

SCHOOL OF BUSINESS

**ASSIGNMENT COVER SHEET**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **STUDENT DETAILS** | | | | | | | | | | | | | | | | | |
| Student name: | | | | Sanket Shinde | | | | | | Student ID number: | | | | 20097530 | | | |
|  | | | | | | | | | | | | | | | | | |
| **UNIT AND TUTORIAL DETAILS** | | | | | | | | | | | | | | | | | |
| Unit name: | | | Business Project | | | | | | | | | Unit number: | | | BUSM7012 | | |
| Tutorial group: | | | | | Q3 2023 | | | | | | Tutorial day and time: | | | | | Wednesday and 6 PM to 9 PM | |
| Lecturer or Tutor name: | | | | | | | Dr. Krishnamurthy Ramanathan | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **ASSIGNMENT DETAILS** | | | | | | | | | | | | | | | | | |
| Title: | | Business Project Final Report | | | | | | | | | | | | | | | |
| Length: | | 4367words | | | | | Due date: | 01/09/2023 | | | | | Date submitted: | | | | 04/09/2023 |
| Home campus (where you are enrolled): | | | | | | | | | Parramatta City Campus | | | | | | | | |
|  | | | | | | | | |  | | | | | | | | |
| **DECLARATION** | | | | | | | | | | | | | | | | | |
| \* | I hold a copy of this assignment if the original is lost or damaged. | | | | | | | | | | | | | | | | |
| \* | I hereby certify that no part of this assignment or product has been copied from any other student’s work or from any other source except where due acknowledgement is made in the assignment. | | | | | | | | | | | | | | | | |
| \* | I hereby certify that no part of this assignment or product has been submitted by me in another (previous or current) assessment, except where appropriately referenced, and with prior permission from the Lecturer / Tutor / Unit Coordinator for this unit. | | | | | | | | | | | | | | | | |
| \* | No part of the assignment/product has been written/produced for me by any other person except where collaboration has been authorised by the Lecturer / Tutor /Unit Coordinator concerned. | | | | | | | | | | | | | | | | |
| \* | I am aware that this work will be reproduced and submitted to plagiarism detection software programs for the purpose of detecting possible plagiarism **(which may retain a copy on its database for future plagiarism checking).** | | | | | | | | | | | | | | | | |
| **Student’s signature:** | | | | | | Sanket Shinde | | | | | | | | | | | |
| **Note:** An examiner or lecturer/tutor has the right to not mark this assignment if the above declaration has not been signed. | | | | | | | | | | | | | | | | | |

ARO 00380 08/15

Enhancing Production Performance Through the Reduction of Machine Downtime at Kraft Heinz Seven Hills, NSW

BUSM7012 Business Project

Q3 2023

Prof. Krishnamurthy Ramanathan

By Sanket Shinde 20097530

1. Introduction

Efforts to minimize downtime in food production facilities are of paramount importance, ensuring timely product delivery. Beyond immediate benefits, reduced downtime enhances overall productivity, optimizing resource utilization. It significantly decreases operational costs, improving business profitability. Moreover, less downtime leads to increased customer satisfaction, guaranteeing consistent product availability.

Reducing equipment downtime in manufacturing operations directly boosts machine utilization, increasing throughput and reducing order lead times, enabling swift responses to customer demands. These multifaceted benefits enhance customer satisfaction, a pivotal goal for competitive businesses (Nwanya, Udofia et al. 2017).

This project analyzes downtime within the wet section of Kraft Heinz, Seven Hills, a prominent player in the food industry, focusing on liquid product manufacturing. Drawing upon the author's extensive year-long experience, the analysis delves deep into the core of downtime issues to uncover primary causes disrupting production. The project aims to recommend strategies for reducing downtime and improving overall production performance.

2. Background Information:

Kraft Heinz Australia, a subsidiary of the multinational food giant, Kraft Heinz Company, is a prominent entity in the Australian food industry. With an annual turnover of approximately A$1.2 billion (Kraft Heinz Foodservice Australia, n.d.), it operates four advanced manufacturing facilities across Australia, staffed by over 900 professionals. Formerly known as Cerebos Australia Ltd., the company specializes in prepared foods, offering a diverse product range, including sauces, spices, coffee blends, and more.

Operating in a competitive market, Kraft Heinz Australia focuses on excellence and innovation. Within this context, downtime poses a significant challenge, affecting production quotas, timelines, and customer satisfaction. To address this, the company proactively identifies and addresses downtime factors, aiming to enhance productivity, cost-efficiency, and customer satisfaction.

This project centres on the Seven Hills production unit, seeking to understand and mitigate downtime challenges. The goal is to provide recommendations to optimize production performance and reduce downtime, ultimately achieving operational excellence – a core objective for Kraft Heinz Australia.

3. Objective and Research Question:

3.1 Objective:

The overarching mission of this project is to diligently identify and effectively mitigate the central factors contributing to downtime within the **six production lines** nestled within the wet section of the esteemed Kraft Heinz Seven Hills facility. By meticulously scrutinizing the multifaceted issues that have been impeding seamless operations, the ultimate aim is to usher in a new era characterized by heightened productivity, unwavering competitiveness, and the unwavering commitment to consistently deliver superior quality products to the discerning customer base, precisely on schedule.

This venture represents a deliberate and systematic effort to peel back the layers of complexity shrouding the causes of downtime. Through rigorous analysis and data-driven insights, the project seeks to unravel the core challenges faced by the production lines, confront them head-on, and orchestrate their systematic resolution. In this quest for operational excellence, the project sets its sights on the twin goals of optimizing productivity and ensuring the timely delivery of exceptional products that stand as a testament to Kraft Heinz's unwavering commitment to quality and customer satisfaction.

By addressing these paramount objectives, the project endeavours to propel Kraft Heinz Seven Hills towards a future marked by uninterrupted operational efficiency and an unassailable competitive edge in the dynamic landscape of food production.

3.2 Research Questions:

To help achieve this overall objective, five research questions have been formulated.

1. What are the primary causes of downtime in each production line at the wet section of Kraft Heinz Seven Hills?
2. What impact is current downtime having on the cost of production and planned output?
3. What patterns or trends can be observed regarding downtime occurrences and their impact on production targets?
4. What approaches can be adopted to reduce downtime?
5. Based on the findings of the above four research questions, what recommendations can be provided to ensure that proper maintenance procedures are used to reduce downtime on priority production lines so that production can be enhanced?

4. Situation Analysis:

This research focuses on downtime within the production lines of the wet section at Kraft Heinz Seven Hills. Downtime refers to the temporary halt in production activities, encompassing failures, stoppages, and time spent on non-marketable products due to quality standards (Kleef & Rooji, 2006).

Machine downtime has diverse causes, including breakdowns, jams, operator unavailability, resource shortages, and planned or unplanned repairs (Nwanya, Udofia et al., 2017).

The research aims to uncover downtime's root causes and develop strategies for improvement. Understanding the financial impact on current expenses and future output guides financial decisions.

By analyzing downtime incidents and their effects on production milestones, patterns and trends emerge, offering insights into areas for refinement. Identifying tactics to reduce downtime and assessing their costs informs resource allocation.

These research queries transcend mere inquiry; they lead to process enhancement, cost containment, and increased productivity. This exploration's goal is pragmatic: to boost operational efficiency, reduce production costs, and ensure timely product delivery to customers.

4.1 Situation Analysis: Bottling Process at Kraft Heinz, Seven Hills

In the bottling process at Kraft Heinz, a carefully planned workflow encompasses several distinct stages. It begins with the transfer of empty bottles onto a conveyor system, a task managed by the Depalletiser. This phase can be carried out manually or through automated systems.

Next, the bottles enter the Labellers and Printing section, where meticulous labelling is performed. Each bottle is adorned with essential information, including work orders and best-before dates.

Following this labelling process, the bottles move to the filler section. Here, they are precisely filled with their intended products. Adjacent to the filler station, the capper ensures the bottles are securely sealed.

Safety measures include the use of an X-ray detection system to guard against contamination. Bottles passing this stage then enter a tilted conveyor, where their caps are thoroughly disinfected using a high-temperature product from the filler. Afterwards, they pass through a cooling tunnel.

Continuing along the production line, the bottles reach the Hot Melt Packing System (HMPS), where they are carefully packed into cartons, each holding 3 to 12 bottles. These cartons are then moved to the palletiser system, where they are systematically stacked to form pallets.

Once a pallet is completed, an Automated Guided Vehicle (AGV) transports it to a conveyor that leads to the warehouse. Importantly, this intricate process is consistent across all bottling production lines at Kraft Heinz Seven Hills.

These insights are based on the author's work experience and discussions with operators, technicians, and the engineering team at Kraft Heinz Seven Hills plant.

