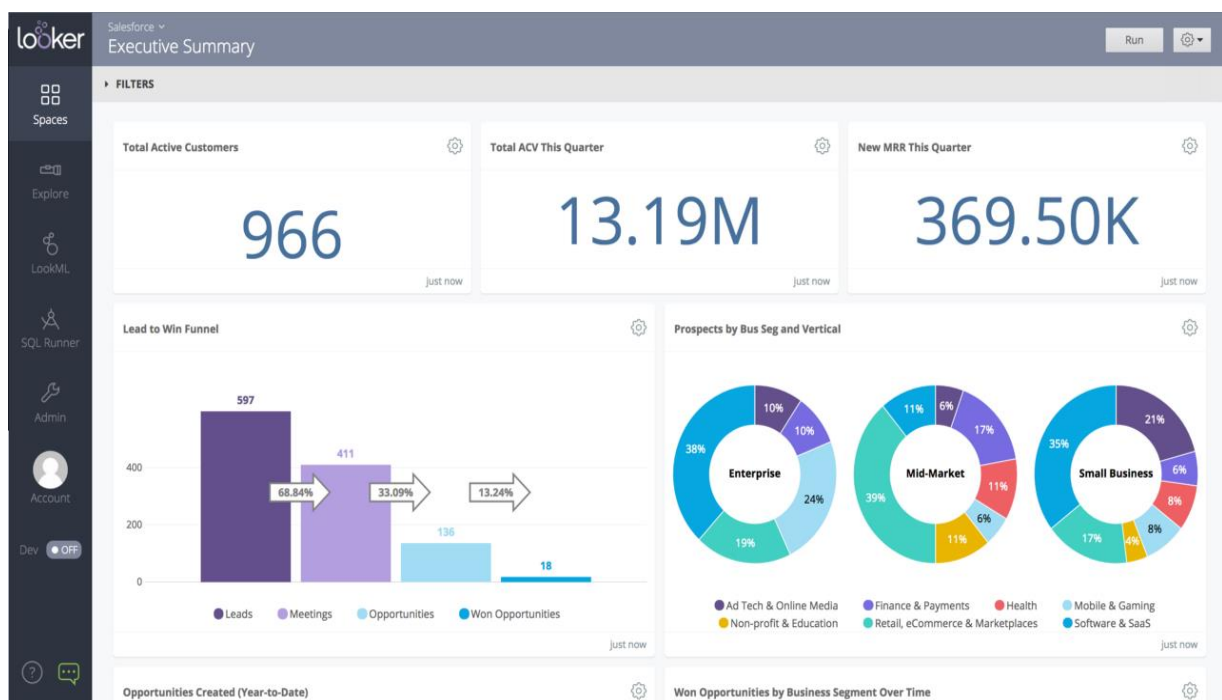


Figure 11 : Looker

Looker's focus on teamwork and data exploration makes it easy for users to produce and distribute insights based on data. Looker facilitates collaboration and a common understanding of data by providing a single picture of the data throughout an organization, which helps to make well-informed decisions.

- Clear Analytics

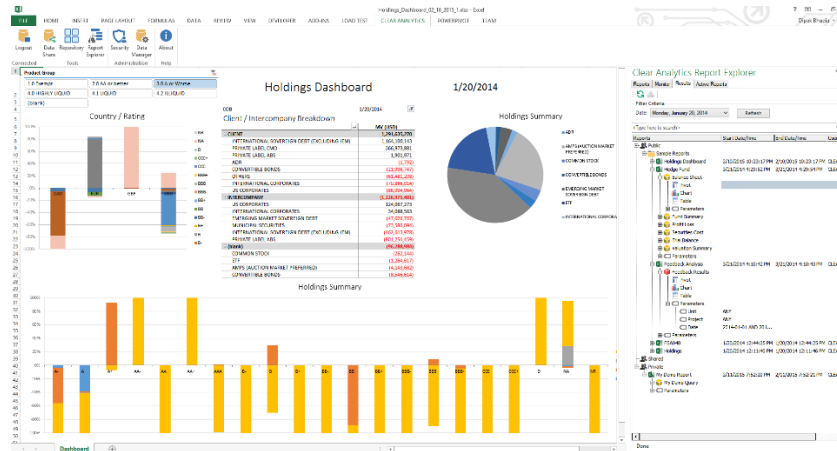


Figure 12 : Clear Analytics

By filling the gap between Excel's functionality and BI capabilities, Clear Analytics enables users that are already comfortable with Excel to complete complex analytics and reporting jobs with ease. Because of its interaction with Excel, customers who want to take use of BI functions but still know Excel's interface can transfer more easily.

- Tableau

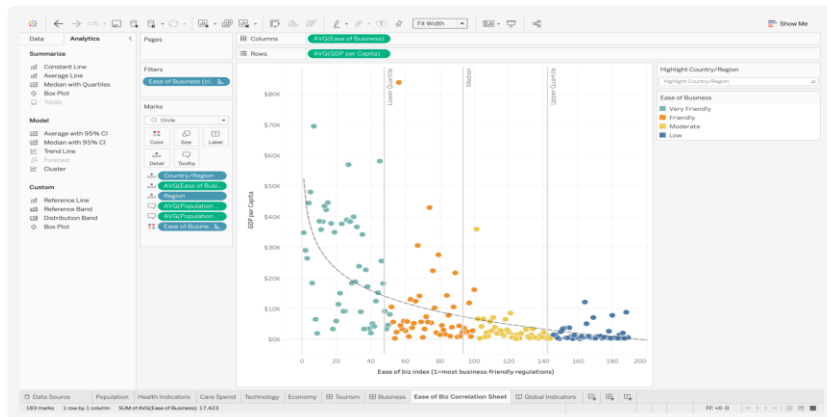


Figure 13 : Tableau

Users can build interactive and visually appealing dashboards with Tableau's intuitive data visualization features, making complex data easier to understand for stakeholders. People in all kinds of companies may interact with data in an efficient manner thanks to its intuitive interface, which promotes well-informed decision-making.

- Oracle BI

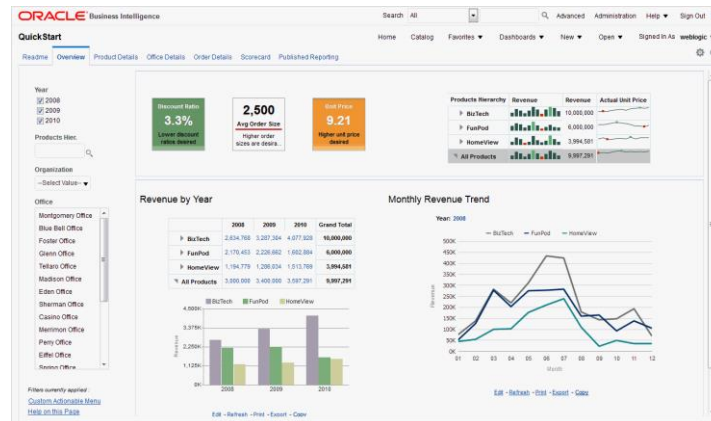


Figure 14 : Oracle

Large businesses can benefit from Oracle BI's wide range of tools for reporting, analytics, and data visualization as well as its scalability and integration with Oracle databases. Organizations managing complex data ecosystems choose it because of its efficiency in handling large volumes of data.

- Domo

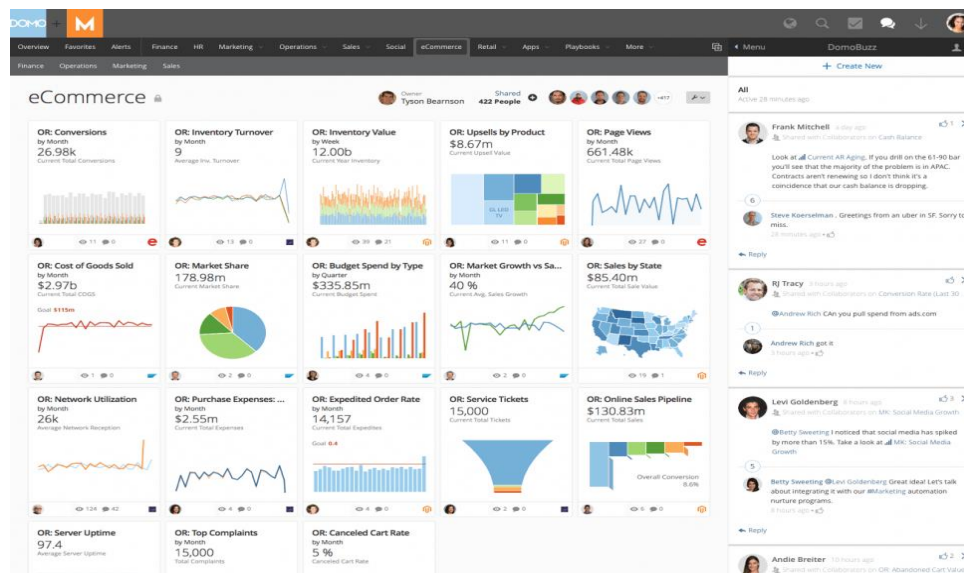


Figure 15 : Domo

By connecting data sources, Domo's cloud-based platform allows for real-time data analysis and visualization. By offering easily accessed and useful insights, it serves corporate users who are looking for flexibility in their decision-making.

- IBM Cognos Analytics



Figure 16: IBM Cognos

Using data generated by AI to support decision-making at all organizational levels, IBM Cognos Analytics focuses on self-service analytics, reporting, and dashboard design. Its focus on AI-driven insights improves analytics' range and usefulness for well-informed decision-making procedures.

Business analysis techniques

Business Process Modeling (BPM)

This technique entails putting current or planned business processes into written form and visualizing them. BPM might be utilized by Yard of Ale to plan out every aspect of their brewing process, from sourcing ingredients to packaging and delivery. Yard of Ale is able to

pinpoint inefficiencies, bottlenecks, and areas for improvement in its brewing procedures by generating process flowcharts.

- How Yard of Ale Uses BPM

Map out the exact steps involved in making their beer using BPM to find areas where time or resources are being wasted. This can improve quality control procedures, expedite inventory management, and maximize productivity.

