MDSAA

Master's Degree Program in

Data Science and Advanced Analytics

Business Process Management

Submission 2: Business Process Analysis

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1   Qualitative Analysis

In the first step of the process analysis the focus will be laid on the qualitative factors. We start with a value-added analysis, followed by a waste analysis and then consolidating the findings with the issue register and three frameworks, i.e. Pareto, PICK and Why Why Analysis.

1.1   Value-Added Analysis

Value-adding (VA) steps are those that directly contribute to the outcome. Steps that do not directly contribute to the outcome but are important for the business are classified as **business value-adding** (BVA) steps. All other steps are classified as **non value-adding** (NVA) steps. Each activity was analyzed to determine whether it contributes to the outcome. Based on this analysis, each activity was classified accordingly, which can be seen in Figure 1. It becomes clear that most steps are creating value for the customer or the business. However, there are still 8 items which do not add value. These are mainly due to duplicated steps because of missing items in an order.

1.2   Waste Analysis

This analysis focuses on identifying unnecessary steps. These steps are grouped into three categories: 'Move', 'Hold' and 'Overdo'. The 'Move' category encompasses all steps related to transportation or motion. "Hold" contains all steps related to activities which require a wait, whether for inventory or for something else. Finally, Overdo includes all steps that go beyond what is necessary for the desired outcome. Overdo can further be clustered into defects, overprocessing and overproduction.

1.2.1   Move

Transportation:
- 15% of calls are routed to another store. This includes calls transferred between stores due to customer or store bottlenecks.
- 10% of orders placed via the website are intended for different stores, requiring the transfer of order information.

Motion:
- Couriers need to move to collect orders, receive TPAs, drive to the customer and return to the store due to missing items

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1.2.2   Hold

Inventory:

- Orders in the "Registered", "Prepared / quality control", and "On the way" stages represent Work-In-Process (WIP)

Waiting:

- 25% of calls are not answered. This indicates waiting time for customers attempting to place orders by phone.
- Registering a customer and entering their details during the ordering process delays the entire transaction. This takes on average 1 minute and 30 seconds on for orders via phone.
- Although the average preparation time is 7 minutes with a standard deviation of 1 minute, waiting for kitchen staff to start preparing an order can lead to the courier waiting.

1.2.3   Overdo

Defects:

- Around 15% of orders have errors like missing products, causing couriers to return to the store.
- 5% of website orders are outside the delivery area. These orders need to be canceled, and customers are invited to visit the closest store instead.

Over-processing:

- Double checking of VAT numbers, although necessary for accuracy.
- Handling specific customer requirements for telephone orders, from simple ingredient questions to complex allergy inquiries, could be streamlined.

Over-production:

- Manually checking every item of website orders due to lack of integration with the central system and high error rates takes up to 1 minute and 5 seconds with a standard deviation of 45 seconds.
- Asking critical questions that lead to order cancellation at a later stage in the process, e.g. asking where the customer is located.

1.3   Prioritize Problems

1.3.1   Issue Register

In order to prioritize, we grouped all identified issues into three categories. High Priority, Medium Priority and Low Priority. The main indicator for clustering was the monetary impact of an issue. This was derived from the available data with some assumptions. Where appropriate, qualitative impacts were described. For some issues, no data was provided, or it would not make sense to do so, e.g. calculating the quantitative impact by asking for the fiscal number twice. The holistic issues register is shown in Figure 2.

1.3.2   Root-Cause Analysis

Figure 3 illustrates that the unanswered calls present the greatest potential. It is important to note that the y-axis is on a logarithmic scale due to the significant opportunity for improvement in this area compared to the others. Once the issue of unanswered calls has been addressed, the second-largest source of inefficiency is the occurrence of 15% of orders lacking items, which forces the courier to return to the store. This is followed by the necessity of registering customers.

The PICK Analysis differentiates the identified issues into four categories. The first quadrant of Figure 4 represents the challenging issues to implement. The second quadrant contains issues that should be implemented without delay. The third quadrant identifies issues that should be killed. The fourth quadrant contains issues for the backlog that could be implemented at a later stage. This analysis shows that the movement of couriers, the transfer of website orders between stores and the preparation of missing items are low-hanging fruit for improving the process. Unanswered calls and customer registration also show great potential but are difficult to change quickly.

After the two most impactful issues were identified, i.e. unanswered calls and missing items, a why why analysis was conducted to understand the root cause. These analyses can be seen in Figure 5 and Figure 6. It can be observed that the main reasons for unanswered calls are occupied phone operators due to wrong staff planning in peak hours or difficulties in the ordering process which extend the calls. For missing items, the predominant factors are quite similar, e.g. in peak hours items get lost due to inefficient planning. Another common factor is that similar products or orders get confused due to bad management.