4.2 Situation Analysis: Downtime Report at Kraft Heinz Seven Hills

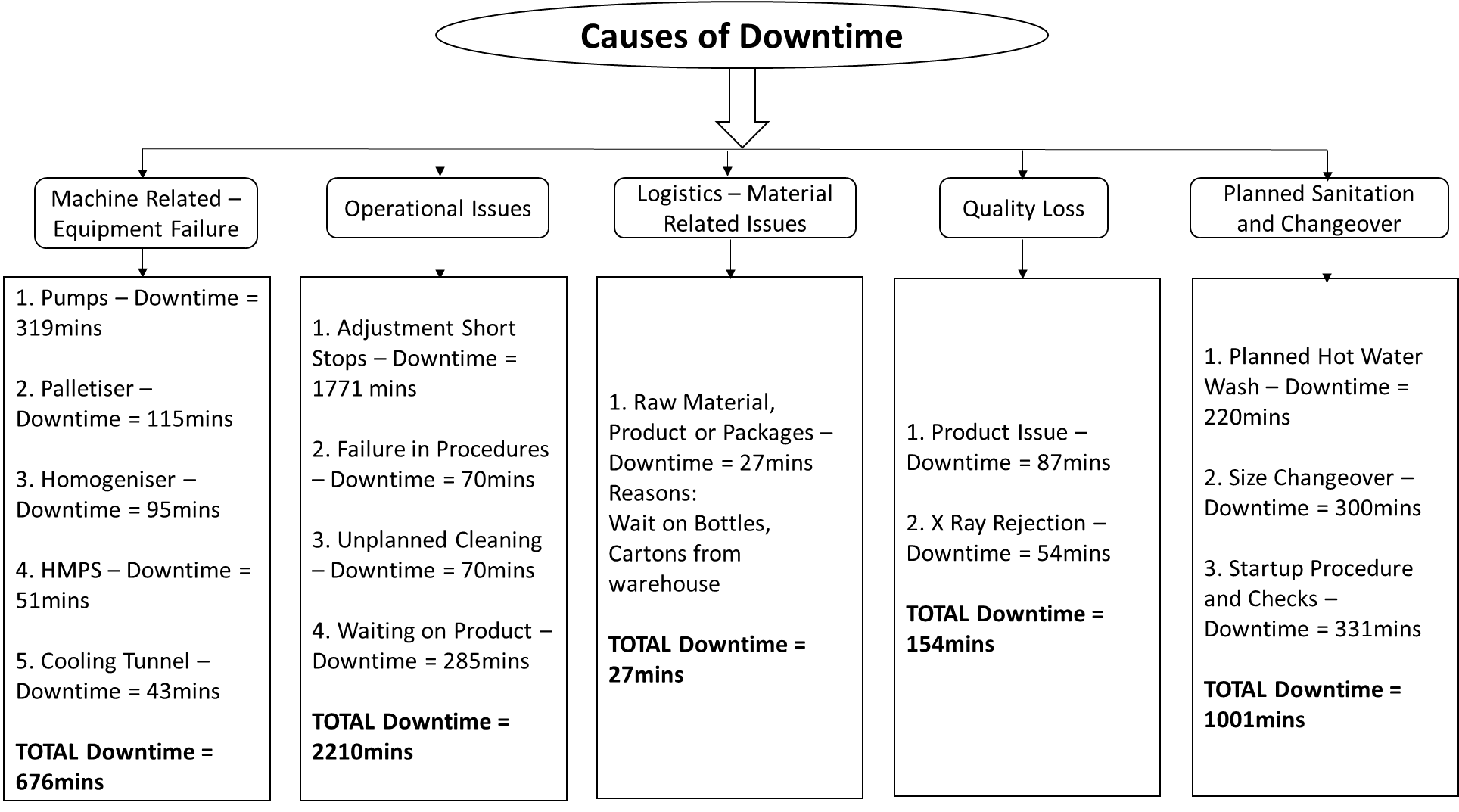
Kraft Heinz's Engineering department demonstrates a judicious approach to handling downtime issues through the implementation of a meticulous downtime code system. This sophisticated system is ingeniously structured into 10 distinct groups, each serving as a dedicated category for recording the multifaceted aspects of downtime concerns. One of the standout benefits of this system lies in its innate ability to foster accurate reporting and comprehensive comprehension of the intricate web of downtime causes that can potentially affect a production line.

It's worth noting that the first half of these 10 groups, precisely the initial five, are strategically geared towards the realm of scheduled downtime, which falls outside the scope of our analytical pursuits. The real crux of our investigation hones in on the remaining five groups: **Equipment Failure, Logistics, Operational, Quality Loss, and Planned Changeover and Sanitation**. Within these categories lie the fertile grounds for our endeavours to shine, as they represent tangible opportunities for transformative improvements. Operators and engineers, the lifeblood of any production line, wield these codes as tools of precise documentation. This methodical approach, in turn, facilitates an in-depth analysis that unveils the primary instigators of downtime on each production line, an invaluable insight that informs our quest for enhanced operational efficiency.

5. Addressing Research Question 1:

What are the primary causes of downtime in each production line at the wet section of Kraft Heinz Seven Hills?

In addressing Research Question 1, which focuses on identifying the primary causes of downtime in each production line within the wet section of Kraft Heinz Seven Hills, a comprehensive examination of all six production lines was conducted. These lines play a pivotal role in the manufacturing process, each catering to distinct product ranges and employing unique processes.

Figure 1: Causes of downtime in the Catering line for the period 1st April 2023 to 1st May 2023

The Catering line, designed for larger bottles ranging from 2 to 4 litres, follows a procedure akin to the one elucidated in the situation analysis. Within this line, downtime primarily stems from Equipment Failure, with issues such as Pumps, Palletisers, Homogenisers, HMPS, and Cooling Tunnel malfunctions being observed most frequently. Operational issues, notably Adjustment Short Stops, also contribute significantly to downtime. Logistic issues related to Raw Materials, Products, or Packages, and Quality Loss issues are comparatively minimal. Planned Sanitation and Changeover activities, including Hot Water Wash, Size Changeovers, and Startup Procedures, also account for a substantial portion of downtime in this line.

Refer Appendix 1  
Figure 2: Causes of downtime in the Hunter line for the period 1st March 2023 to 1st April 2023

The Hunter Line, akin to the Catering line in terms of bottle size, serves a different product. This line encounters downtime mainly in the form of Adjustment Short Stops within Operational issues and Planned Sanitation and Changeover activities.

Refer Appendix 1  
Figure 3: Causes of downtime in the Mainline for the period 1st April 2023 to 1st May 2023

The Main Line, responsible for bottling 500ml to 600ml sauce bottles, faces considerable Equipment Failure downtime, with the Filler, Meypack Case Packer, Homogeniser, and Palletiser being prominent contributors. Operational issues, Adjustment Short Stops, and Waiting on Product instances are also substantial sources of downtime. Logistic issues and Quality Loss issues have a minimal impact on this line. Planned Sanitation and Changeover activities are significant contributors to downtime, encompassing activities such as Hot Water Wash, Caustic Wash, Size and Product Changeovers, and Startup Procedures.

Refer Appendix 1  
Figure 4: Causes of downtime in the Table Sauce Line for the period 1st April 2023 to 1st May 2023

The Table Sauce Line, dealing with 200 to 400ml glass bottles, encounters Equipment Failure downtime, primarily attributed to the Capper, Labeller, and Pumps. Operational issues, particularly Adjustment Short Stops, play a significant role in downtime, alongside Waiting on Product instances. Logistic issues and Quality Loss issues are minimal contributors. Planned Sanitation and Changeover activities include Hot Water Wash, Startup Procedures, and Size/Product Changeovers, accounting for a substantial portion of downtime.

Refer Appendix 1  
Figure 5: Causes of downtime in the Liquid Gravy Line for the period 1st April 2023 to 1st May 2023

The Liquid Gravy Line, which produces 200ml pouches of liquid gravy, differs significantly from the bottling production lines, employing distinct machinery and processes. Equipment Failure downtime predominantly results from issues with the Case Packer (Mespick), Filler, and HMPS. Adjustment Short Stops within Operational issues and Waiting on Product instances are notable sources of downtime. Quality Loss issues and Logistics issues have minimal impact. Planned Sanitation and Changeover activities, including Maintenance, Sanitation, and Hot Wash, substantially contribute to downtime in this line.

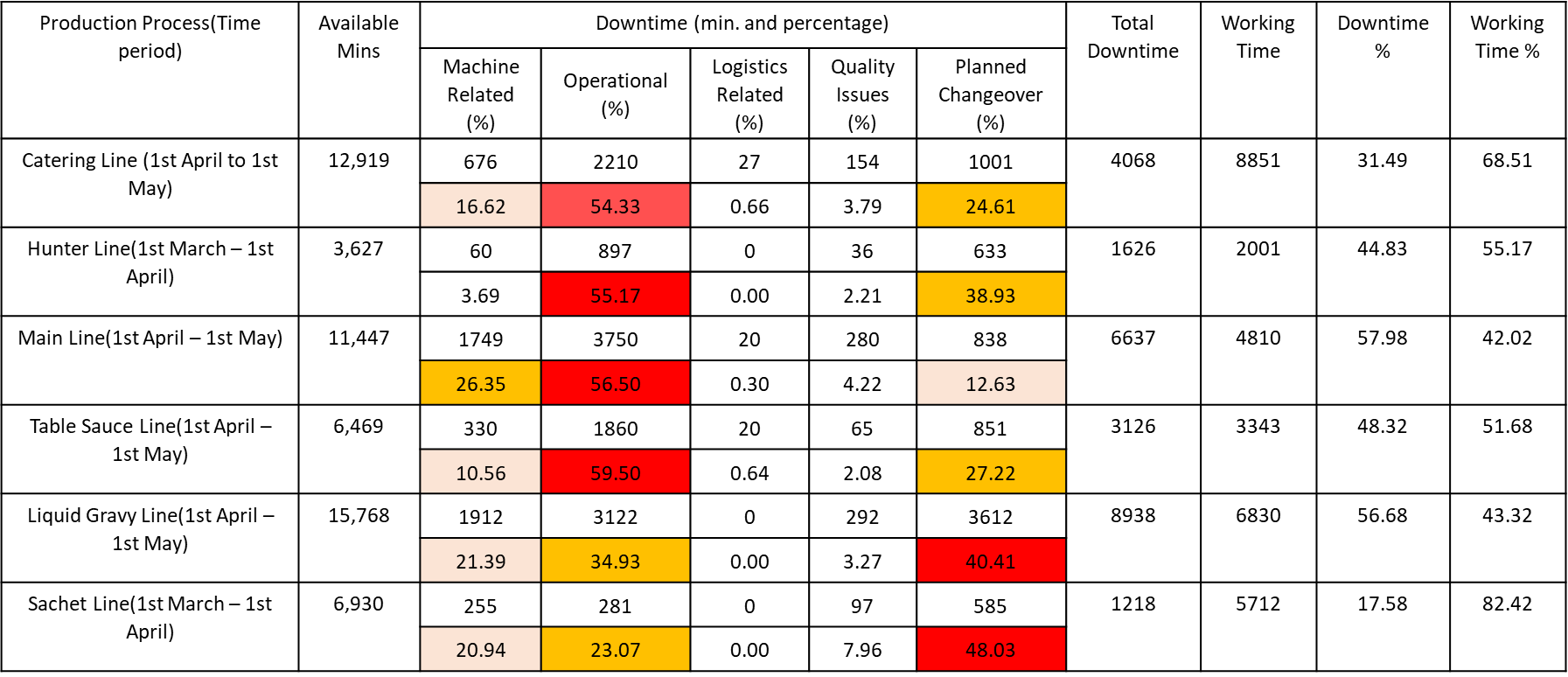
Refer Appendix 1  
Figure 6: Causes of downtime in the Sachet Line line for the period 1st March 2023 to 1st April 2023

The Sachet Line, dedicated to 50g tomato paste sachets, deals with Equipment Failure downtime primarily attributed to the Filler. Operational issues, including Adjustment Short Stops, Unplanned Cleaning, Waiting on Product, and Waiting on Maintenance, also contribute. Quality Loss issues and Logistics issues have minimal impact. Planned Sanitation and Changeover activities encompass Sanitation and Cleaning, Label, Ink, Glue, Roll, Rewind Changes, and Product Changeovers.

This meticulous categorization of downtime causes across the six production lines, as per the framework proposed by Hoque & Maalouf (2021), not only enhances the understanding of these issues but also lays the foundation for devising targeted strategies and actions to mitigate downtime occurrences and optimize production performance. Such insights are invaluable for Kraft Heinz Australia in its pursuit of operational excellence and ensuring the on-time delivery of high-quality products to its customers.

6. Addressing Research Question 2:

What impact is current downtime having on the cost of production and planned output?