- Graphical representation for Yard of Ale

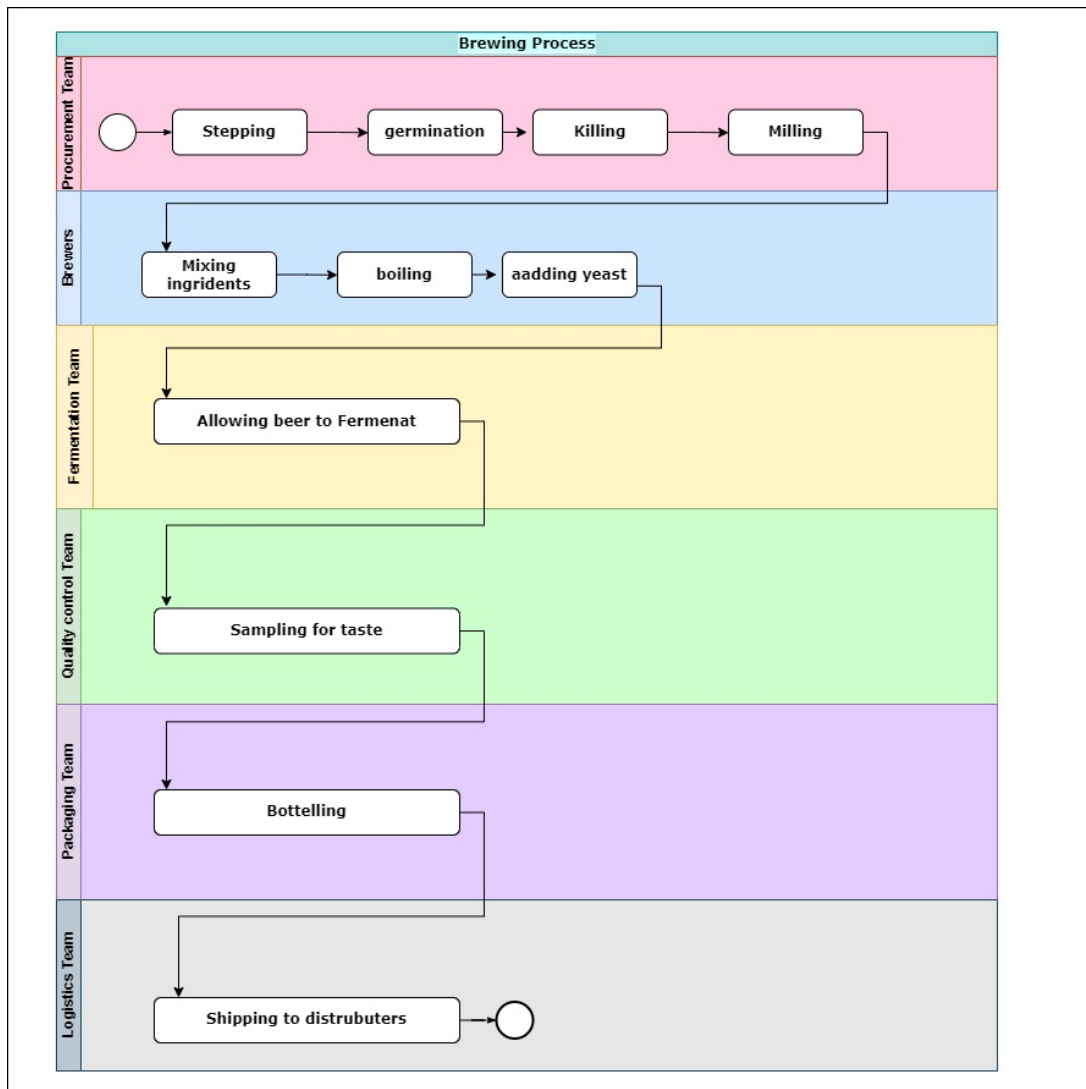


Figure 17 : Graphical representation of BPM (developed by author)

Brainstorming

Brainstorming promotes candid conversations and the production of ideas. To come up with creative ideas for new beer recipes, marketing plans, or process upgrades, Yard of Ale's brewing team, marketers, and operational staff can participate in brainstorming sessions.

- **How to Use Yard of Ale Brainstorming Techniques**

To generate ideas for new flavors, package designs, or marketing initiatives, hold brainstorming meetings on a regular basis. This kind of teamwork can produce original ideas and innovative solutions.

CATWOE

This method of problem-solving looks at the Customers, Actors, Transformation, Owner, and Environment components of a system. CATWOE can be used for Yard of Ale in order to evaluate the effects of introducing new brewing technologies or process enhancements.

- **How to Utilize Yard of Ale's CATWOE**

Examine how the introduction of a new brewing technology (such as automated fermentation) would impact the following: existing brewery practices (worldview), customers' tastes, brewery employees, ownership concerns, and the wider environmental impact

Moscow (Must or Should, Could or Would)

This prioritization technique divides project requirements into four categories: Must, Should, Could, and Would. Yard of Ale may utilize Moscow to rank brewery enhancements in order of importance and separate essential changes from extra features.

- **How to Utilize Yard of Ale's Moscow:**

Based on what is necessary (Must-have) to improve quality, what should be included (Should-have) for operational efficiency, and what would be advantageous (Could-have or Would-have) for future expansion, prioritize brewing equipment upgrades or process optimizations.

MOST (Mission, Objectives, Strategies, and Tactics) Analysis

Organizational missions are matched with particular goals, plans, and techniques through the use of MOST (Mission, Objectives, Strategies, and Tactics) Analysis. MOST Analysis is a tool that Yard of Ale can use to make sure that their brewing practices support their goal of producing high-quality craft beer.

- **How Yard of Ale Uses MOST Analysis**

Ensure that brewing techniques support the goal of creating high-quality artisan beer. Establish goals like preserving premium ingredients, devise plans to create inventive brewing methods, and use strategies like routine quality inspections to accomplish these goals.

PESTLE Analysis

This method assesses the outside influences on an organization, including those that are Political, Economic, Social, Technological, Legal, and Environmental. PESTLE Analysis is a useful tool for Yard of Ale to comprehend market trends, legal requirements, and consumer preferences within the craft beer sector.

- **How Yard of Ale Uses PESTLE Analysis**

To adapt and prosper in the industry, consider the effects of evolving rules on brewing procedures, technological developments in brewing apparatus, changes in customer preferences, and environmental sustainability trends.

Six Thinking Hats

Using Six Thinking Hats during talks entails taking into account various points of view. This method can be used by Yard of Ale in strategy meetings to examine new approaches to brewing, marketing, and business growth.

- **How to Use Yard of Ale's Six Thinking Hats:**

As you hold discussions about introducing new beer types, assign team members different "hats" (creativity, rationality, optimism, etc.) to ensure that a range of perspectives are taken into account for thorough decision-making.

SWOT analysis

SWOT analysis evaluates the opportunities, threats, weaknesses, and strengths of a company. To find areas for improvement, competitive advantages, and market expansion potential, Yard of Ale can perform a SWOT analysis.

- How Yard of Ale Uses SWOT Analysis

To enable well-informed strategic planning, identify concerns including heightened competition, opportunities in emerging beer markets, distribution channel problems, and distinctive brewing techniques.

- SWOT Analysis for Yard of Ale

Strengths	Weakness
Varied and Unique Beer Portfolio Strong Customer Loyalty Programs Consistent Quality Control in Brewing Innovative Brewing Techniques Experienced Brewmasters and Staff Well-Established Brand Presence Positive Reputation for Taste and Quality Well-Defined Marketing Strategies Effective Distribution Network Engaged and Supportive Customer Base	Limited Geographic Market Presence Dependence on Seasonal Demand Vulnerability to Fluctuations in Raw Material Prices Limited Budget for Marketing Initiatives Lack of Advanced Brewing Technology Reliance on Specific Suppliers or Ingredients Insufficient R&D for New Brew Development Inadequate Digital Marketing Efforts Narrow Range of Product Offerings Challenges in Brand Differentiation
Opportunities	Threats
Expansion into Untapped Markets Development of E-commerce Platforms Collaboration with Local Breweries or Festivals Introduction of Limited Edition Brews	Increasing Competition from Craft Breweries Stringent Government Regulations on Alcohol Sales

<p>Incorporation of Health-Conscious or Organic Brews</p> <p>Product Line Diversification (Ciders, Flavored Beers)</p> <p>Leveraging Social Media for Marketing</p> <p>Creating Brewery Tours or Experiences</p> <p>Partnering with Restaurants or Events for Promotions</p> <p>Focusing on Sustainable Brewing Practices</p>	<p>Economic Downturns Affecting Consumer Spending</p> <p>Global Pandemic Impacts on Brewery Operations</p> <p>Changes in Consumer Preferences or Tastes</p> <p>Fluctuations in Raw Material Costs (Hops, Barley)</p> <p>Supply Chain Disruptions (Transportation, Imports)</p> <p>Rising Taxes or Tariffs on Alcohol Sales</p> <p>Environmental Concerns Impacting Brewing Practices</p> <p>Negative Publicity or Recalls affecting Brand Image</p>
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Table 12 :SWOT analysis for Yard of Ale (Developed by Author)

Data Mining

Large-scale data sets can be analyzed using data mining, a potent technique that can reveal important links, trends, and insights. It uses a variety of methods, such as statistical analysis, machine learning, and database querying, to find information that is concealed within datasets.

Generally speaking, data mining makes it possible to examine vast amounts of data in order to find patterns, correlations, and anomalies. For example, it might be useful in retail to comprehend the preferences and buying habits of customers. It helps with illness risk factor identification and treatment protocol optimization in the healthcare industry. It is employed in finance to identify fraudulent transactions and forecast market movements.

All things considered, data mining is a flexible technique that can be used in a variety of industries. It enables companies and researchers to draw useful conclusions from large, complicated data sets, which promotes better decision-making and results.

Characteristics of data mining

- **Pattern Recognition:** To support predictive analysis and well-informed decision-making, data mining focuses on finding patterns, relationships, and correlations within data that may not be immediately obvious.
- **Scalability:** It can analyze enormous datasets from a variety of sectors and areas since it can manage massive volumes of data efficiently.
- **Many Techniques:** To extract useful information from unprocessed data, it makes use of a variety of techniques, including statistical analysis, machine learning algorithms, clustering, classification, and association.

- **Automated examination:** By automating the process of finding patterns, data mining technologies save manual labor and allow for the quick examination of enormous datasets.
- **Predictive Capabilities:** Data mining can help with forecasting and proactive decision-making by predicting future trends, behaviors, or results by studying previous data.
- **Finding of Insights:** It unearths previously undiscovered yet important insights that help companies improve their operations, comprehend consumer behavior, and formulate more effective strategies.
- **Iterative Process:** To assure accuracy and dependability of insights, data mining is an iterative process comprising several processes, such as data cleaning, preprocessing, model construction, assessment, and refining.
- **Applicability Across Domains:** Because of its adaptability, it may be used in a variety of domains, including retail, marketing, healthcare, finance, and more, to provide specialized solutions for certain sector problems.
- **Decision Support Tool:** It facilitates strategic planning and operational enhancements by offering evidence-based insights and suggestions.
- **Privacy and Ethical Concerns:** Data mining necessitates the cautious handling of sensitive data, highlighting the importance of ethical data usage, privacy protection, and regulatory compliance.

Data mining techniques

1. Classification

Data is categorized into predetermined classes or labels using classification, a supervised learning technique. It employs algorithms to extract patterns from labeled data, which are then applied to fresh, unlabeled data in order to make predictions. For example, it can use recognized traits to determine whether an email is spam or not.

2. Clustering

Based on innate similarities, similar data points are grouped together using clustering, an unsupervised learning technique. It finds organic groupings in data without the need for pre-established classes. Without having any prior knowledge of consumer categories, it can, for instance, segment customers based on their purchase patterns.

3. Regression Analysis

Regression analysis uses the relationships between variables to predict a continuous numerical result. In order to help in trend estimation or forecasting, it looks at the relationship between a dependent variable and one or more independent variables.

4. Association Rule Mining

In big datasets, association rule mining finds correlations and associations between variables. It is frequently used in market basket analysis to identify purchase trends since it detects patterns where one event leads to another.

5. Anomaly Detection

This technique finds data deviations or outliers that deviate from predicted patterns. It's essential for detecting fraud, protecting networks, and spotting abnormalities in production procedures.

6. Text Mining

This technique takes unstructured textual data and uses it to extract useful information. Using text sources like social media, documents, or consumer reviews, it applies methods like sentiment analysis, topic modeling, and natural language processing (NLP) to extract meaningful information.

7. Neural Networks

To identify patterns in data, neural networks mimic how the human brain functions. When it comes to difficult tasks like speech recognition, image identification, and prediction, these deep learning models work incredibly well.

8. Decision Trees

Decision trees make use of a model of decisions and their potential outcomes that resembles a tree. They aid in decision-making and result prediction by dividing data into smaller subsets according to criteria.

9. Time Series Analysis

To predict future patterns or behaviors, time-ordered data points are examined using time series analysis. Weather forecasting, stock market research, financial forecasting, and other fields can all benefit from it.

Reasons to use data mining

1. Obtain Information

Data mining can reveal links, patterns, and trends hidden in datasets that conventional analysis could miss. It provides insightful information that facilitates decision-making.

2. Predicts analysis

It makes predictive modeling possible by predicting future patterns, actions, or results based on past data. This forecasting skill supports proactive decision-making and planning.

3. More Effective Decision-Making

Data mining helps organizations make decisions by offering evidence-based insights. Making less educated guesses and depending less on gut feeling results in more calculated and wise choices.