Figure 7: Summary of downtime

This table presents a comprehensive overview of downtime analysis across six production lines within Kraft Heinz's Seven Hills facility. Each production line is characterized by its specific product range and operational processes.

Among these lines, the **Main Line** experiences the highest downtime at 57.98% of available time. This is primarily attributed to operational issues, with "Adjustment Short Stops" being a major contributor.

In the **Catering Line**, downtime is primarily caused by both machine-related and operational issues, with "Equipment Failure" and "Adjustment Short Stops" being significant culprits, resulting in a downtime of 31.49%.

The **Hunter Line** exhibits a significant operational downtime of 55.17%, mainly due to "Adjustment Short Stops."

For the **Table Sauce Line**, operational issues are prominent, particularly "Adjustment Short Stops," resulting in a downtime of 48.32%.

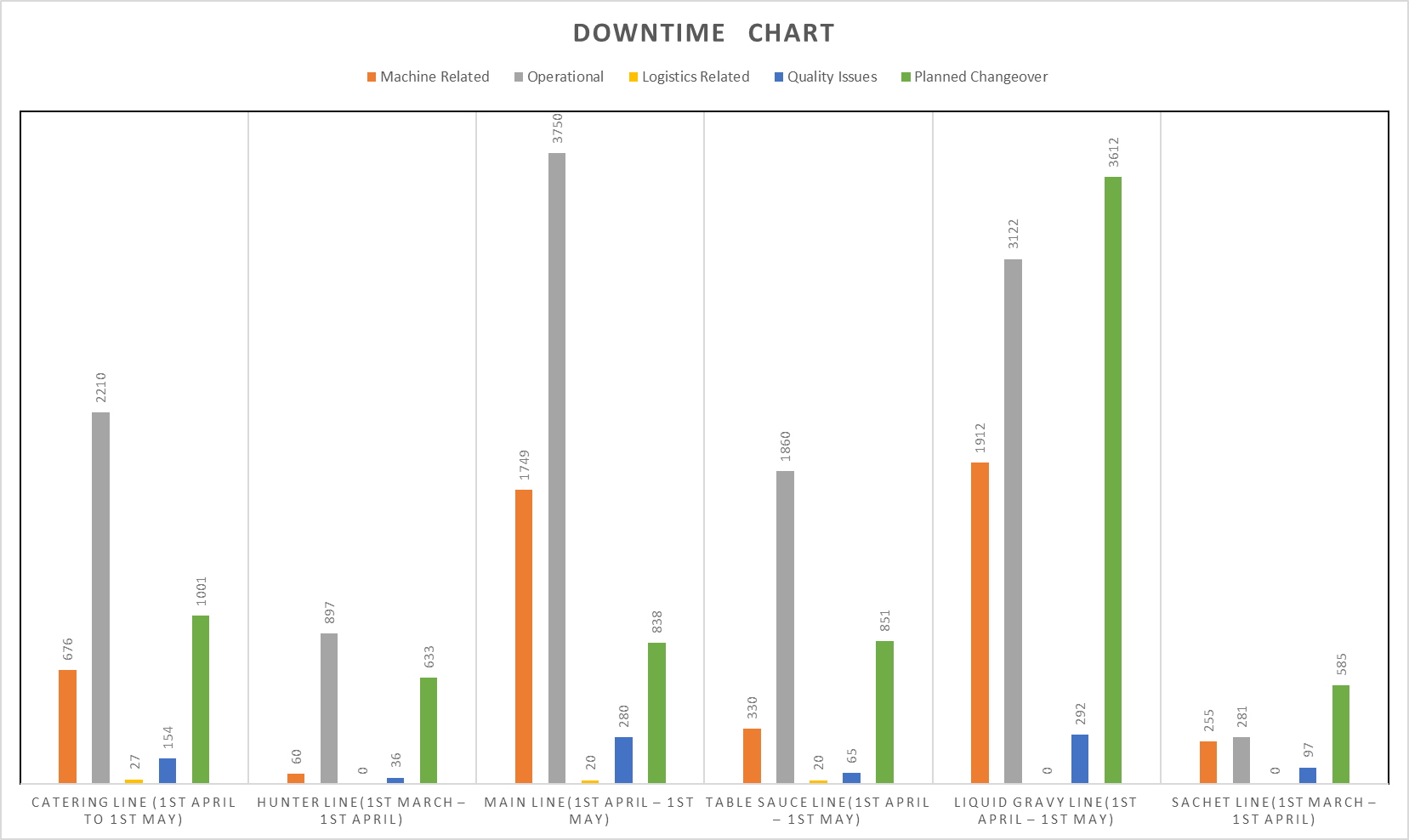
The **Liquid Gravy Line** experiences a notable overall downtime of 56.68%, with "Adjustment Short Stops" and "Waiting on Product" being the leading causes.

Lastly, the **Sachet Line** has the least downtime at 17.58%, primarily due to machine-related issues such as "Equipment Failure" and "Operational Issues."

In summary, operational issues, particularly "Adjustment Short Stops," contribute significantly to downtime in most production lines, with the Main Line having the highest overall downtime. This analysis provides valuable insights for optimizing production efficiency and reducing downtime.

7. Addressing Research Question 3:

What patterns or trends can be observed regarding downtime occurrences and their impact on production targets?

Figure 8: Downtime Chart

The bar graph illustrates the breakdown of downtime in each production line at Kraft Heinz's Seven Hills facility, categorized into five distinct groups: Equipment Failure, Operational Issues, Logistics-Related Issues, Quality Issues, and Planned Changeover and Sanitation. This analysis sheds light on which specific issues contribute the most to downtime and further supports the investigation of Research Question 3, which aims to identify suitable approaches for mitigating these issues.

Starting with the **Catering Line**, it is evident that the primary contributors to downtime are Operational Issues, Planned Changeover and Sanitation, and Equipment Failure. This insight is invaluable as it emphasizes the need for strategies that target these categories to minimize downtime effectively.

In the case of the **Hunter Line**, a similar pattern emerges, with Operational Issues, Planned Changeover and Sanitation, and Equipment Failure playing pivotal roles in downtime. This consistency across lines suggests that addressing these issues is crucial to enhancing productivity.

For the **Main Line**, the key contributors are Operational Issues and Equipment Failure, closely followed by Planned Changeover and Sanitation. This data underscores the significance of focusing on these areas to optimize production efficiency.

Moving to the **Table Sauce Line**, we observe that Operational Issues, Planned Changeover and Sanitation, and Equipment Failure are once again the major culprits. This alignment with other lines emphasizes the need for targeted solutions in these domains.

In the **Liquid Gravy Line**, Planned Changeover and Sanitation take the lead, followed by Operational Issues and Equipment Failure. This distinct pattern underlines the importance of concentrating efforts on planned changeover and sanitation processes.

Finally, the **Sachet Line** displays a consistent trend, with Planned Changeover and Sanitation, Operational Issues, and Equipment Failure as the main contributors to downtime. This coherence in findings across production lines reinforces the significance of tackling these issues comprehensively.

In essence, this analysis serves as a vital reference point for understanding the primary causes of downtime in each production line. It provides a clear direction for devising approaches that target these issues, ultimately aiding in the optimization of production performance and the reduction of downtime, in line with Research Question 3's objectives.

8. Addressing Research Question 4:

What approaches can be adopted to reduce downtime?

The analysis of downtime in the various production lines of Kraft Heinz Seven Hills has revealed that three primary factors contribute significantly to disruptions: Operational issues, Equipment Failure, and Planned Changeover and Sanitation. To effectively address these challenges, a multifaceted approach is adopted. Firstly, a comprehensive preventive maintenance strategy is implemented, encompassing carefully selected maintenance policies and decision variables tailored to each production line's specific needs. Additionally, the optimization of operational processes is prioritized, utilizing root-cause analysis methods to identify and rectify underlying issues. This includes standardizing procedures, streamlining cooking schedules, and implementing efficient changeover and sanitation processes through task prioritization and parallel activities. Moreover, operators are provided with extensive training to enhance troubleshooting skills and facilitate smoother changeovers. By employing these proactive measures, Kraft Heinz Seven Hills aims to minimize downtime, boost operational efficiency, and ensure the timely delivery of high-quality products to its customers.

A typical preventive maintenance model encompasses a carefully selected maintenance policy, such as periodic preventive maintenance or predictive maintenance, which dictates the timing and nature of maintenance activities. It also includes decision variables like maintenance frequency, labour allocation, and parts inventory levels, which are tailored to the chosen policy. The ultimate objective is often to minimize costs while maximizing equipment reliability, all while adhering to various constraints such as limited storage for spare parts and budgetary limitations (Nguyen & Bagajewicz, 2010).

Preventive maintenance, often regarded as a linchpin in the realm of industrial asset management, emerges as a potent strategy for curbing the total cost of ownership associated with manufacturing equipment. In an environment characterized by dynamic machine utilization and varying breakdown frequencies, the significance of preventive maintenance becomes all the more pronounced (Gopalakrishnan et al., 1997).

Manufacturing operations are multifaceted, entailing an array of maintenance strategies such as preventive maintenance, corrective maintenance, inspections, and more (De Almeida et al., 2015; Lee and Cha, 2016). However, the primary spotlight often falls on preventive maintenance due to its pivotal role in ensuring equipment reliability and availability while concurrently mitigating maintenance costs (Cavalcante et al., 2018).

Based on the insights gleaned from our analysis of downtime in the various production lines at Kraft Heinz Seven Hills, we have developed a series of targeted approaches to address the primary factors contributing to operational disruptions – Operational issues, Equipment Failure, and Planned Changeover and Sanitation. These approaches, when strategically implemented, will serve to enhance the overall efficiency and reliability of our production processes.

**1. Comprehensive Preventive Maintenance Strategy:** Our foremost recommendation is the adoption of a comprehensive preventive maintenance strategy. This tailored strategy includes specific maintenance policies and decision variables for each production line. By implementing the right maintenance policy, along with well-calibrated decision variables like maintenance frequency and parts inventory levels, we aim to proactively identify and rectify potential issues before they disrupt operations. This approach not only minimizes downtime but also bolsters the reliability of our equipment.

**2. Operational Process Optimization:** We emphasize the optimization of operational processes. To achieve this, we propose the use of root-cause analysis methods to uncover and address underlying issues. Standardizing procedures across production lines, streamlining cooking schedules, and introducing efficient changeover and sanitation processes, including task prioritization and parallel activities, are vital steps. These measures will result in smoother workflows, reduced operational disruptions, and heightened production efficiency.

**3. Workforce Training for Troubleshooting and Changeovers:** A well-trained workforce is pivotal in maintaining smooth operations. As such, we recommend investing in extensive training programs for our operators. Equipping them with troubleshooting skills and proficiency in changeovers is crucial for minimizing downtime and ensuring our team can adeptly handle challenges as they arise.

By embracing these proactive measures, Kraft Heinz Seven Hills aims to not only reduce downtime but also enhance overall operational efficiency. Our goal is to ensure the timely delivery of high-quality products to our valued customers. For a detailed overview of these approaches and their specific applications to each production line, please refer to the figures included in Appendix 2(Figure 9-14).

9. Addressing Research Question 5:

Based on the findings of the above four research questions, what recommendations can be provided to ensure that proper maintenance procedures are used to reduce downtime on priority production lines so that production can be enhanced?

9.1 The following three recommendations are suggested.

1. Roll out a comprehensive preventive maintenance program featuring a meticulously planned schedule and regular component inspections. Simultaneously, empower our operators with training in early issue detection and fundamental troubleshooting techniques.
2. Initiate operational process optimization by conducting thorough root cause analyses. Standardize adjustments and provide operator training to ensure that our product cooking and scheduling processes operate at their best. Implement robust production planning, and real-time monitoring, and foster improved communication and coordination.
3. Elevate our changeover and sanitation processes by strategically prioritizing tasks and introducing parallel activities. Optimize our changeover procedures through standardized protocols while ensuring efficient sanitation procedures are in place.

Recommendation 1: Comprehensive Preventive Maintenance.

To bolster equipment reliability and reduce downtime, it's crucial to establish a regular maintenance schedule for each production line, clearly delineating maintenance tasks, and their frequencies, and assigning responsible personnel. Furthermore, implement routine inspections of critical components across all production lines, encompassing sensors, pumps, conveyors, and machine parts, to swiftly detect wear, corrosion, or malfunctions. To empower our team, offer comprehensive training programs enabling operators and maintenance staff to identify early signs of equipment issues, allowing them to take proactive measures and prevent potential downtime. Additionally, equip them with fundamental troubleshooting skills, enabling them to efficiently address minor issues without the need for external assistance.

Recommendation 2: Operational Process Optimization.

To boost operational efficiency and minimize downtime, implementing structured root cause analysis is essential. This approach identifies the fundamental factors behind operational issues and downtime, facilitating precise, targeted solutions. Standardizing adjustment procedures is equally critical, as it ensures consistency during production and minimizes the risk of errors. Furthermore, enhancing operator training programs, covering machinery operation, common issue troubleshooting, and adherence to standardized procedures, is key. Promoting cross-functional collaboration among various departments involved in production fosters insights sharing, addresses challenges collectively, and enhances overall efficiency. Lastly, optimizing production schedules based on historical data, product demand, and machine capacity reduces idle time and maximizes overall efficiency.

Recommendation 3: Enhancement of Changeover and Sanitation Processes.

Efficiency in changeover and sanitation processes can significantly reduce downtime. To achieve this, it's crucial to develop a systematic approach for task prioritization during these activities, ensuring optimal resource allocation and time management. Implementing parallel activities during changeovers and sanitation allows multiple tasks to be executed simultaneously, effectively reducing downtime. Standardizing changeover and sanitation procedures across all production lines creates a unified approach that minimizes errors and maintains consistency. Specialized training for operators in executing changeovers and sanitation tasks is essential, empowering them to perform proficiently. Furthermore, enhancing equipment accessibility through thoughtful layout design facilitates easy access for cleaning and changeover tasks, ultimately reducing the time required for these critical activities.

9.2 Benefits of Downtime Reduction

  
Figure 15: Enhancement of Uptime

This table provides a comprehensive overview of the downtime and potential uptime increases for each of Kraft Heinz Seven Hills' production lines by implementing reductions in downtime by 25%, 50%, and 75%.

1. **Catering Line**: In this production line, with the current downtime of 4068 minutes, the available uptime is 8851 minutes. If the downtime could be reduced by 25%, the uptime would increase by 1017 minutes, and with a 50% reduction in downtime, uptime would increase by 2034 minutes. A 75% reduction in downtime would lead to a substantial increase in uptime by 3051 minutes.
2. **Hunter Line**: The Hunter Line, with its current downtime of 1626 minutes, has an available uptime of 2001 minutes. Reducing downtime by 25% would yield an extra 406.5 minutes of uptime, while a 50% reduction would provide an additional 813 minutes. A 75% reduction in downtime would result in a remarkable 1219.5 minutes of increased uptime.
3. **Main Line**: This production line currently experiences a downtime of 6637 minutes, allowing for an uptime of 4810 minutes. A 25% reduction in downtime would extend the uptime by 1659.25 minutes, while a 50% reduction would offer 3318.5 extra minutes of uptime. If downtime could be decreased by 75%, the uptime would increase by an impressive 4977.75 minutes.
4. **Table Sauce Line**: With a downtime of 3126 minutes, this line has an available uptime of 3343 minutes. Reducing downtime by 25% would provide an additional 781.5 minutes of uptime, while a 50% reduction would yield 1563 extra minutes. A 75% reduction in downtime would grant an impressive 2344.5 minutes of increased uptime.
5. **Liquid Gravy Line**: The Liquid Gravy Line currently experiences downtime for 8938 minutes, allowing for 6830 minutes of uptime. Reducing downtime by 25% would extend the uptime by 2234.5 minutes, and a 50% reduction would result in 4469 extra minutes of uptime. If downtime could be decreased by 75%, the uptime would increase by a substantial 6703.5 minutes.
6. **Sachet Line**: With a current downtime of 1218 minutes, the Sachet Line has an available uptime of 5712 minutes. Reducing downtime by 25% would offer an additional 304.5 minutes of uptime, while a 50% reduction would grant 609 extra minutes. A 75% reduction in downtime would lead to a noteworthy 913.5 minutes of increased uptime.

In summary, these calculations illustrate the potential benefits of reducing downtime in each production line, leading to increased uptime and enhanced overall operational efficiency.

The additional income generated due to the augmented production resulting from the integration of downtime reduction strategies is expected to be significant, effectively balancing the initial investment expenditures. Furthermore, as the efficiency enhancements become fully operational, the associated expenses are predicted to gradually decrease, especially during the initial year of implementation.

10. Conclusion:

In conclusion, this business project delved deep into the intricacies of downtime reduction within the production lines of Kraft Heinz Seven Hills. Downtime, which encompasses all the moments when no marketable product is being produced, emerged as a critical issue with multifaceted implications. This study meticulously explored the root causes of downtime, recognizing three primary factors: operational issues, equipment failure, and planned changeover and sanitation.

To address these challenges, a multifaceted approach was recommended. Firstly, the implementation of a comprehensive preventive maintenance program was proposed. This involved creating a regular maintenance schedule, conducting component inspections, and providing training in issue identification and basic troubleshooting.

Secondly, operational process optimization was suggested, including root cause analysis, standardization of adjustment procedures, operator training, cross-functional collaboration, and scheduling optimization.

Thirdly, enhancement of changeover and sanitation processes was recommended, incorporating task prioritization, parallel activities, procedure standardization, operator training, and improved equipment accessibility.

The potential benefits of these measures were quantified, demonstrating significant increases in uptime and, subsequently, production capacity. These improvements are expected to generate substantial incremental revenue, offsetting initial investment costs and progressively decreasing operational expenses.

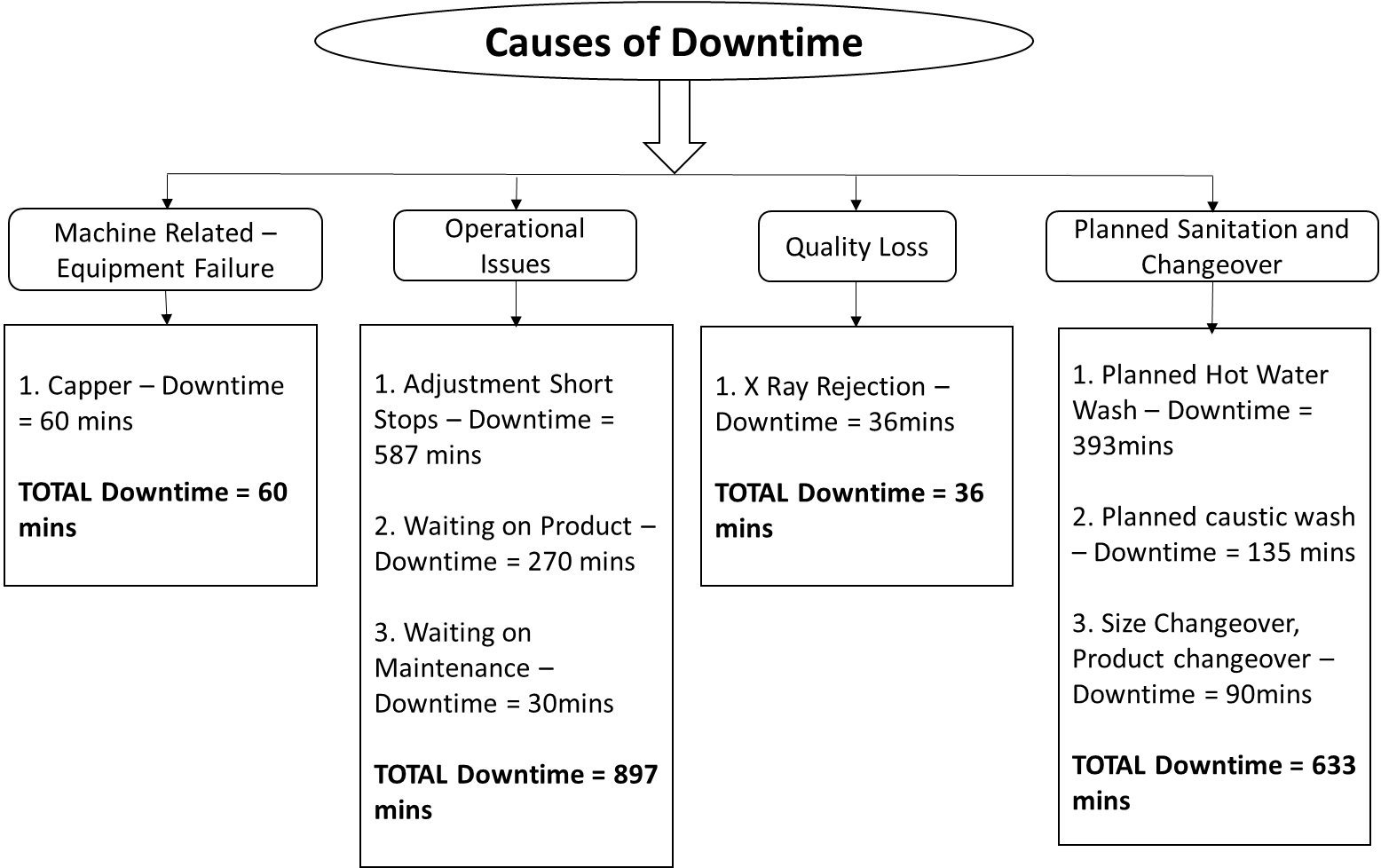
This project represents not only an academic exercise but a pragmatic pursuit of operational excellence, cost containment, and customer satisfaction. By reducing downtime and optimizing production processes, Kraft Heinz Seven Hills aims to enhance its market positioning, ensuring the timely delivery of high-quality products to its valued customers.