4. Business Optimization

By finding inefficiencies, streamlining procedures, and cutting expenses, data mining optimizes business operations. It improves general efficiency and simplifies processes.

5. Understanding the client

It facilitates comprehension of the behavior, tastes, and shopping habits of the client. With this information, firms may efficiently address client wants by customizing their offerings in terms of goods, services, and marketing tactics.

6. Competitive Advantage

Organizations obtain a competitive edge by deriving insightful knowledge from data. Remaining ahead of the competition in the market requires an understanding of emerging patterns, customer sentiment, and market trends.

7. Fraud Detection and Risk Management

Anomalies and possible fraudulent activity are identified with the help of data mining tools. It is also applied in a variety of sectors for risk assessment and reduction.

8. Personalization and Marketing

By using data mining insights, businesses may better target particular demographics, personalize consumer experiences, and develop focused marketing efforts.

9. Research and Development

Data mining supports research and development initiatives in domains such as science, technology, and medicine. It facilitates the analysis of intricate data sets and the information extraction needed for creativity and innovation.

10. Compliance and Regulation

Data mining aids in regulatory compliance for sectors including finance and healthcare. It streamlines procedures and guarantees conformity to standards.

11. Trend Identification

By helping to spot new trends, it enables businesses to modify their approaches and take advantage of fresh opportunities.

Data mining process

1. **Understanding Business Objectives:** The first step in the data mining process is to understand the project's particular goals and objectives. This involves determining the business opportunity or problem that data mining seeks to solve. Decisions on data collection, analysis, and interpretation are guided by an understanding of the context and purpose, which guarantees alignment with business goals.

2. **Data Collection:** This process entails obtaining pertinent information from a variety of sources. This information may be semi-organized (like XML files), unstructured (like text and photos), or structured (like databases). The efficacy of the analysis that follows is strongly influenced by the caliber and applicability of the data that was gathered.

3. **Data Cleaning:** To guarantee the quality, consistency, and dependability of the gathered data, it is imperative that it be cleaned. Managing missing values, eliminating duplication, fixing mistakes, and standardizing are all part of this process.

4. **Exploratory Data Analysis (EDA):** To acquire understanding and comprehend the dataset's properties, EDA entails preliminary dataset exploration and analysis. To find patterns, anomalies, or relationships in the data, methods like correlation analyses, summary statistics, and visualizations are employed.
5. **Feature Selection/Engineering:** Selecting the most pertinent variables or features that make a substantial contribution to the study is known as feature selection. For the purpose of enhancing the dataset's predictive capacity and model performance, feature engineering may entail changing or adding new features.
6. **Model Building:** The prepared dataset is subjected to the proper data mining algorithms or techniques at this stage. In order to identify patterns, correlations, or classifications in the data, models are trained using historical data.
7. **Model Evaluation:** To make sure the models appropriately depict the underlying patterns in the data, their performance is assessed using a variety of metrics and methodologies. In order to evaluate the models' predicted accuracy, this phase entails testing them on different datasets that were not used during training.
8. **Model Deployment:** To produce insights or make forecasts, effective models are put into use in the operational context. To facilitate well-informed decision-making, they are incorporated into business procedures or decision-making frameworks.
9. **Maintenance and Monitoring:** To guarantee that models continue to be accurate and relevant over time, ongoing monitoring is necessary. Sustained efficacy requires regular checks for evolving patterns in the data and updates or retraining of the model.
10. **Interpretation and Reporting:** Lastly, stakeholders are informed of the insights, conclusions, and forecasts obtained from the data mining process. Clear and comprehensible

results presentation is essential to supporting well-informed decision-making inside the company.

Applications of data mining in Yard of Ale

Application	Process in Yard of Ale	Benefits
Sales	Data mining has a big influence on Yard of Ale's sales tactics. The beer company can understand customer behavior by examining sales data, which includes client purchase history, preferences, and seasonal trends. This makes it possible to anticipate sales more precisely, which helps the brewery identify high-value clients, optimize inventory levels, and target particular customer categories with promotions. Furthermore, data mining facilitates the comprehension of price and sales channel efficacy, resulting in more focused and productive sales undertakings.	<ul style="list-style-type: none"> • Clear prediction of sales • Improved potential for cross-selling and customer targeting • Enhanced control over inventories • increased rates of conversion • upgraded criteria for sales performance • Improved comprehension of client requirements • Enhanced connections with customers Prolonged client loyalty • Increased sources of income
Marketing	Data mining is revolutionizing the field of marketing for Yard of Ale. The brewery is able to learn more about the preferences of its customers by examining marketing data, including campaign performance indicators, consumer feedback, and market trends. This information makes it easier to create customized promos, focused marketing campaigns, and	<ul style="list-style-type: none"> • Tailored interactions with customers • enhanced segmentation of customers • increased efficacy of marketing campaigns • Increased brand recognition • Maximized return on marketing investments

	<p>product suggestions, which raises consumer engagement and conversion rates. Additionally, data mining helps optimize marketing expenditures, allowing the brewery to better distribute money among various marketing channels for optimal effect.</p>	<ul style="list-style-type: none"> • Enhanced interaction with customers • Improved comprehension of market trends • improved reputation for the brand • Enhanced creation of leads • Increased competitiveness in the market
Manufacturing	<p>Data mining is the key to quality assurance and process optimization for Yard of Ale's manufacturing procedures. Correlations between brewing processes and product quality can be found by the brewery through the analysis of brewing parameters, production statistics, and quality measures. This knowledge aids in optimizing the brewing procedure, guaranteeing consistency in product quality, cutting expenses associated with production, and decreasing waste. Furthermore, data mining-derived predictive analytics can help with supply chain management optimization, equipment maintenance forecasting, and production schedule streamlining for more effective operations.</p>	<ul style="list-style-type: none"> • Reliable product quality • Enhanced brewing procedures • decreased downtime in production • Effective use of resources • Reduced manufacturing expenses • reduced number of product flaws • Managing the supply chain more efficiently • Enhanced effectiveness of operations • Improved novelty in products • Increased client satisfaction as a result of superior products

Human Resource	<p>Yard of Ale's HR procedures could be revolutionized by data mining. Finding the variables affecting employee engagement and retention can be aided by analyzing HR data, including as turnover rates, satisfaction surveys, and employee performance indicators. Better talent management techniques, effective staffing, and focused training initiatives are made possible by this knowledge. By using data mining to understand employee behavior, employers may create a good work environment that boosts productivity and employee satisfaction.</p>	<ul style="list-style-type: none"> • Gaining Skill Effectiveness • increased retention of employees • increased contentment among employees • Increased output from the workforce • optimal numbers of employees • lower turnover expenses • enhanced educational initiatives • Improved work environment • Improved methods for developing talent • improved performance within the organization
Customer Service	<p>Yard of Ale relies heavily on data mining to provide excellent customer service. Understanding consumer pain areas, preferences, and service trends is made easier by analyzing customer service interactions, feedback, and complaint data. The brewery can tailor client contacts, optimize response times, and enhance service quality thanks to this knowledge. By using insights obtained from consumer complaints to effectively address</p>	<ul style="list-style-type: none"> • Quickly resolving client concerns • Higher levels of consumer satisfaction • more fidelity to the brand • enhanced feedback loop for customers • Improved comprehension of client preferences • A higher lifetime value for customers

		<ul style="list-style-type: none"> • Effective resource distribution in the service • Improved perception of the brand • Improved client interactions and excellent word-of-mouth advertising
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Table 13 : Applications of data mining in Yard of Ale

Dashboard of Yard of Ale

Authors explanation about the most suitable tool for develop dashboard in Yard of Ale

The author has carefully considered a number of dashboard building tools before deciding that Microsoft Power BI is the best solution for creating the Yard of Ale dashboard. This decision makes sense because of Power BI's outstanding flexibility and fit with Yard of Ale's detailed information visualization requirements. Power BI appears as the unmatched option mainly because to its capacity to connect with a wide range of data sources in an impeccable manner, perfectly matching the various operational aspects of the beer. The foundation of the author's choice is Power BI's deep visualization toolkit, which makes it possible to build dynamic, interactive dashboards that condense complex datasets—such as inventory analytics, customer insights, and sales metrics—into information that is both easily understood and useful.

The real-time analytics capabilities of the platform are in perfect balance with Yard of Ale's requirement for current data, which is essential for quick decision-making in the ever-changing brewing sector. Furthermore, Power BI's easy-to-use interface makes it simple to create and modify customized dashboards that meet every requirement of different brewery stakeholders. Along with Yard of Ale's dependence on Microsoft technology, Power BI's inherent interoperability with programs like Excel and SQL Server reinforces its position as the best option. The author's choice is based mostly on Microsoft Power BI's unmatched capabilities as the key facilitator for Yard of Ale's dashboard development. Add to that the software's strong security mechanisms, which ensure data integrity and compliance with regulations.



Figure 18: Logo of Microsoft power BI tool

Features of Power BI

- **Data Connectivity:** Power BI allows for seamless data integration by connecting to a wide range of data sources, including sophisticated databases, cloud services, and simple Excel spreadsheets.
- **Data Modeling:** With its Power Query Editor, users can mold and model data, making data translation and manipulation easier for more thorough analysis.
- **Interactive Dashboards:** With a large selection of customisable visualization tools, including charts, graphs, maps, and tables, Power BI makes it possible to create visually appealing and interactive dashboards.
- **Real-time analytics:** By providing users with access to real-time data insights and changes, dashboards and reports are guaranteed to display up-to-date information.
- **Natural Language Querying:** Using common language, users may ask inquiries about their data on the platform, which instantly generates visual representations.
- **Power BI's mobile compatibility** allows users to access reports and dashboards on the move with views that are tailored for small screens on a variety of devices.
- **AI-Powered Insights:** It makes use of AI capabilities to deliver automated insights, which help uncover hidden patterns in data. Examples of these insights include anomaly detection and trend analysis.
- **Collaboration and Sharing:** Users can quickly and simply share dashboards and reports with stakeholders, which makes it easier for teams to work together and make decisions.

- Security and Compliance: Role-based access control, data encryption, and adherence to laws and industry standards are just a few of the strong security features that Power BI offers.
- Data communication and sharing inside the Microsoft ecosystem are made easier by Power BI's seamless integration with other Microsoft tools, such as Excel, Azure, and SQL Server, since it is a part of the Microsoft suite.

Advantages and Disadvantages of Microsoft Power BI

Advantages	Disadvantages
<ul style="list-style-type: none"> • Better Ability to Make Decisions. • Enhanced Production and Efficiency. • Practical Knowledge. • An edge over competitors. • Flexibility. • Centralization of Data. • Reporting in real time. • Analytics that predict. • Better Communication with Customers 	<ul style="list-style-type: none"> • Costs associated with implementation. • intricacy. • Problems with Data Quality. • reliance on technology. • Opposition to Modification. • Security Issues. • Integration Problems. • Data is overemphasized. • Requirement for Skilled Workers • Problems with Regulatory Compliance

Table 14 : Advantages and Disadvantages of Power BI

Flow of Power BI

- Data collection involves compiling information from a range of sources, including cloud services, spreadsheets, databases, and more.
- Data Transformation: To clean, transform, and shape the data to meet the needs of analysis, use Power Query Editor.
- Data Modeling: Using Power BI's Data Modeling capabilities, establish links between various datasets and specify measurements and computations in the data model.
- Report building is the process of creating visual reports that convey data insights through the use of various visualization tools, such as tables, graphs, and charts.
- Dashboard Creation: Combining many reports into an interactive, all-inclusive dashboard for a unified perspective.
- Sharing and Cooperation: Encouraging stakeholders to securely share the generated reports and dashboards in order to facilitate cooperative decision-making.
- Deployment and Refresh: To provide broader access, deploy reports and dashboards to Power BI Service. Additionally, schedule data refreshes to ensure that the information is current.