References:

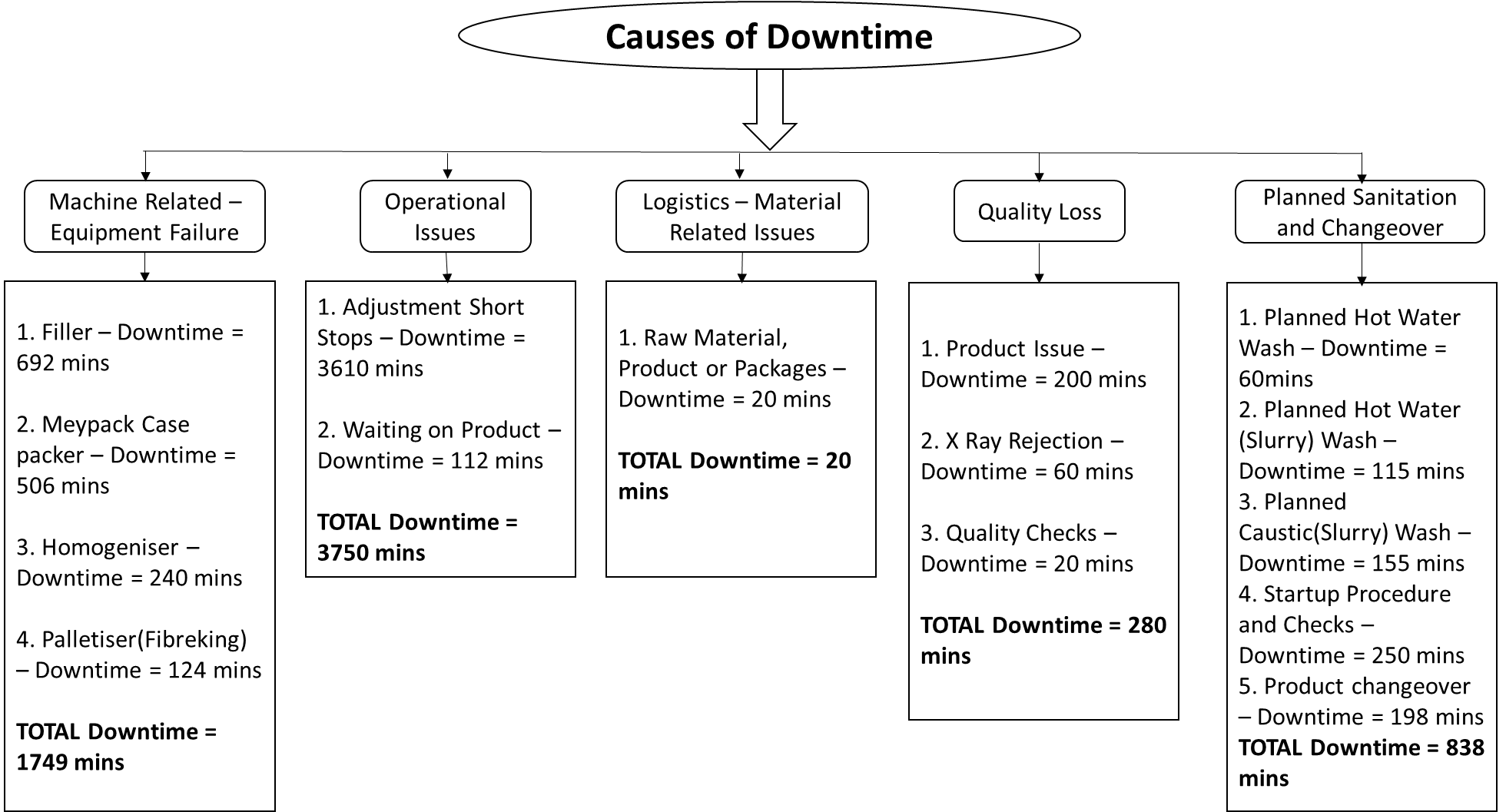
1. *About Us | KraftHeinz* n.d., *www.kraftheinzfoodservice.com.au*, <https://www.kraftheinzfoodservice.com.au/about-us>.
2. Cavalcante, CAV, Lopes, RS, & Scarf, PA 2018, ‘A general inspection and opportunistic replacement policy for one-component systems of variable quality’, *European Journal of Operational Research*, vol. 266, no. 3, pp. 911–919, viewed 3 August 2023, <https://www.sciencedirect.com/science/article/pii/S0377221717309451>.
3. De Almeida, AT et al. 2015, *Multicriteria and Multiobjective Models for Risk*, Springer, Cham, viewed 25 August 2023, <https://link.springer.com/content/pdf/10.1007/978-3-319-17969-8.pdf>.
4. Gopalakrishnan, M, Ahire, SL, & Miller, DM 1997, ‘Maximizing the Effectiveness of a Preventive Maintenance System: An Adaptive Modeling Approach’, *Management Science*, vol. 43, no. 6, pp. 827–840, viewed 22 August 2023, <https://pubsonline-informs-org.ezproxy.uws.edu.au/doi/abs/10.1287/mnsc.43.6.827>.
5. Hoque, I & Maalouf, MM 2021, ‘Quality intervention, supplier performance and buyer–supplier relationships: evidence from the garment industry’, *Benchmarking: An International Journal*, vol. 29, no. 8, pp. 2337–2358, viewed 9 August 2023, <https://www.emerald.com/insight/content/doi/10.1108/BIJ-02-2021-0075/full/html>.
6. Lee, H & Cha, JH 2016, ‘New stochastic models for preventive maintenance and maintenance optimization’, *European Journal of Operational Research*, vol. 255, no. 1, pp. 80–90, viewed 13 August 2023, <https://www.sciencedirect.com/science/article/pii/S0377221716302399?casa\_token=o4-\_DU8x314AAAAA:jBOP-iWqYnXNojkcvh5d0EI7mur\_x7oZUnDR-gBVBXQXLvLvU6adRIkA4m\_eKadMcq552uES7A>.
7. Nguyen, D & Bagajewicz, M 2010, ‘Optimization of Preventive Maintenance in Chemical Process Plants’, *Industrial & Engineering Chemistry Research*, vol. 49, no. 9, pp. 4329–4339, viewed 19 November 2022, <https://pubs-acs-org.ezproxy.uws.edu.au/doi/full/10.1021/ie901433b>.
8. Nwanya, SC, Udofia, JI, & Ajayi, OO 2017, ‘Optimization of machine downtime in the plastic manufacturing’, *Cogent Engineering*, vol. 4, no. 1, <http://eprints.covenantuniversity.edu.ng/9640/1/23311916.2017.1335444.pdf>.
9. Pearson, B 2018, *How to optimize the end of a flexible packaging line*, *www.proquest.com*, viewed 3 August 2023, <https://www.proquest.com/docview/2761400776/fulltext/AC4B298130EE4B0EPQ/1?accountid=36155>.
10. Xia, T et al. 2015, ‘Production-driven opportunistic maintenance for batch production based on MAM–APB scheduling’, *European Journal of Operational Research*, vol. 240, no. 3, pp. 781–790, viewed 10 August 2023, <https://www.sciencedirect.com/science/article/pii/S0377221714006201>.
11. Yang, L et al. 2019, ‘A two-phase preventive maintenance policy considering imperfect repair and postponed replacement’, *European Journal of Operational Research*, vol. 274, no. 3, pp. 966–977.

Appendix:

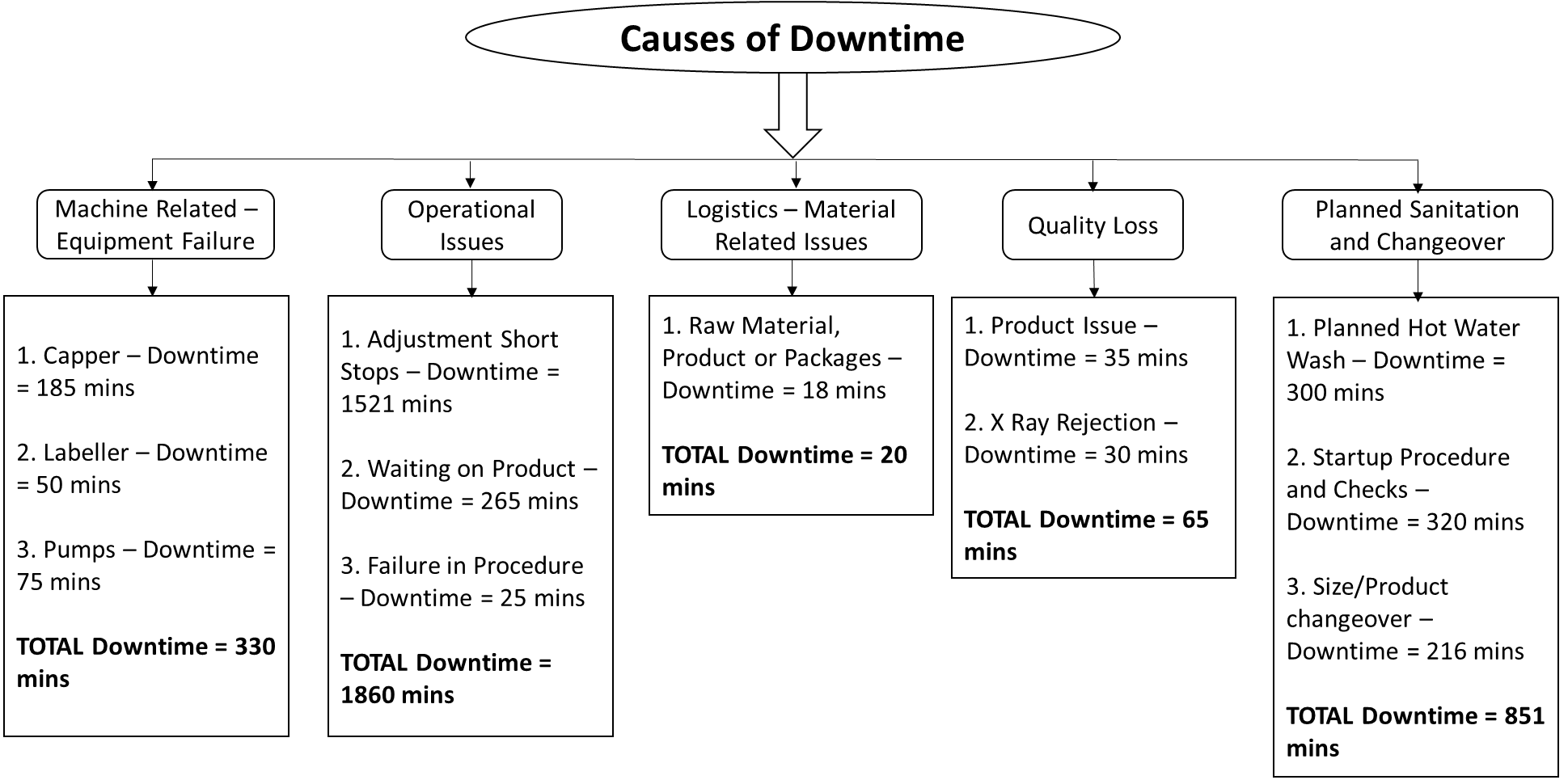
1. Causes of Downtime:  
a. Figure 2: Hunter Line