Excel data sheet of maintenance plan of Yard of Ale

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Machine ID	Section ID	Section	Sub section ID	Sub section	Machine Name	Repair	Last Maintena	Next Mainten	Engineer	Repairing cost	Downtime(hours)	
M001	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration Syst	2/14/2023	1/15/2024	Mr. Sanjeeva Per	LKR 35,000	6	
M002	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration Syst	4/28/2023	3/5/2024	Mrs. Madushani P	LKR 27,500	4	
M003	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration Syst	4/29/2023	4/20/2024	Mr. Chaminda Ra	LKR 55,000	5	
M004	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixe	4/30/2023	6/2/2024	Mrs. Janani Sama	LKR 55,000	7	
M005	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixe	5/1/2023	7/27/2024	Mr. Ravi Silva	LKR 60,200	5.5	
M006	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixe	6/10/2023	9/10/2024	Mr. Nimal Fernand	LKR 60,200	7	
M007	Mil-A	Mill	GS	Grinding Section	Grinding Machine	Grinding Mac	8/5/2023	10/18/2024	Mrs. Piyumi Sena	LKR 47,200	5	
M008	Mil-A	Mill	GS	Grinding Section	Grinding Machine	Grinding Mac	8/6/2023	11/24/2024	Mr. Sanjeeva Per	LKR 47,200	8.5	
M009	Mil-B	Mill	PD	Packaging Division	Packaging Equip	Packaging Eqp	9/19/2023	12/9/2024	Mrs. Madushani P	LKR 60,200	8	
M010	Mil-B	Mill	PD	Packaging Division	Packaging Equip	Packaging Eqp	9/20/2023	2/3/2024	Mr. Chaminda Ra	LKR 60,200	9	
M011	Mil-B	Mill	PD	Packaging Division	Packaging Equip	Packaging Eqp	9/21/2023	2/19/2024	Mrs. Janani Sama	LKR 60,200	6	
M012	Brew-A	Brewhouse	BO	Brewing Operations	Brewing Kettles	Brewing Kettle	10/25/2023	4/7/2024	Mr. Ravi Silva	LKR 35,000	4	
M013	Brew-A	Brewhouse	BO	Brewing Operations	Brewing Kettles	Brewing Kettle	11/30/2023	5/23/2024	Mr. Nimal Fernand	LKR 35,000	5	
M014	Brew-B	Brewhouse	QT	Quality Testing	Quality Control S	Quality Control	12/1/2023	7/6/2024	Mrs. Piyumi Sena	LKR 27,500	7	
M015	Brew-B	Brewhouse	QT	Quality Testing	Quality Control S	Quality Control	12/2/2023	8/31/2024	Mr. Sanjeeva Per	LKR 55,000	6	
M016	BT-A	Bottling Plant	BF	Bottle Filling	Filling Machines	Filling Machine	12/3/2023	10/14/2024	Mrs. Madushani P	LKR 55,000	4	
M017	BT-A	Bottling Plant	BF	Bottle Filling	Filling Machines	Filling Machine	12/4/2023	11/19/2024	Mr. Chaminda Ra	LKR 55,000	5	
M018	BT-B	Bottling Plant	LP	Labeling & Packaging	Labeling Machine	Labeling Mach	12/12/2023	12/27/2024	Mrs. Janani Sama	LKR 47,200	7	
M019	BT-B	Bottling Plant	LP	Labeling & Packaging	Labeling Machine	Labeling Mach	12/12/2023	1/22/2024	Mr. Ravi Silva	LKR 47,200	5.5	
M020	Waste-A	Waste Treatment Plant	IP	Initial Processing	Initial Sorting Mac	Initial Sorting	12/12/2023	3/8/2024	Mr. Nimal Fernand	LKR 47,200	7	
M021	Waste-A	Waste Treatment Plant	IP	Initial Processing	Initial Sorting Mac	Initial Sorting	12/12/2023	1/2/2024	Mrs. Piyumi Sena	LKR 55,000	5	
M022	Waste-B	Waste Treatment Plant	BT	Biological Treatment	Biological Reactor	Biological Read	1/7/2023	2/28/2024	Mr. Sanjeeva Per	LKR 55,000	8.5	
M023	Waste-B	Waste Treatment Plant	BT	Biological Treatment	Biological Reactor	Biological Read	3/22/2023	4/13/2024	Mrs. Madushani P	LKR 27,500	6	
M024	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Rob	Routine Maint	3/22/2023	5/27/2024	Mr. Chaminda Ra	LKR 27,500	4	
M025	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Rob	Routine Maint	3/22/2023	7/12/2024	Mrs. Janani Sama	LKR 35,000	5	
M026	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Rob	Routine Maint	3/22/2023	8/17/2024	Mr. Ravi Silva	LKR 35,000	7	
M027	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Rob	Routine Maint	3/15/2023	9/23/2024	Mr. Nimal Fernand	LKR 60,200	5.5	
M028	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	3/15/2023	11/6/2024	Mrs. Piyumi Sena	LKR 60,200	7	
M029	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	11/14/2023	12/21/2024	Mr. Sanjeeva Per	LKR 60,200	5	
M030	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	12/29/2023	3/21/2024	Mrs. Madushani P	LKR 60,200	8.5	
M031	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	1/25/2023	2/19/2024	Mr. Chaminda Ra	LKR 55,000	8	
M032	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	1/25/2023	4/7/2024	Mrs. Janani Sama	LKR 55,000	9	
M033	FactM-B	Factory Maintenance	RD	Repair Division	Repair Tools	Machine Repa	1/25/2023	5/23/2024	Mr. Ravi Silva	LKR 60,200	8	
M034	Rep-S-A	Repair/Fabrication Shop	MR	Machine Repair	Lathe Machines	Machine Repa	1/25/2023	7/6/2024	Mr. Nimal Fernand	LKR 60,200	10	
M035	Rep-S-A	Repair/Fabrication Shop	MR	Machine Repair	Lathe Machines	Machine Repa	4/5/2023	8/31/2024	Mrs. Piyumi Sena	LKR 60,200	9.5	
M036	Rep-S-B	Repair/Fabrication Shop	FD	Fabrication Division	Metal Fabrication	Fabrication Di	6/18/2023	10/14/2024	Mr. Sanjeeva Per	LKR 60,200	5	
M037	Rep-S-B	Repair/Fabrication Shop	FD	Fabrication Division	Metal Fabrication	Fabrication Di	6/18/2023	11/19/2024	Mrs. Madushani P	LKR 55,000	7	
M038	Rep-S-B	Repair/Fabrication Shop	FD	Fabrication Division	Metal Fabrication	Fabrication Di	6/18/2023	12/27/2024	Mr. Chaminda Ra	LKR 55,000	5.5	
M039	Qual-A	Quality Control	PI	Product Inspection	Inspection Machi	Product Inspe	6/18/2023	1/22/2024	Mrs. Janani Sama	LKR 55,000	7	

Figure 19 : Excel data sheet part 1 of maintenance plan of Yard of Ale (Developed by Author)

M040	Qual-A	Quality Control	PI	Product Inspection	Inspection Machi	Product Inspe	6/18/2023	3/8/2024	Mr. Ravi Silva	LKR 35,000	5	
M041	Qual-A	Quality Control	PI	Product Inspection	Inspection Machi	Product Inspe	8/24/2023	1/15/2024	Mr. Nimal Fernand	LKR 35,000	8.5	
M042	Qual-A	Quality Control	PI	Product Inspection	Inspection Machi	Product Inspe	10/9/2023	3/5/2024	Mrs. Piyumi Sena	LKR 27,500	8	
M043	Qual-A	Quality Control	PI	Product Inspection	Inspection Machi	Product Inspe	10/9/2023	4/20/2024	Mr. Sanjeeva Per	LKR 60,200	9	
M044	Qual-B	Quality Control	PA	Process Audits	Quality Analysis D	Regulatory Co	10/9/2023	6/2/2024	Mrs. Madushani P	LKR 60,200	8	
M045	Qual-B	Quality Control	PA	Process Audits	Quality Analysis D	Regulatory Co	10/9/2023	7/27/2024	Mr. Chaminda Ra	LKR 60,200	7	
M046	Qual-B	Quality Control	PA	Process Audits	Quality Analysis D	Regulatory Co	10/9/2023	9/10/2024	Mrs. Janani Sama	LKR 47,200	5.5	
M047	Qual-B	Quality Control	PA	Process Audits	Quality Analysis D	Regulatory Co	10/9/2023	10/18/2024	Mr. Ravi Silva	LKR 47,200	7	
M048	Rnd-A	Research and Developm	PRO	Product Innovation	Prototyping Mach	Product Innov	5/20/2023	11/24/2024	Mr. Nimal Fernand	LKR 47,200	5	
M049	Rnd-A	Research and Developm	PRO	Product Innovation	Prototyping Mach	Product Innov	7/8/2023	12/9/2024	Mrs. Piyumi Sena	LKR 60,200	5	
M050	Rnd-B	Research and Developm	PRO	Process Optimization	Prototyping Mach	Product Innov	7/8/2023	2/3/2024	Mr. Sanjeeva Per	LKR 60,200	6	
M051	Rnd-B	Research and Developm	PRO	Process Optimization	Prototyping Mach	Product Innov	3/7/2023	1/2/2024	Mrs. Madushani P	LKR 60,200	4	
M052	Rnd-B	Research and Developm	PRO	Process Optimization	Prototyping Mach	Product Innov	3/7/2023	2/28/2024	Mr. Chaminda Ra	LKR 35,000	5	
M053	IT-A	IT	IM	Infrastructure Management	IT Infrastructure	Infrastructure	3/7/2023	4/13/2024	Mrs. Janani Sama	LKR 35,000	7	
M054	IT-A	IT	IM	Infrastructure Management	IT Infrastructure	Infrastructure	3/7/2023	5/27/2024	Mr. Ravi Silva	LKR 27,500	5.5	
M055	IT-A	IT	IM	Infrastructure Management	IT Infrastructure	Infrastructure	6/5/2023	7/12/2024	Mr. Nimal Fernand	LKR 27,500	7	
M056	IT-A	IT	IM	Infrastructure Management	IT Infrastructure	Infrastructure	7/28/2023	8/17/2024	Mrs. Piyumi Sena	LKR 60,200	5	
M057	IT-B	IT	SD	Software Development	Software Develop	Software Dev	7/28/2023	9/23/2024	Mr. Sanjeeva Per	LKR 60,200	8.5	
M058	IT-B	IT	SD	Software Development	Software Develop	Software Dev	7/28/2023	11/6/2024	Mrs. Madushani P	LKR 60,200	8	
M059	IT-B	IT	SD	Software Development	Software Develop	Software Dev	4/22/2023	12/21/2024	Mr. Chaminda Ra	LKR 55,000	9	
M060	IT-B	IT	SD	Software Development	Software Develop	Software Dev	4/22/2023	3/21/2024	Mrs. Janani Sama	LKR 55,000	8	

Figure 20 : Excel data sheet part 2 of maintenance plan of Yard of Ale (Developed by Author)

Creating Dashboard with Power BI

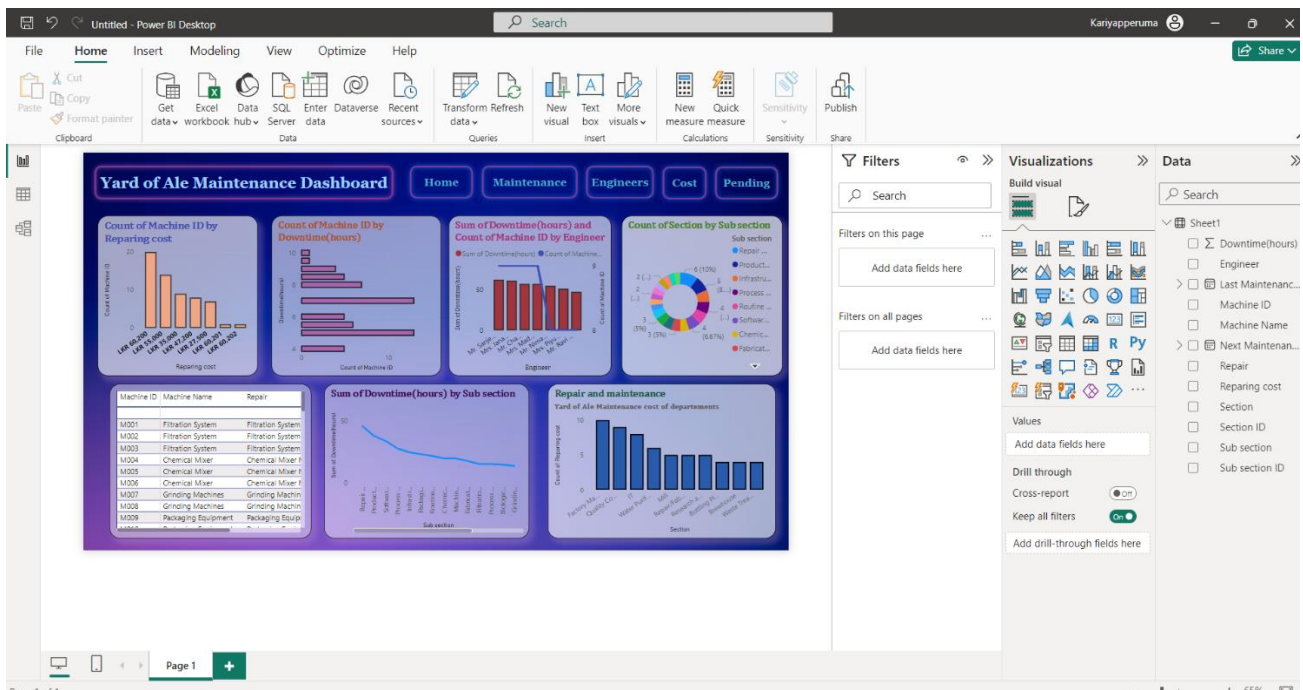


Figure 21 : Creating Dashboard with Power BI(developed by Author)

Maintenance dashboard of Yard of Ale

Machine ID	Section ID	Section	Sub section ID	Sub section	Machine Name	Repair	Last Maintenance Date	Next Maintenance
M001	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration System Repair	Tuesday, February 14, 2023	Monday, Janua
M002	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration System Repair	Friday, April 28, 2023	Tuesday, Ma
M003	WPP-A	Water Purification Plant	FU	Filtration Units	Filtration System	Filtration System Repair	Saturday, April 29, 2023	Saturday, Ap
M004	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixer Maintenance	Sunday, April 30, 2023	Sunday, Ju
M005	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixer Maintenance	Monday, May 1, 2023	Saturday, Ju
M006	WPP-B	Water Purification Plant	CH	Chemical Treatment	Chemical Mixer	Chemical Mixer Maintenance	Saturday, June 10, 2023	Tuesday, Septem
M007	Mil-A	Mil	GS	Grinding Section	Grinding Machines	Grinding Machines Repair	Saturday, August 5, 2023	Friday, Octob
M008	Mil-A	Mil	GS	Grinding Section	Grinding Machines	Grinding Machines Repair	Sunday, August 6, 2023	Sunday, Novemb
M009	Mil-B	Mil	PD	Packaging Division	Packaging Equipment	Packaging Equipment Fix	Tuesday, September 19, 2023	Monday, Decem
M010	Mil-B	Mil	PD	Packaging Division	Packaging Equipment	Packaging Equipment Fix	Wednesday, September 20, 2023	Saturday, Febru
M011	Mil-B	Mil	PD	Packaging Division	Packaging Equipment	Packaging Equipment Fix	Thursday, September 21, 2023	Monday, Febru
M012	Brew-A	Brewhouse	BO	Brewing Operations	Brewing Kettles	Brewing Kettles Overhaul	Wednesday, October 25, 2023	Sunday, A
M013	Brew-A	Brewhouse	BO	Brewing Operations	Brewing Kettles	Brewing Kettles Overhaul	Thursday, November 30, 2023	Thursday, M
M014	Brew-B	Brewhouse	QT	Quality Testing	Quality Control Sensors	Quality Control Sensors Calibration	Friday, December 1, 2023	Saturday, .
M015	Brew-B	Brewhouse	QT	Quality Testing	Quality Control Sensors	Quality Control Sensors Calibration	Saturday, December 2, 2023	Saturday, Aug
M016	Br-A	Bottling Plant	BF	Bottle Filling	Filling Machines	Filling Machines Service	Sunday, December 3, 2023	Monday, Octob
M017	Br-A	Bottling Plant	BF	Bottle Filling	Filling Machines	Filling Machines Service	Monday, December 4, 2023	Tuesday, Novemb
M018	Br-B	Bottling Plant	LP	Labeling & Packaging	Labeling Machines	Labeling Machines Maintenance	Tuesday, December 12, 2023	Friday, Decemb
M019	Br-B	Bottling Plant	LP	Labeling & Packaging	Labeling Machines	Labeling Machines Maintenance	Tuesday, December 12, 2023	Monday, Janua
M020	Waste-A	Waste Treatment Plant	IP	Initial Processing	Initial Sorting Machines	Initial Sorting Machines Repair	Tuesday, December 12, 2023	Friday, Ma
M021	Waste-A	Waste Treatment Plant	IP	Initial Processing	Initial Sorting Machines	Initial Sorting Machines Repair	Tuesday, December 12, 2023	Tuesday, Janu
M022	Waste-B	Waste Treatment Plant	BT	Biological Treatment	Biological Reactors	Biological Reactors Maintenance	Saturday, January 7, 2023	Wednesday, Febru
M023	Waste-B	Waste Treatment Plant	BT	Biological Treatment	Biological Reactors	Biological Reactors Maintenance	Wednesday, March 22, 2023	Saturday, Ap
M024	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Robots	Routine Maintenance	Wednesday, March 22, 2023	Monday, M
M025	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Robots	Routine Maintenance	Wednesday, March 22, 2023	Friday, Ju
M026	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Robots	Routine Maintenance	Wednesday, March 22, 2023	Saturday, Aug
M027	FactM-A	Factory Maintenance	RM	Routine Maintenance	Maintenance Robots	Routine Maintenance	Wednesday, March 15, 2023	Monday, Septemb

Figure 22 : Maintenance dash board of Yard Ale (Developed by Author)

Dashboard Interfaces of Yard of Ale

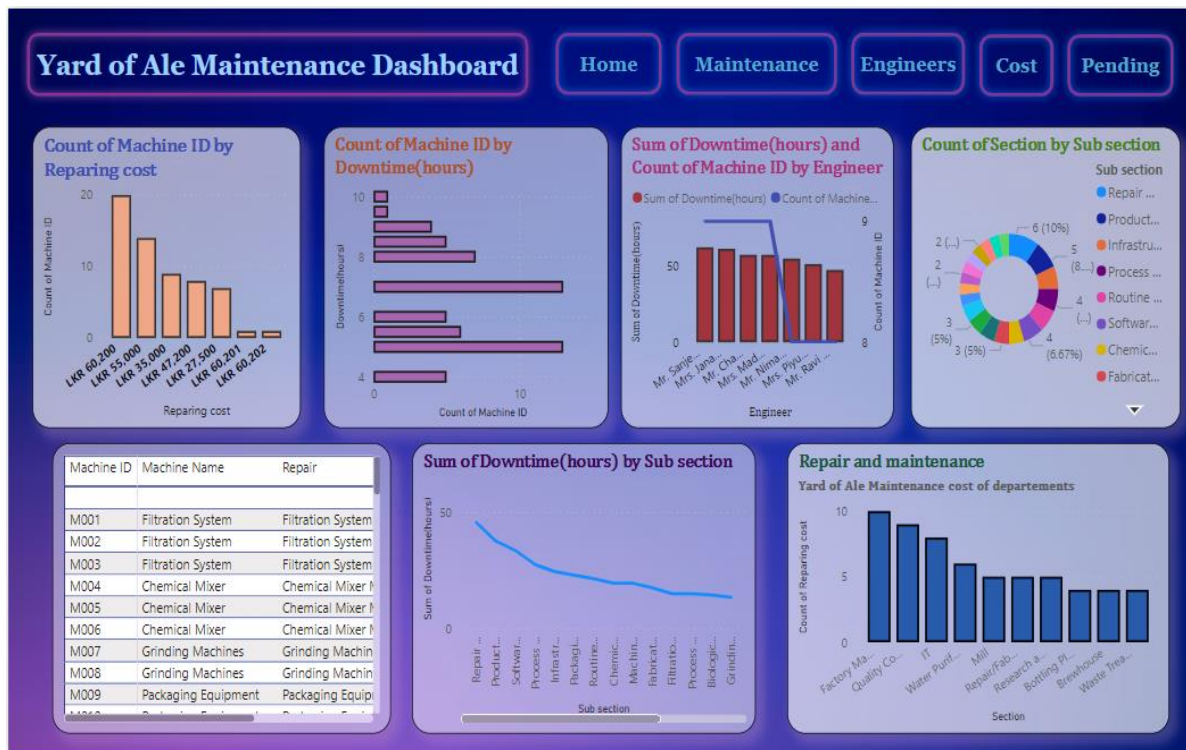


Figure 23 : Dashboard Interfaces of Yard of Ale (Developed by Author)

The dashboard interface displays the manager's data view of the specifics of the company's upkeep. Thus, all of the data tables, graphs, and charts are displayed on this interface. Additionally, managers have the option to click on each graphical preview to discover additional analyzed facts about a selected graph. This includes an analyzed information table that includes all of the statistical data related to the chart or graph that is presented. Only managers with their unique username and password, provided by the Yard of Ale company's IT department, can access this main portal. The operational manager, the data scientist employed by the organization, and the technical and IT teams are in charge of overseeing the alternate and routine updates to this and other dashboards. Higher management typically uses these dashboards in board meetings and general meetings to assist with decision-making. They also use the data directly to inform their decisions regarding business administrations. In addition, the maintenance dashboard holds great significance for the company's maintenance panel, which is in charge of maintaining all machinery in the Yard of Ale's sub-sections up to

date at all times. Thus, this dashboard is an excellent resource for learning about machine malfunctions, the cost of fixing a specific machine, lost productivity as a result of malfunctions, and much more. This dashboard's primary benefit is that it makes the next maintenance and the responsible engineer in charge of overseeing it easy to see.

Another display shows the repairs that have been made in the past along with the person who performed them. This helps identify who is responsible for the next failures and means that engineers are bound by their obligations and responsibilities. Managers are therefore faced with making judgments regarding outdated, inefficient machinery that frequently break, as well as whether to replace or continue maintaining these machines.