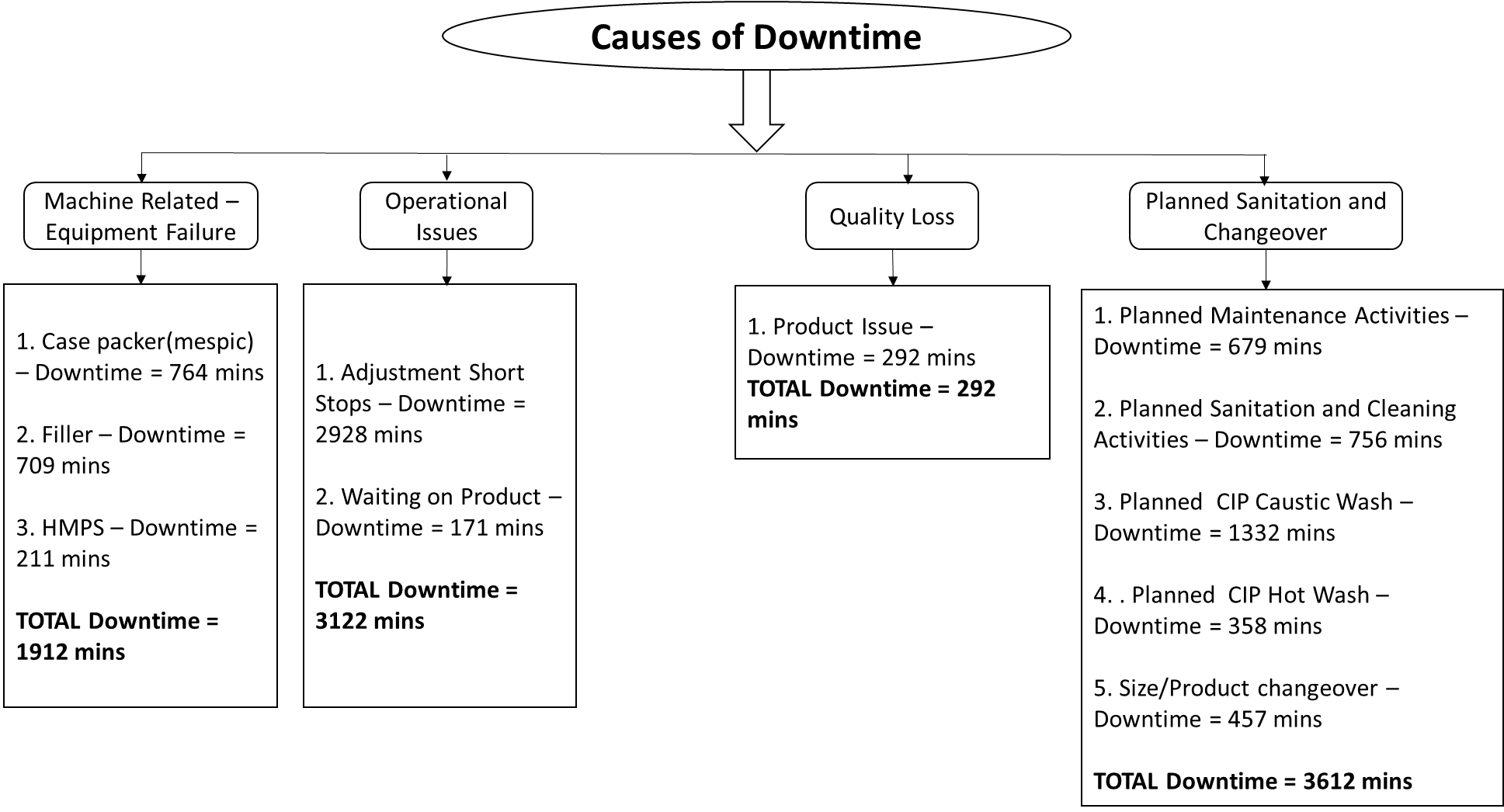


b. Figure 3: Mainline

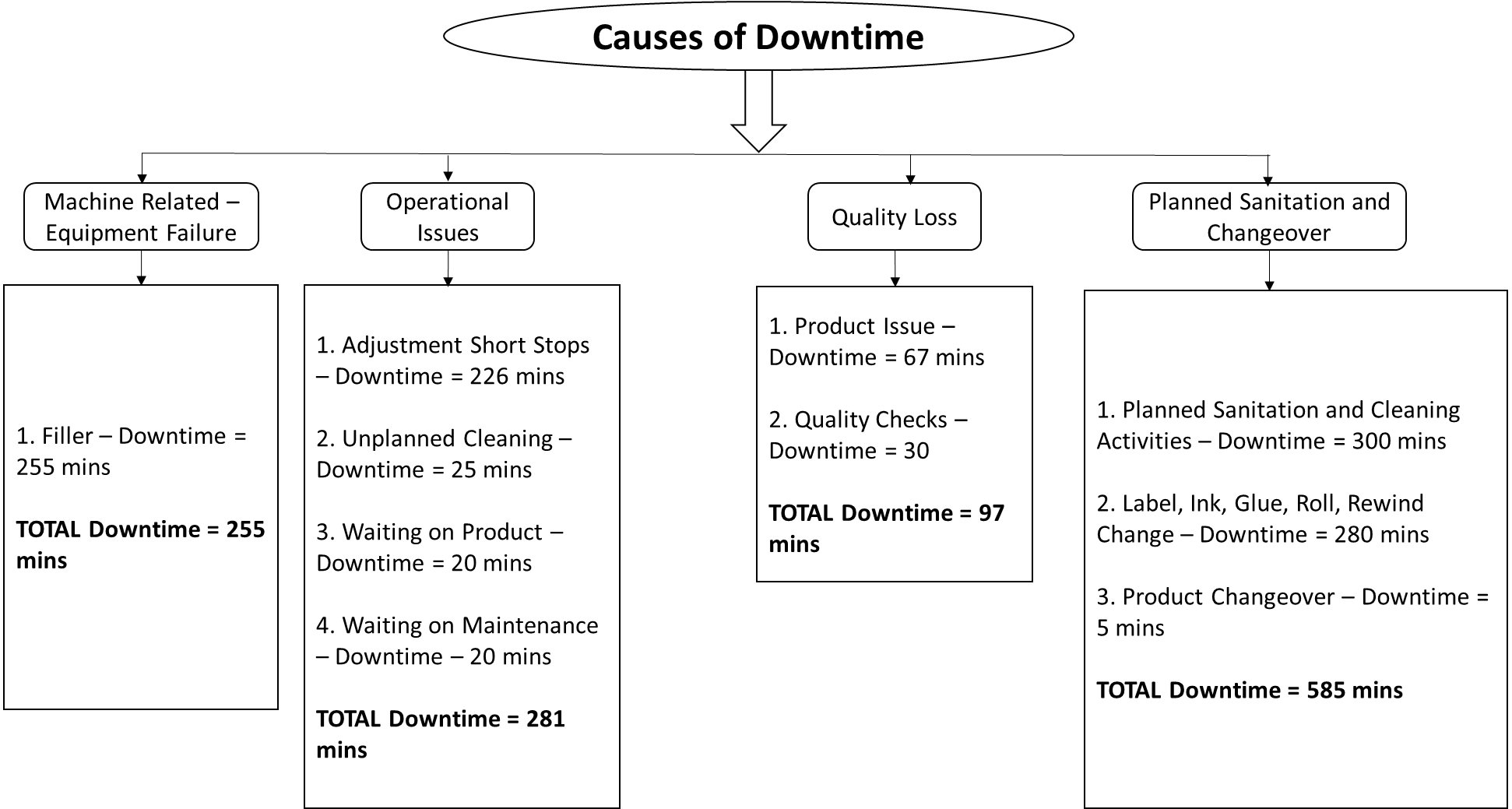


c. Figure 4: Table Sauce Line

  
d. Figure 5: Liquid Gravy Line

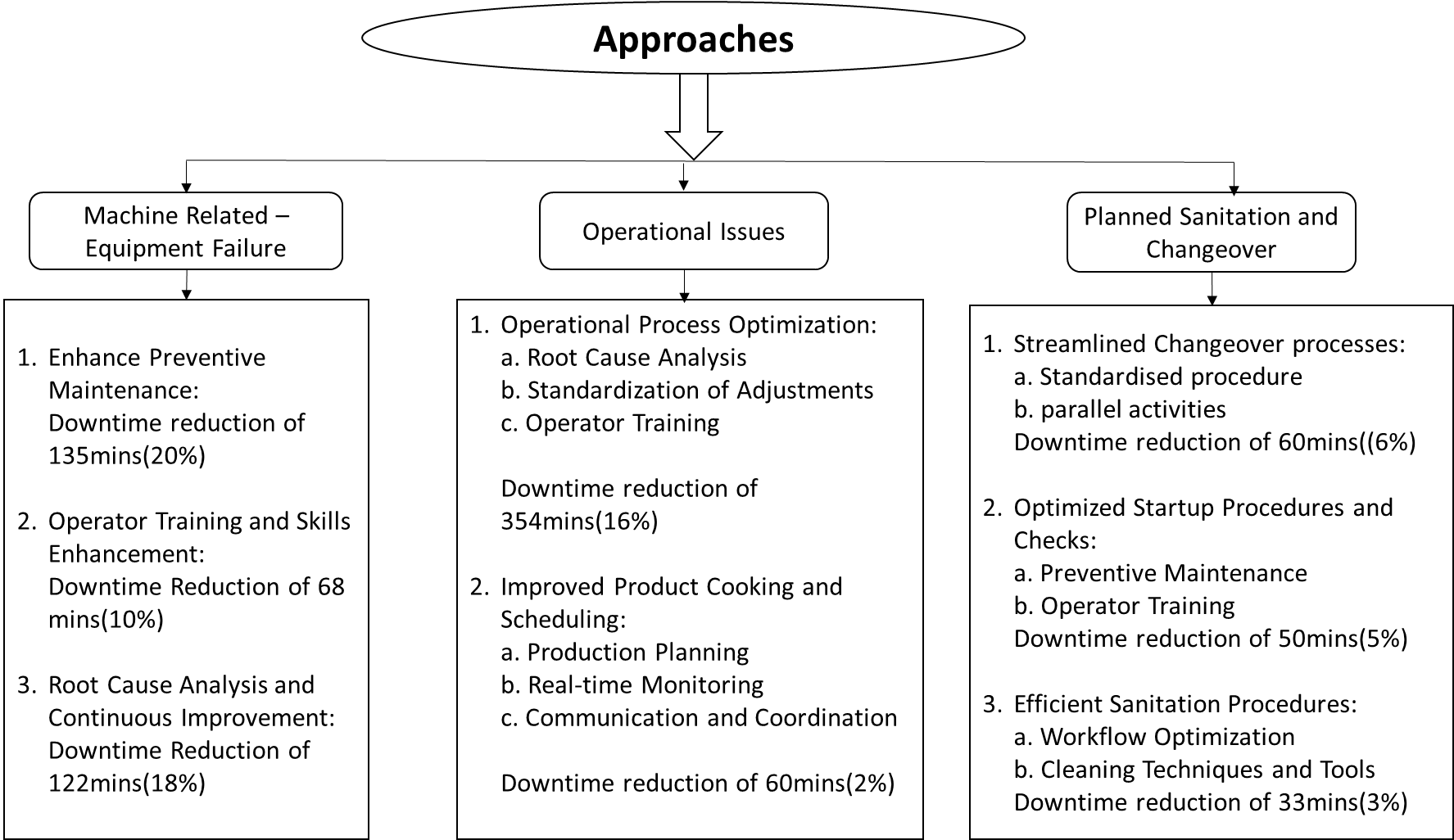


e. Figure 6: Sachet Line

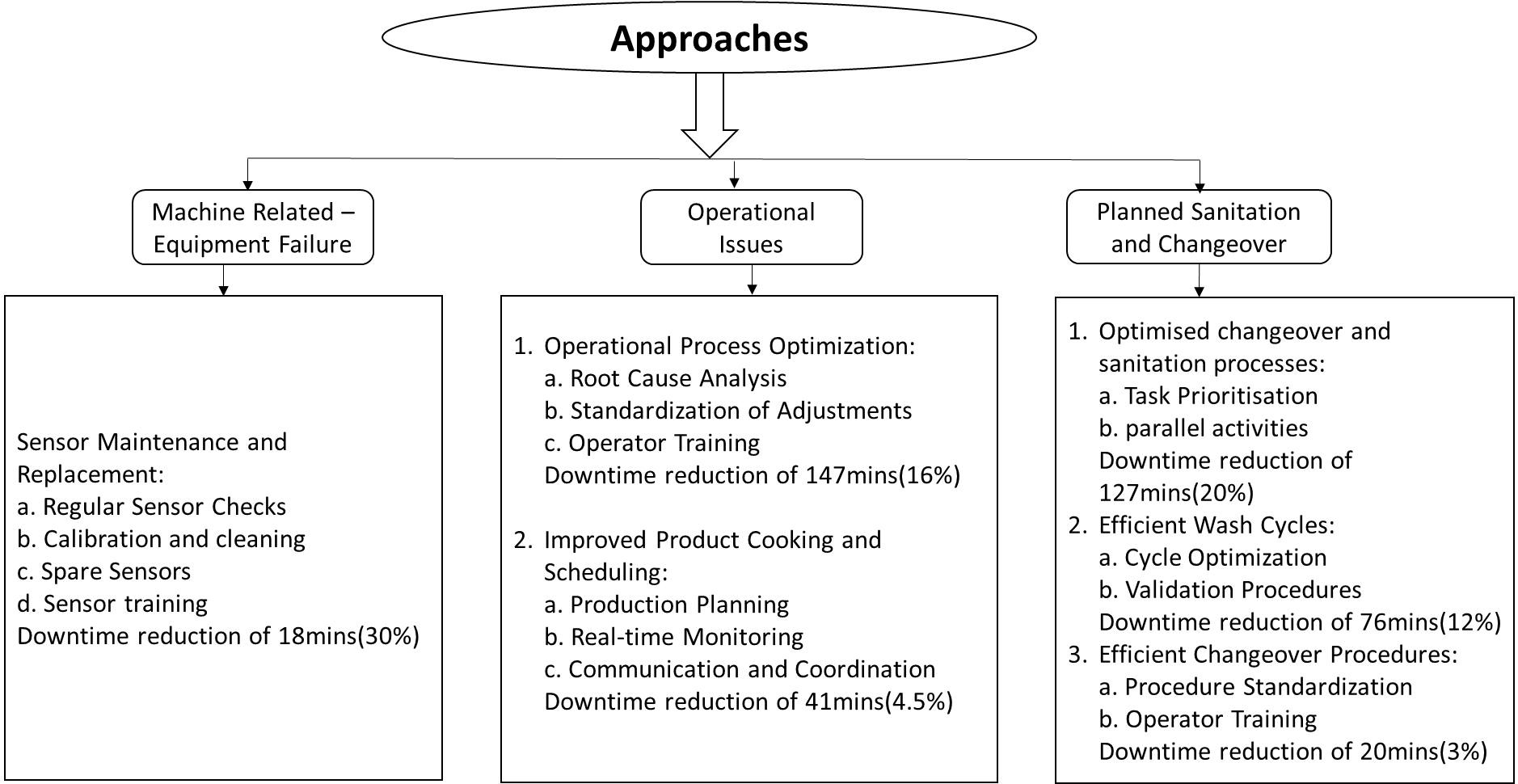


2. Approaches to address downtime issues:

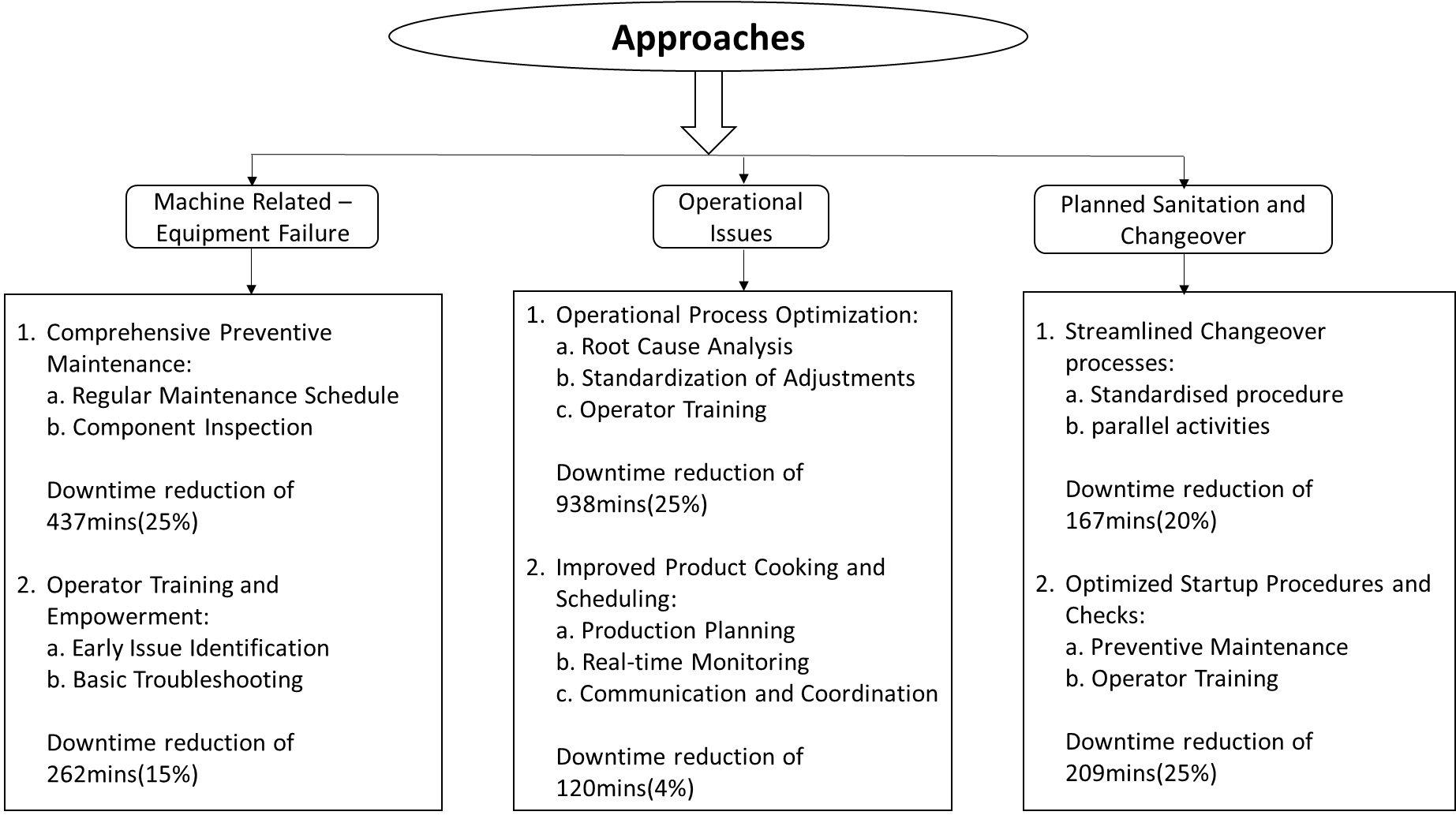
1.