Features of using maintenance dashboard

Feature	Impact on Yard of Ale	Impact on Maintenance Section
Equipment Status	The real-time visualization of equipment status in the maintenance dashboard ensures an uninterrupted brewing process at Yard of Ale. By providing a clear overview of operational equipment, it safeguards against unexpected disruptions, ensuring consistent production flow and meeting customer demand effectively.	This feature offers a proactive approach to maintenance by swiftly identifying equipment requiring attention. It empowers the maintenance team to prioritize tasks efficiently, reducing downtime and swiftly addressing issues before they escalate, thereby optimizing maintenance workflows.
Downtime Analysis	Downtime analysis aids in refining production planning and resource allocation at	For maintenance, this feature offers invaluable insights into recurring

	Yard of Ale. By pinpointing bottlenecks and downtime causes, the brewery can optimize its production schedule, minimizing lost production time, and meeting demand more effectively	issues, enabling the team to focus on critical areas. It streamlines the identification of root causes, allowing for targeted interventions and improving overall maintenance efficiency.
Preventive Maintenance Schedule	The implementation of a preventive maintenance schedule ensures consistent equipment functionality at Yard of Ale, reducing unexpected breakdowns that could impact product quality or delivery schedules.	It aids in proactive planning for maintenance activities. By scheduling preventive tasks based on set intervals or usage patterns, the maintenance team can reduce reactive repairs and optimize equipment reliability.
Work Order Tracking	Work order tracking optimizes resource allocation and reduces idle time in production processes at Yard of Ale. It ensures smoother operations, minimizing delays and maximizing resource efficiency.	By providing visibility into the status of maintenance tasks, the feature allows for better planning and prioritization. It helps in reducing the backlog of pending tasks, streamlining workflows, and enhancing overall maintenance effectiveness.
Asset Performance	The visualization of asset performance aids in optimizing operational costs	Asset performance insights facilitate predictive maintenance, allowing the

	and maintaining product quality at Yard of Ale. By ensuring efficient utilization of assets, it contributes to consistent product standards and reduced operational expenses.	maintenance team to identify potential failures before they occur. It enables proactive measures, minimizing equipment downtime and enhancing overall equipment reliability.
Root Cause Analysis	Impact on Yard of Ale: Root cause analysis promotes process efficiency and product quality at Yard of Ale. By uncovering underlying issues, it enables the brewery to address concerns that could impact customer satisfaction or product consistency.	This feature empowers the maintenance team to identify recurring issues and their root causes. By implementing corrective actions, it minimizes repeated failures, enhances equipment reliability, and improves overall maintenance efficiency.
Inventory Management	Effective inventory management ensures timely availability of critical spare parts at Yard of Ale. This minimizes disruptions due to unavailability of components, ensuring continuous production.	Optimized inventory levels streamline maintenance operations. It ensures timely repairs while minimizing carrying costs, ensuring efficient utilization of resources in the maintenance department.

Table 15 : Features of using maintenance dashboard

User friendliness of Dashboard elements in Yard of Ale

Charts and graphs visualization in Yard of Ale

- Chart 01

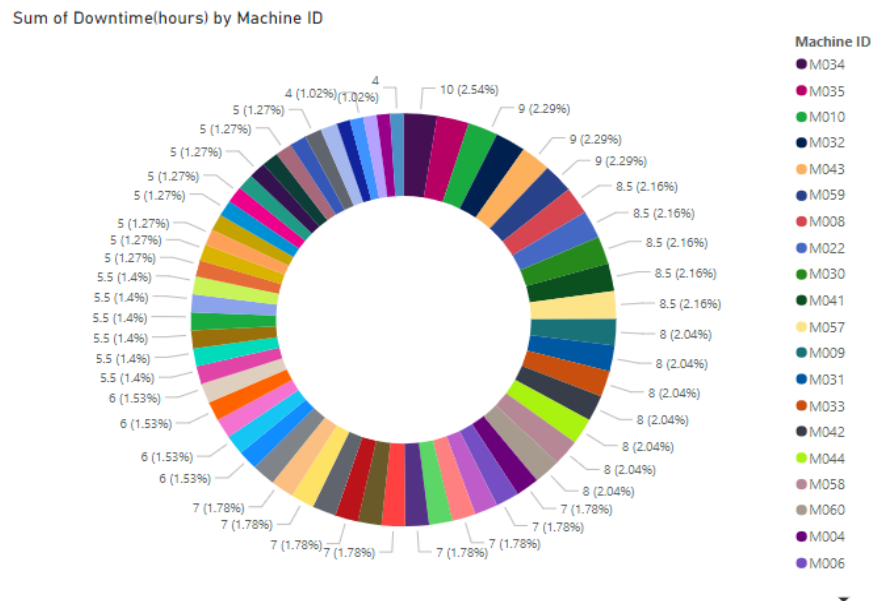


Figure 24 : Chart 01 (Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Pie chart
Dependent value	Downtime Hours
Independent Value	Machine ID
User-friendliness	Moderately high

Table 16 : Chart 01

So in this chart the independent is Machine ID variable and the dependent variable is Downtime hours. In this chart the machines not getting long hours to repair that can see in clearly.

- Chart 02

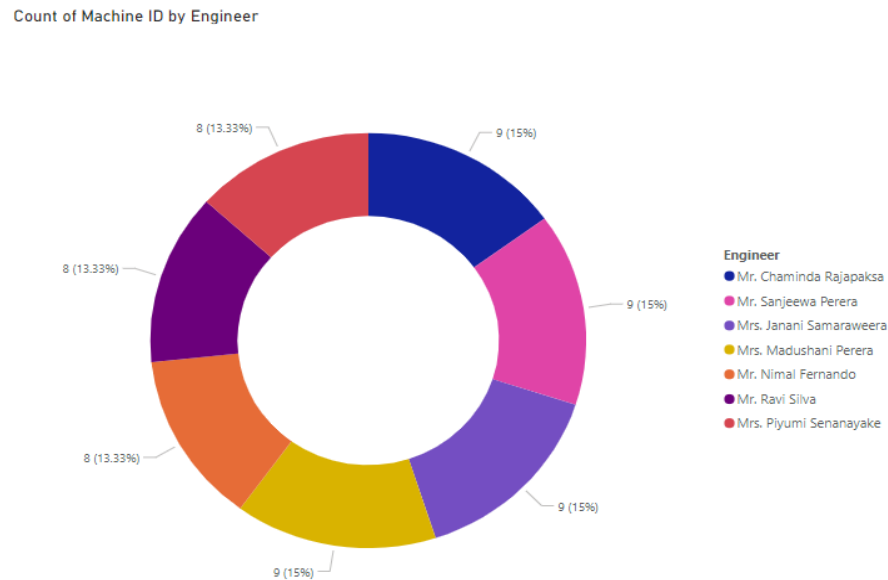


Figure 25 : Chart 02(Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Pie chart
Dependent value	Machine ID
Independent Value	Engineer
User-friendliness	Moderately high

Table 17 :Chart 02

According to the above pie chart, managers can easily identified most responsible engineers in company. So they are Mr. Chaminda, Mr Sanjeeva , Mrs. Madushani and Mrs. Janani. These engineers are very capable.

- Chart 03

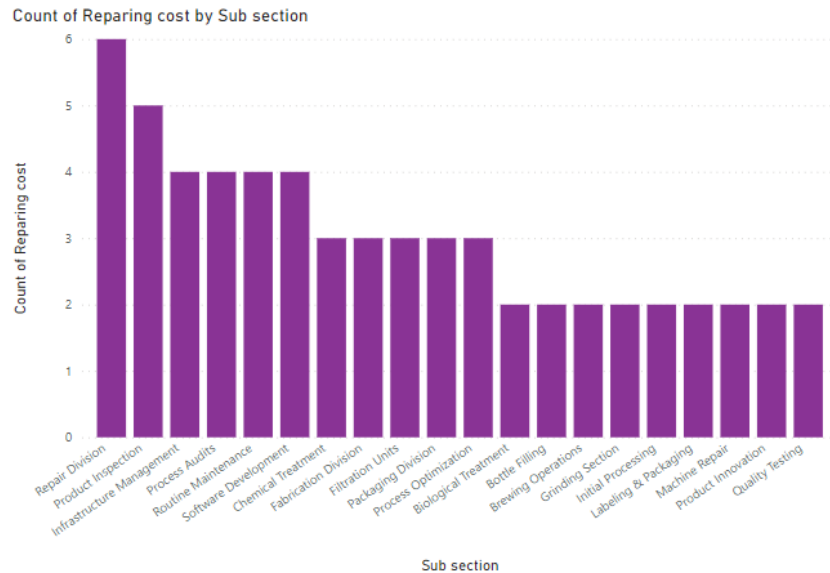


Figure 26 : Chart 03 (Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Bar graph
Dependent value	Repairing Cost
Independent Value	Sub section
User-friendliness	high

Table 18 : Chart 03

According to this bar graph it shows the Count of repairing cost by sub section. So in horizontal line it shows the repairing cost and the vertical line shows the sub sectors. So highest cost gone to Repairing division.

- Chart 04

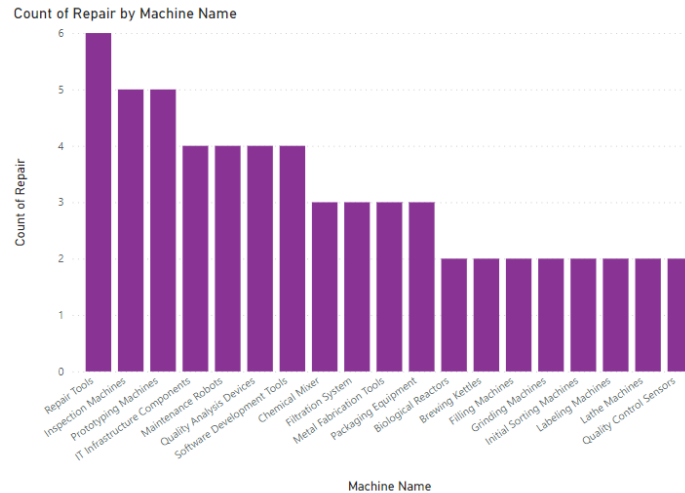


Figure 27 : Chart 04 (Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Bar graph
Dependent value	Count of Repair
Independent Value	Machine name
User-friendliness	high

Table 19: Chart 04

In this chart shows the Count of repair by machine Name. In vertical line shows the Count of repair and horizontally shows the Machine name. So the highest is Repair tools. In this chart it clearly shows how are the repair count of machines high to low.

- Chart 05

Count of Next Maintenance Due by Engineer

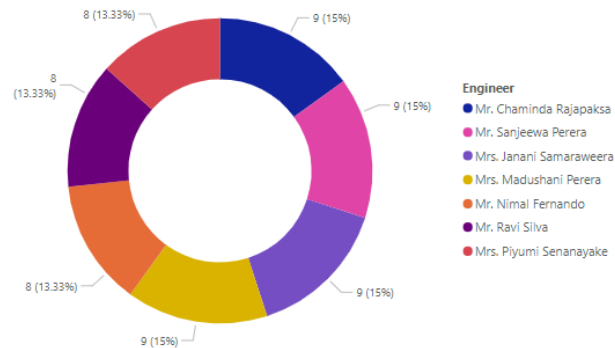


Figure 28 : Chart 05 (Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Bar graph
Dependent value	Count next maintenance
Independent Value	Engineer
User-friendliness	Moderately high

Table 20 : Chart 05

In this Pie chart shows the Count of Next Maintenance Due by Engineer. So in this chart more next maintenance due have for Mr. Chaminda , Mr. Sanjeeva and Mrs. Madushani.

- Chart 06

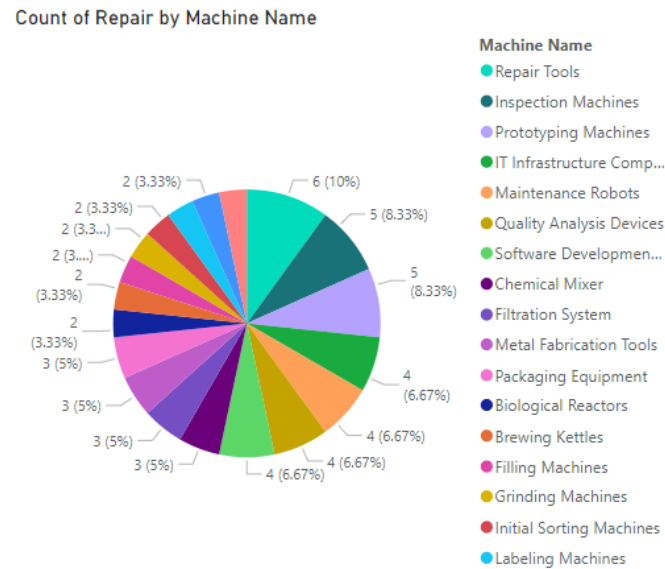


Figure 29 : Chart 06 (Developed by Author)

Fact	Dashboard in Yard of Ale
Text	English (Alphanumeric text)
Font	DIN
Size	Heading(14) other (10)
Color	Different colors
Data visualization	Bar graph
Dependent value	Count of repair.
Independent Value	Machine name
User-friendliness	Moderately high

Table 21 : Chart 06

This pie chart shows the Count of repair by machine name. And the dependent variable is count of repair and independent variable is Machine name. So in this pie chart user can see clearly that the more count of repairs have for repair tools machine and metal fabrication tools.

Evaluation of dashboard in Yard of Ale Company

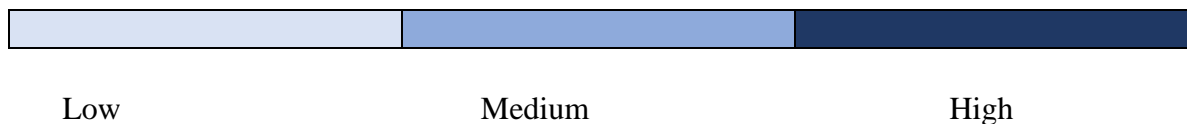
Feature	Achieved business requirement	How its helped to engineers	Inventory health	How its helped to manage healthy inventory system
Equipment Status	By giving real-time insights into equipment functionality, the Equipment Status feature guarantees smooth operations at Yard of Ale. It is in complete harmony with the brewery's goal of continuous output and effective equipment use.	By providing instant visibility into the health of equipment, this function helps engineers. It gives them the ability to proactively handle maintenance requirements, quickly addressing problems and guaranteeing continuous operations, reducing downtime.		Although not specifically related to inventory management, making sure that equipment functions properly helps to maintain a healthy inventory system by reducing production interruptions that may have an impact on inventory levels.
Downtime Analysis	Yard of Ale is able to better satisfy customer demand while cutting down on lost production time by utilizing Downtime	Engineers gain knowledge about the reasons behind recurrent outages. It makes it possible to optimize equipment performance,		By minimizing unplanned interruptions that can have an influence on inventory levels, downtime

	Analysis to refine production schedules.	streamline maintenance tasks, and make targeted interventions.		analysis tangentially supports the upkeep of a healthy inventory system.
Preventive Maintenance Schedule	Yard of Ale's goal of proactive maintenance planning, minimizing reactive repairs, and optimizing maintenance schedules is in line with the Preventive Maintenance Schedule.	Having a planned maintenance schedule is beneficial to engineers. They can predict maintenance requirements, distribute resources effectively, and lower unplanned breakdowns thanks to it, all of which promote equipment health.		By guaranteeing steady operations, Preventive Maintenance helps to maintain a healthy inventory system. It lowers the possibility of unplanned maintenance stops that could affect inventory control.
Work Order Tracking	By giving Yard of Ale employees information into the progress of maintenance jobs, Work Order Tracking optimizes maintenance workflows and	It has a moderate effect on inventory health. Inventory health is indirectly supported by maintenance streamlining, which avoids delays		Work Order Management in a Healthful Inventory System By guaranteeing that maintenance chores are

	supports effective resource allocation.	brought on by unfinished maintenance work.		immediately performed and so limiting potential disruptions to inventory-related operations, tracking indirectly contributes to the management of a healthy inventory system.
Asset Performance	Asset Performance Analysis guarantees effective asset utilization at Yard of Ale, in line with the brewery's objective of maximizing operational efficiency. This is a feature of the asset performance achieved business need.	This feature provides insights into asset efficiency, which empowers engineers.		By ensuring that assets function at their best, asset performance helps to lower the chance that production disruptions will have an adverse effect on inventory.
Root Cause Analysis	By ensuring that assets function at their best, asset performance helps to lower the	By identifying reoccurring problems, engineers gain an advantage.		By locating and fixing operational inefficiencies,

	chance that production disruptions will have an adverse effect on inventory.	It helps keep equipment reliable, minimize recurrent equipment failures, and put corrective measures into place.		Root Cause Analysis indirectly influences activities connected to inventory management and helps maintain a healthy inventory system.
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Table 22 : Evaluation of dashboard in Yard of Ale Company



Legal issues on business information

Legal issues involved in the secure exploitation of business intelligence tools

Data protection laws

- Data protection

A important basis for protecting people's personal information in an increasingly digital world is provided by data protection legislation. These laws establish guidelines for organizations' responsible gathering, using, and storing of personal data, guaranteeing security, equity, and openness while managing sensitive data. The idea that people should have control over their data is at the heart of these rules, which mandate that companies seek express authorization before collecting or processing personal data.

The principles of accountability, purpose limitation, and data reduction form the basis of numerous data protection legislation, including the CCPA, GDPR, and numerous national rules across the globe. It is required of organizations to gather data only for specific, legal purposes, to keep it accurate, current, and to avoid storing it longer than necessary. Another important factor is security, which calls for organizations to have strong security measures in place to shield data from breaches and illegal access.

Following data protection regulations is not just required by law, but it is also a commitment to building trust and responsibility with people who entrust businesses with their personal information. There are serious repercussions for breaking these rules, such as hefty fines and harm to one's image. Therefore, in order to preserve moral and legal practices when processing personal data, corporations must place a high priority on comprehending and abiding by these regulations.

- Importance of Data protection

Protecting Individual Privacy: Data protection makes sure that people are still in charge of their personal data. In order to avoid unauthorized access or misuse, it sets boundaries around how their data is gathered, processed, and utilized by businesses.

Establishing Confidence and Trust: Businesses and their clients can develop trust by adhering to data privacy laws. People are more inclined to participate with organizations, strengthening relationships and loyalty, when they are certain that their data is managed appropriately and securely.

Reducing the Chance of Data Theft: Complying with security protocols reduces the possibility of data breaches. Strong security procedures guard against online attacks and stop private data from being stolen or accessed by unauthorized parties.

Maintaining Legal Compliance: It is imperative to abide by international rules and data protection laws, including the CCPA, GDPR, and others. Organizations that violate the law may face severe penalties, legal repercussions, and harm to their reputation.

Promoting Responsible Data Practices, Innovation, and Ethical Use of Data: Data protection promotes ethical use of data while guaranteeing its responsible usage. It pushes businesses to come up with creative methods to use data to extract insights while upholding the rights and privacy of individuals.

Maintaining Brand Integrity and Reputation: An organization's reputation can be seriously harmed by a data breach or improper treatment of information. Respecting data privacy guidelines aids in preserving the legitimacy and integrity of a brand in the eyes of stakeholders and consumers.

Supporting Global Business Practices: Following to data privacy regulations makes it easier for companies to conduct business internationally as they expand internationally. It helps businesses operate across different legal frameworks, guaranteeing ethical and legal data management procedures everywhere.

The elected laws and procedures for data protection.

Popular data protection acts and laws in the world

- General Data Protection Regulation (GDPR) - European Union

Implementation Date: 25 May 2018

The General Data Protection Regulation (GDPR) is an all-encompassing law that regulates personal data protection and privacy for citizens of the European Union (EU) and the European Economic Area (EEA). It places a strong emphasis on people's rights with regard to their personal data and places duties on businesses that handle it, emphasizing accountability, transparency, and permission.

- California Consumer Privacy Act (CCPA) - United States

Implementation Date: First of January, 2020

The California Civil Process Act (CCPA) gives citizens of California more rights with regard to personal information that is held by California-based enterprises. By providing access, deletion, and opt-out options, it grants individuals authority over the gathering and use of their data.

- Personal Data Protection Act (PDPA) - Singapore

Date: October 15, 2012; revisions still pending

Description: In Singapore, the Personal Data Protection Act (PDPA) governs how corporations gather, utilize, and disclose personal data. While giving rights for individuals to access and amend their data, it establishes requirements related to data protection, such as permission, purpose limitation, and accuracy of data.

- Data Protection Act 2018 - United Kingdom

Date of Implementation: May 25, 2018

Description: In order to reinforce and expand upon the principles of the GDPR, the UK passed the Data Protection Act 2018 after Brexit. It regulates data processing and protection in the UK and places a strong emphasis on ethical and open data management procedures.

- Health Insurance Portability and Accountability Act (HIPAA) - United States

Enactment Date: August 21, 1996 (Privacy Rule in 2003)

Description : HIPAA is a federal law that governs the security and privacy of health information and establishes guidelines for its protection. It guarantees the integrity and confidentiality of personal health data that is handled by covered entities.

- Personal Information Protection and Electronic Documents Act (PIPEDA) - Canada

Date of Enactment: April 13, 2000 (with further modifications)

Organizations in the private sector that handle personal data while conducting business are subject to PIPEDA. It sets guidelines for the gathering, utilizing, and disclosing of personal information with the intention of preserving people's right to privacy.

Threats how impact on Yard of Ale

- Insider Threats and Data Misuse

Insider threats pose a risk to Yard of Ale, as staff members or people with authorized access may misuse confidential information. This hazard results from either unintentional data handling errors or malevolent intent. Workers who have access to confidential information may purposefully divulge it, abuse it for their own benefit, or inadvertently handle data improperly, which could result in breaches or leaks. Such acts might jeopardize confidential customer data, proprietary recipes, or important business plans, which would hurt Yard of Ale's standing and ability to compete in the brewing sector.

- Cybersecurity Vulnerabilities

Security flaws in the form of malware, phishing scams, or system flaws are serious threats to Yard of Ale's data security. Attacks on the brewery's systems or networks may lead to data breaches, which could expose private data. In addition to disrupting business operations and perhaps harming Yard of Ale's brand name in the event that client data is compromised, malware or phishing attempts may result in unauthorized access or data theft.

- Lack of Regular Security Updates and Patches

Yard of Ale's data security is at risk if regular security upgrades and patches aren't applied to hardware and software. Vulnerabilities in outdated software could be exploited by hackers, resulting in system compromises or data breaches. Ignoring routine upgrades raises the possibility of cyberattacks or illegal access to private data, which could have an effect on Yard of Ale's ability to continue operations and maintain the confidence of its clients.

- Third-Party Security Risks

A Threat there are security risks when using third-party partners or vendors for services or data sharing. Yard of Ale may be affected by security breaches or data leaks if these organizations don't have strong security procedures in place or if they become compromised. The probability of data breaches or illegal access rises when third-party security measures are not adequately vetted or overseen, which could damage Yard of Ale's credibility.

Cia triad concept

Cia triad is a popular information security model. This concept was started in 1998. Cia triad is a very important concept because there are three principles known as,

- confidentiality
- availability
- integrity

For an example for begin a fire there should be main three elements that are oxygen, fuel, heat if one of those were missing then it will not begin a fire so this example equal to cia concept if the one of the principles were missing then it can't be a successful defense mechanism.

Cia main 3 principles

1. Confidentially

In cia concept the c letter is known as confidentially. Protect information and for look the protect. Information can get access only to the authorized ones. In companies identify sensitive data as employee data, accounts etc... To secure data it is better to implement security mechanisms like passwords, encryptions etc...

2. Integrity

In cia concept i stand for integrity. So, in this principle authorized person can change the data under this concept. For an example in a company when a data that should be change then as a authorized the person supervisor will change it but if the person that is under the supervisor can't change data. If that person changes it will not be accepted. Also, the data can be changed when transmitting data when storing data and when use data.

3. Availability

Letter a in cia concept called availability. Information should always be available for access to authorized users when needed. To make it more efficient organizations can use servers, applications and redundant networks.