Figure 9: Catering Line - Approaches

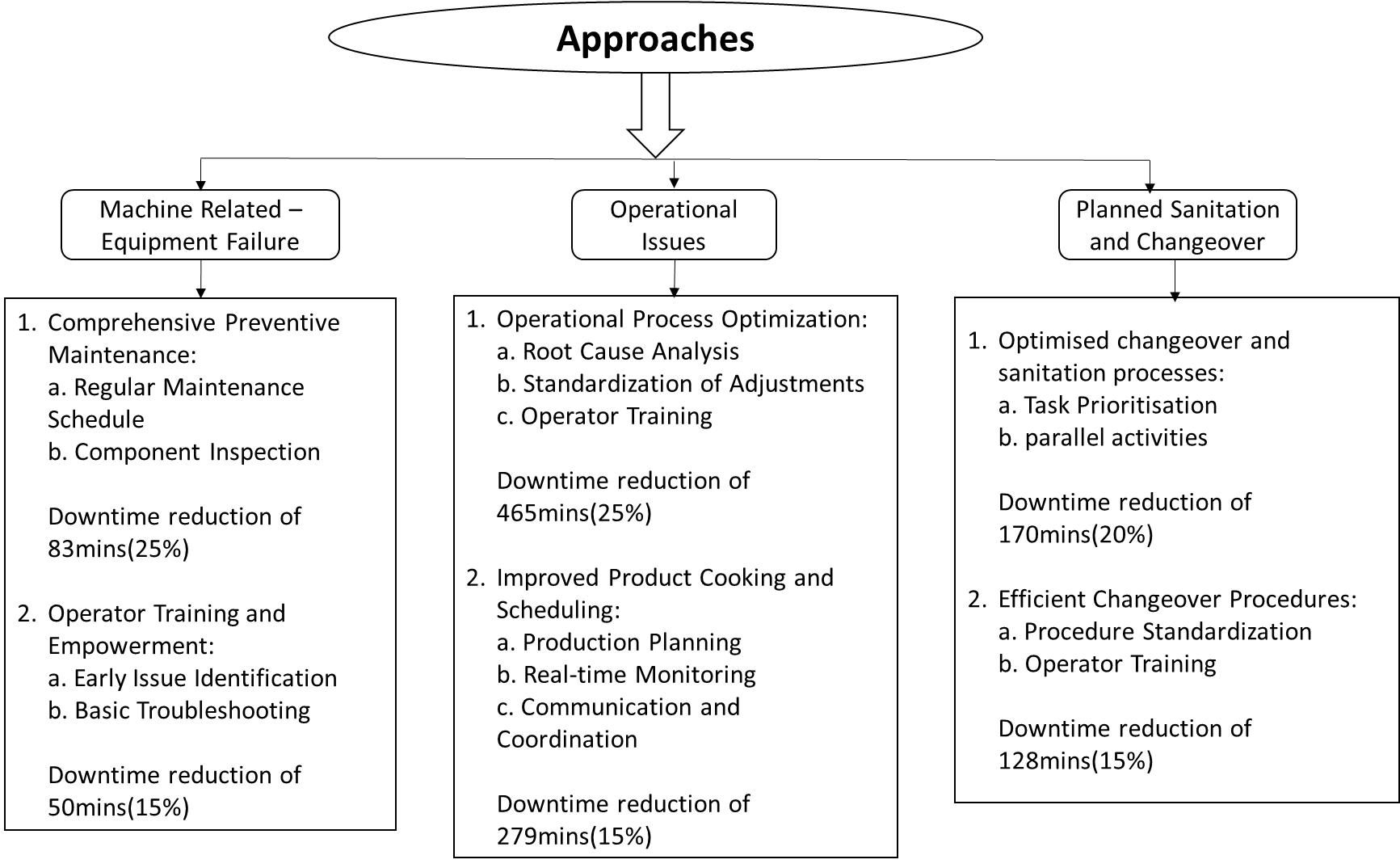
2.

Figure 10: Hunter Line – Approaches

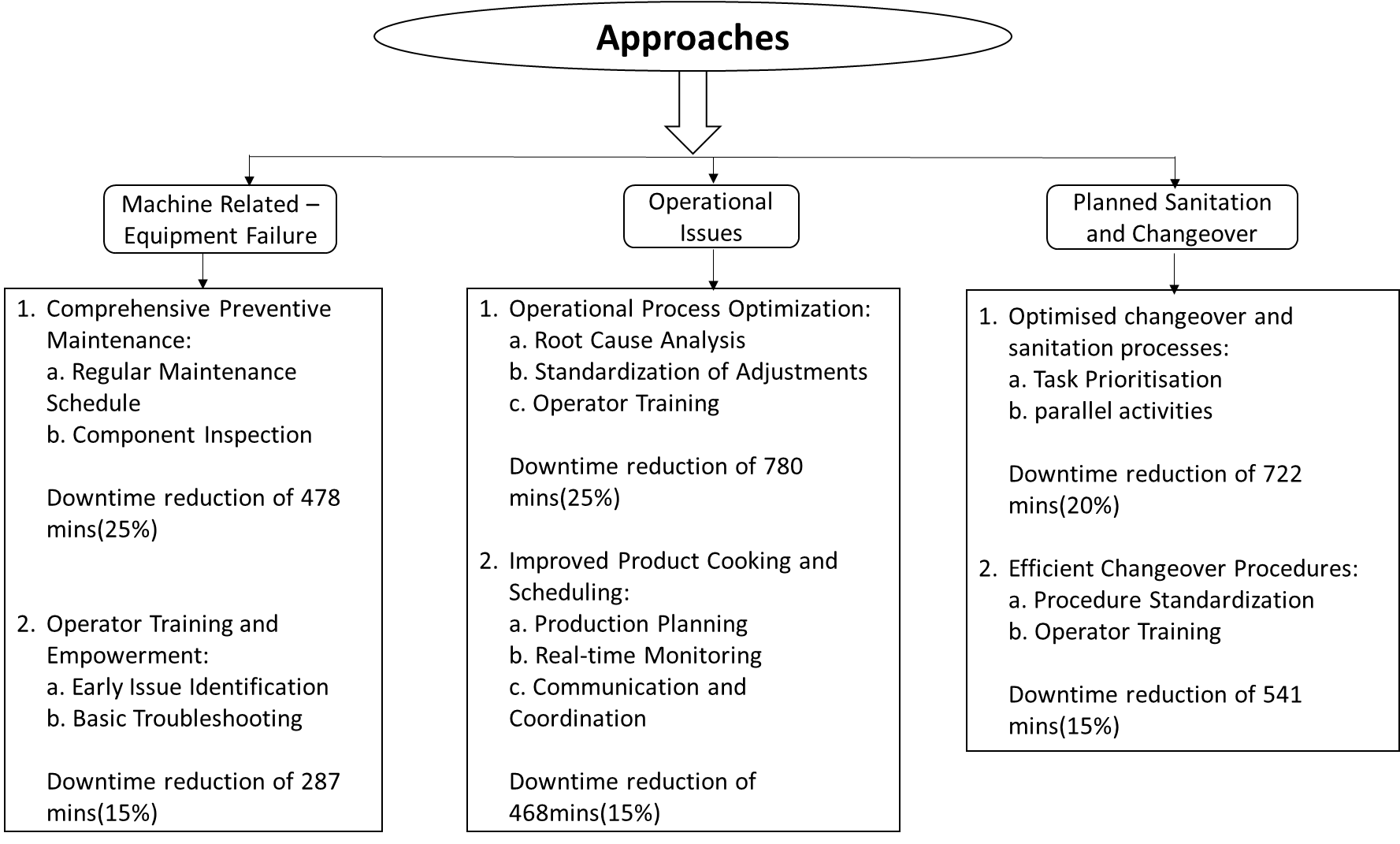
3.

Figure 11: Main Line – Approaches

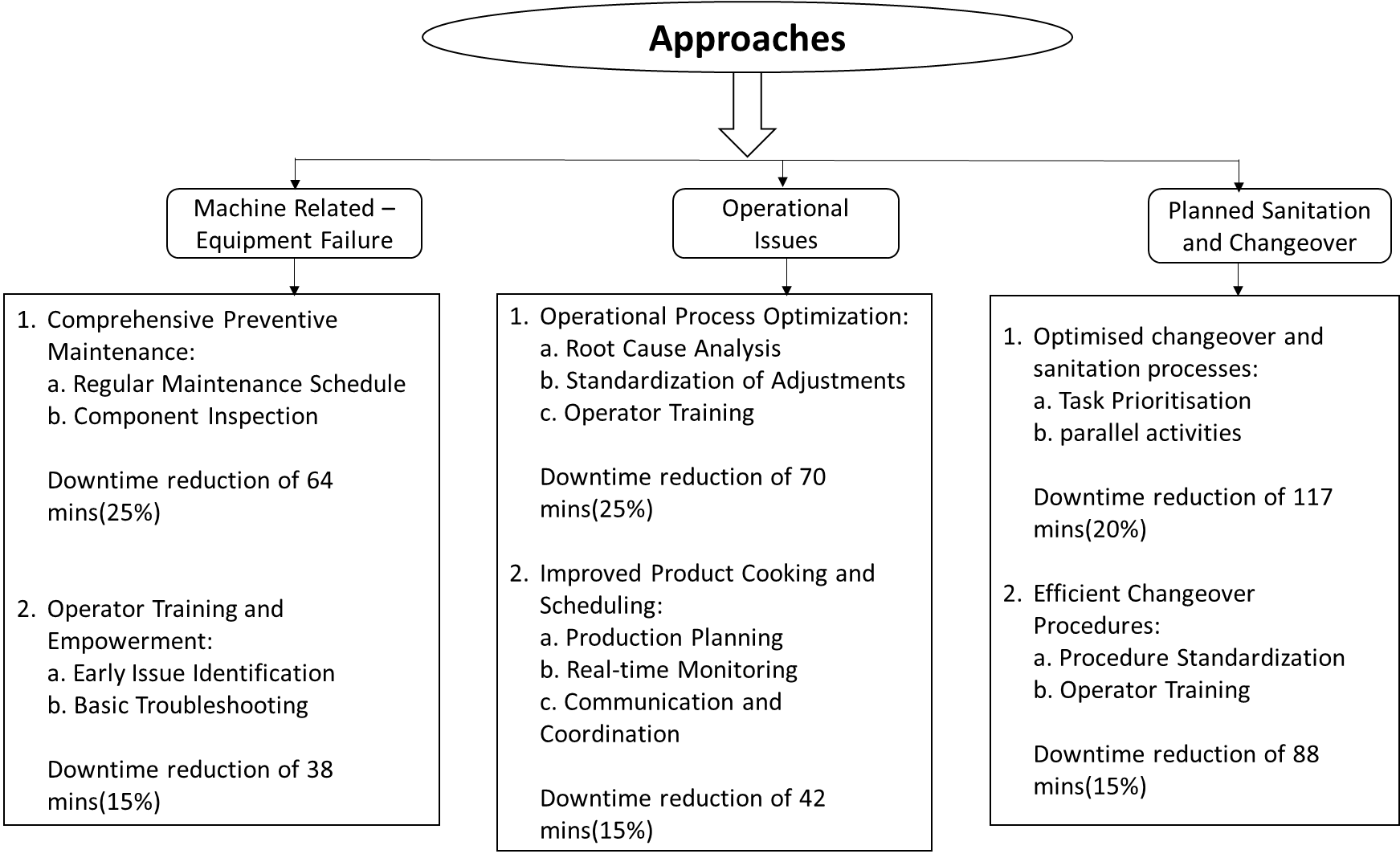
4.

Figure 12: Table Sauce Line - Approaches

5.

Figure 13: Liquid Gravy – Approaches

6.

Figure 14: Sachet Line – Approaches