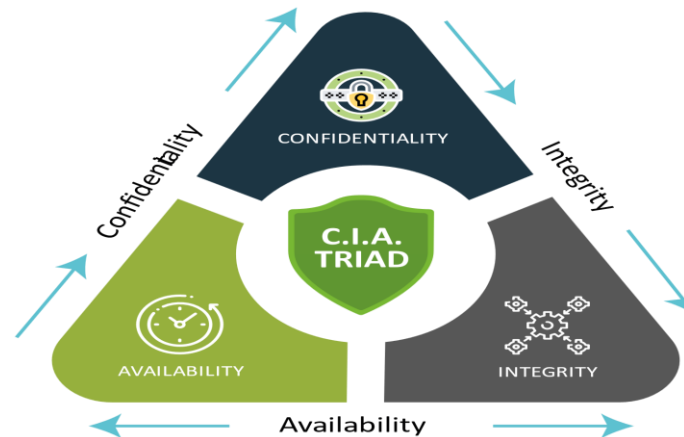


Figure 30 : CIA Triad

Impacts on CIA to Yard of Ale

CIA TRAIID CONCEPT	IMPACT ON YARD OF ALE
Confidentially	Yard of Ale relies heavily on confidentiality to protect sensitive information that gives it a competitive advantage. It is crucial to protect client information, financial records, and secret recipes. Yard of Ale prevents unwanted access to its trade secrets and customer data by implementing strict access controls and encryption techniques. As a result, the company's market position is protected, and long-term connections with customers are fostered along with regulatory compliance and customer trust. Yard of Ale's reputation in the industry is maintained by confidentiality

	<p>protocols, which give customers peace of mind that their data is being handled appropriately. Implementing data classification policies and educating staff members on data handling procedures are additional steps in maintaining confidentiality. Regular evaluations and audits ensure conformance to standard practices, confirming Yard of Ale's dedication to data security. Confidentiality measures also shield the business from possible data breaches and industrial espionage, protecting its distinct products and competitive edge.</p>
Integrity	<p>The operational efficacy of Yard of Ale is contingent upon its integrity. It is essential to guarantee the precision and coherence of production standards, supply chain data, and inventory records. Yard of Ale depends on data integrity to support its decision-making on inventory control and product quality assurance. Critical information reliability is ensured by implementing version control, checksums, and data validation checks. This lessens the chance of data corruption, errors, or illegal changes that can jeopardize manufacturing procedures or lead to inaccurate inventory counts.</p> <p>Preserving data integrity also contributes to Yard of Ale's image as a premium product provider. The company's ability to satisfy consumer requests and maintain uniform product standards is based on reliable data. Yard of Ale maintains its commitment to providing premium products while reducing the risks associated with inaccurate or corrupted data by investing in technologies that assure data integrity and putting strict data management practices in place.</p>

Availability	<p>Availability allows easy access to vital business data, which is essential for Yard of Ale's daily operations. Operational productivity depends on uninterrupted access to customer databases, inventory systems, and business intelligence tools. Data availability is critical to Yard of Ale's production procedures, customer support, and supply chain management. Yard of Ale lowers the risks connected with downtime and service interruptions by ensuring the constant availability of resources through redundant systems, frequent backups, and scalable infrastructure.</p> <p>Furthermore, keeping up a high availability ensures prompt decision-making and quick reactions to market demands. Agile decision-making is made possible by Yard of Ale's access to real-time sales data, inventory levels, and production indicators. This allows for swift adjustments in response to changes in the market or in customer preferences. This capacity helps the business remain competitive and react quickly to changing market conditions.</p>
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Table 23 : Impacts on CIA to Yard Ale

Other beer manufacturing companies in Sri Lanka

Popular beer manufactures

- Lion Brewery (Ceylon) PLC

Lion Brewery (Ceylon) PLC is a pioneer in the Sri Lankan beer industry. With a rich past spanning more than a century, Lion Brewery has made a name for itself as a leader in superior brewing. A wide variety of beers, such as the highly sought-after Lion Lager, Lion Strong, Lion Stout, and Lion Strong Extra Special, are among the company's excellent portfolio offerings. Lion Brewery has established itself as a major force in the Sri Lankan beer market thanks to its dedication to quality, innovation, and satisfying customer preferences. Because of its unwavering commitment to creating unique flavors and upholding strict quality standards, Lion Brewery has become a household name among Sri Lankan beer fans.



Figure 31 : Lion Brewery (Ceylon) PLC

- Carlsberg Brewery Lanka Limited

This well-known international company has established itself in Sri Lanka's beer market. The world-famous Carlsberg brand is among the many beers that the Carlsberg Brewery produces. The brewery has a rich tradition and is dedicated to producing exceptional beer. Utilizing its international standing for excellence and flavor, the brewery serves beer connoisseurs in Sri

Lanka by providing a high-end drinking experience. Due in large part to Carlsberg Brewery Lanka Limited's presence in the Sri Lankan market, consumers now have a greater variety of beer selections to suit their diverse preferences. Customers looking for great beer experiences in Sri Lanka continue to be drawn to Carlsberg because of its emphasis on premium ingredients and brewing know-how.



Figure 32 : Carlsberg Brewery Lanka Limited

- Three Coins Brewery

Three Coins Brewery is a prominent participant in Sri Lanka's beer manufacturing industry, distinguished by its dedication to producing high-quality brews. Three Coins Lager, the brewery's signature beer, has a devoted fan base among consumers thanks to its unique flavor and reliable quality. Three Coins Brewery prioritizes brewing excellence while accommodating a wide range of customer preferences and providing a tasty and refreshing beer experience. Three Coins Lager is now a well-known option in Sri Lanka's beer market thanks to its commitment to using premium ingredients and strict brewing guidelines. The brewery's focus on innovation, tradition, and customer satisfaction highlights its influence on the regional beer scene and its ability to satisfy the discriminating palates of beer lovers throughout the nation.



Figure 33 : Three Coins Brewery

- Asia Pacific Brewery (Lanka) Limited / Heineken Lanka Limited

A significant participant in Sri Lanka's beer manufacturing industry, Asia Pacific Brewery (Lanka) Limited is well-known for its wide range of beer brands. The brewery provides a variety of beer options to suit the varying tastes and inclinations of the community. Asia Pacific Brewery has successfully launched and maintained a variety of beer styles, adding to the lively beer culture in Sri Lanka by utilizing its brewing skills and market insights. With a dedication to quality and creativity, the brewery is growing and adding to the variety of options for customers. Asia Pacific Brewery is committed to creating unique beer experiences, which helps it satisfy the wide range of needs of beer lovers in Sri Lanka.



Figure 34 : Heineken Lanka Limited

Improvements of business process in Yard of Ale.

- **Production Efficiency:** Using lean manufacturing techniques will help Yard of Ale increase production efficiency. This entails analyzing current workflows to find and fix inefficiencies, cutting down on process waste, and making the most use of available resources. Production can be streamlined to provide a more efficient and economical manufacturing process by implementing automation where it makes sense and reassessing inventory management techniques.
- **Supply Chain Management:** The operations of Yard of Ale depend heavily on improving supply chain management. The reduction of supply chain disruptions can be achieved by fortifying supplier relationships, deploying more precise forecasting models derived from historical data and market patterns, and using technology such as RFID for inventory tracking. Operational efficiency can be increased by optimizing logistics and making sure raw supplies are procured on time.
- **Quality Control:** In order to keep consistent product standards, quality control measures must be raised. Product quality can be greatly increased by carrying out frequent audits, strict compliance checks, and employee training for adherence to quality assurance procedures. Adopting a feedback-integration and continuous improvement culture can strengthen Yard of Ale's dedication to producing high-quality goods.
- **CRM (customer relationship management):** A thorough grasp of the requirements and preferences of customers is necessary to refine CRM procedures. Yard of Ale can enhance customer service and personalize its offers by employing CRM software to monitor and analyze consumer feedback, interactions, and purchase habits. Consumer loyalty and deeper relationships can be fostered by expeditiously answering client issues and streamlining communication methods.

- **Marketing and Sales Strategies:** In order to better understand customer behavior, data analytics and business intelligence (BI) solutions must be used. Yard of Ale can better target particular demographics, pinpoint marketing initiatives, and spot new market trends by deriving actionable insights from data. This method maximizes market reach and brand visibility by enabling a more targeted and effective sales strategy.
- **Human Resources Management:** Investing in people may have a big impact on overall productivity. Some ways to do this include providing thorough training programs, encouraging a healthy work environment, and coordinating HR procedures with organizational objectives. A motivated and competent workforce is a result of comprehensive HR strategies that guarantee employee happiness, professional growth, and retention.
- **Technological Integration:** Yard of Ale's operations can be completely transformed by integrating cutting-edge data analytics tools, IoT for equipment monitoring, and ERP systems. These technology developments boost operational effectiveness, make it easier to make well-informed decisions, and provide real-time insights, which eventually leads to improvements in a variety of business processes.

New trends with BI

Augmented Analytics: Augmented analytics incorporates machine learning (ML) and artificial intelligence (AI) into data analysis, thereby modernizing business intelligence. It finds trends, streamlines data preparation, and produces insights that can be put to use. The goal of this movement is to make business intelligence (BI) easier to use so that even non-technical people can gain insightful knowledge from data.

Self-Service BI: This type of business intelligence enables individuals from various businesses to access and analyze data on their own without heavily depending on IT

departments. With its user-friendly interfaces, users can generate reports, dashboards, and analyze data. This approach promotes a culture of data-driven decision-making by democratizing access to data.

Embedded analytics: By directly integrating BI capabilities into processes and apps, embedded analytics offers insights into users' everyday actions. By integrating analytics within their operational systems, firms can improve their ability to make decisions without juggling many tools.

Data Governance and Security: It is more important than ever to manage data governance and security as data volumes increase. The main goals of BI tools are to secure sensitive data by bolstering security measures, guaranteeing compliance with laws like GDPR, and improving data governance features.

Real-time analytics allows companies to examine data as it is being generated, providing quick insights and opportunities for action. This tendency encourages making decisions quickly using the most recent data, which is very helpful in dynamic situations.

Mobile BI and Collaboration: As people depend more and more on their mobile devices, mobile BI has become more popular. It promotes collaboration and decision-making outside of traditional office environments by enabling users to access data and insights while on the go.

Predictive and Prescriptive Analytics: More predictive and prescriptive analytics features are being integrated into business intelligence platforms. While prescriptive analytics offers suggestions for actions to attain desired outcomes, predictive analytics predicts future patterns. This allows firms to proactively prepare and react to changing conditions.

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Grading Rubric

Grading Criteria	Achieved	Feedback
LO1 Discuss business processes and the mechanisms used to support business decision-making.		
P1 Examine, using examples, the terms 'Business Process' and 'Supporting Processes'.		
M1 Differentiate between unstructured and semi-structured data within an organisation.		
D1 Evaluate the benefits and drawbacks of using application software as a mechanism for business processing.		
LO2 Compare the tools and technologies associated with business intelligence functionality		
P2 Compare the types of support available for business decision-making at varying levels within an organization.		
M2 Justify, with specific examples, the key features of		

business intelligence functionality.		
D2 Compare and contrast a range of information systems and technologies that can be used to support organisations at operational, tactical and strategic levels.		
LO3 Demonstrate the use of business intelligence tools and technologies		
P3 Determine, with examples, what business intelligence is and the tools and techniques associated with it.		
P4 Design a business intelligence tool, application or interface that can perform a specific task to support problem-solving or decision-making at an advanced level.		
M3 Customise the design to ensure that it is user friendly and has a functional interface.		
D3 Provide a critical review of the design in terms of		

how it meets a specific user or business requirement and identify		
what customisation has been integrated into the design.		
LO4 Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used		
P5 Discuss how business intelligence tools can contribute to effective decision-making. P6 Explore the legal issues involved in the secure exploitation of business intelligence tools.		
M4 Conduct research to identify specific examples of organisations that have used business intelligence tools to enhance or improve operations		
D4 Evaluate how organisations could use business intelligence to extend their target audience and make them more competitive within the market, taking security legislation into consideration		