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1.4   Summary

In the qualitative analysis of Home Burger's order-to-cash process, we identified key inefficiencies and categorized them into value-adding (VA), business value-adding (BVA) and non-value-adding (NVA) steps. Our waste analysis highlighted significant issues: 15% of calls are misrouted, 10% of website orders require reassignment, 25% of calls go unanswered and 15% of orders contain errors. Key areas for improvement include reducing the number of unanswered calls and minimizing order errors, which are primarily caused by peak hour congestion and order management inefficiencies.

2   Quantitative Analysis

When analyzing the outcome of Home Burger´s business process there are several insights to consider. Firstly, we can see that the utilization for the couriers and the manager is significantly high with a percentage of 97. This possibly leads to a bottleneck inside the process especially during the home delivery and the takeaway, causing many instances to not finish. On the other hand, receptionists and employee´s which are responsible for the website have significantly less utilization with 16 and 17 percent. The employees with the least occupation are phone operators with only 9 percent. Therefore, high possibilities in enhancing the efficiency of the process lie in distributing the work more effectively.

Due to the bottlenecks inside the process only **14 out of 50 instances** finish the process successfully. The minimum time for a process to run through is 6,25 minutes while the maximum is 499 minutes (more than 8 hours) and the average **181 minutes** (3 hours). Taking a deeper look at the subprocess, we can see that the reason for the long delay is due to the prepare order stage with an average time of 118 minutes and the home delivery with an average time of 244 minutes. Furthermore, these subprocesses are represented by significantly high waiting times for the resources. Therefore, the biggest pain points lie in these processes which need to be modified to enable faster processing, less waiting time and thus more customer satisfaction.

To examine the impacts for the efficiency and the delay of the process, several different scenarios were conducted. In a second scenario the manager was subducted from the takeaway process, as incorrectly placed items can also be handled by the receptionist. Furthermore, the delivery time was reduced from 50 to 30 minutes. This can be internally achieved by reducing the distance range of possible deliveries. With these small changes several enhancements could have been achieved. The average time of a process reduced to **160 minutes** and now **39 of 50 instances** completed the process.

Another scenario was built to analyze the impact by reducing the occupation of couriers. This will be done by increasing the number of couriers. This will further increase the costs but could therefore lead to better efficiency and more customer satisfaction. The results are the following.

3   Explanation of the Redesign Actions

As a first step in the redesign process, we try to reduce the quantity of falsely placed items which lead to high inefficiency during the process since the order needs to be send back to the kitchen and be corrected. Dealing with this issue can lead to less mistakes and efficiently reduce the average process time. To achieve this, we introduce a double check of the placed items after preparing the order which will be conducted by the manager. This process redesign can be represented by Heuristic 3 – Triage, which means that a task will be specialized into alternative tasks for better error handling in this case.

With the established double check by the manager, we expect a tremendous improvement of the error rate of missing items that come to light when the delivery happens. Through that we pull the error more to the beginning of the process, avoiding any unneeded loss of time. We estimate that the initially given ratio of 15% for missing items for home deliveries could be decreased around 90% to 2% as the missing item was fixed already before. We assume that the average delivery time is including the additional time the delivery worker needs to get missing items. With this assumption, the high average time for each delivery should therefore also decrease as a result drastically as only for a few orders missing items have to be collected from the store.

Furthermore, as explained in the quantitative analyses, the manager is occupied too much which leads to bottleneck situations during the process. To avoid this, the manager will not further be included in the takeaway process and be replaced by the receptionist who has more spare time for less important tasks. This process redesign is called Heuristic 7 – Resource optimization, because the overload of a role gets distributed to another group which is more idle. Furthermore, with this rearrangement a task regarding the communication with the manager can be eliminated and thus streamline the process by utilizing the Heuristic 1 – Task elimination.

Additionally, the manager´s feedback activity during the home delivery will be now replaced by the idle website´s responsible. This makes sense since this employee is already familiar with the digital order process. Work is therefore distributed more efficiently between different roles which is why this redesign also pertains to Heuristic 7 – Resource optimization.

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In the redesigned process for Home Burger's order-to-cash system, a double-check mechanism managed by the restaurant manager was introduced with the objective of significantly reducing errors in order placements (during the order preparation). This approach is anticipated to result in a notable reduction in the incidence of erroneous orders, thereby reducing the necessity for delivery personnel to return to the store. Furthermore, we optimized the allocation of resources by reassigning the manager's tasks in the takeaway process to the receptionist, who has available capacity, thereby alleviating bottlenecks. The managerial feedback activities during deliveries have been transferred to an employee responsible for website orders, leveraging their digital expertise to streamline operations. The objective of these changes is to enhance efficiency, reduce errors, and improve customer satisfaction by ensuring more rapid and reliable service delivery.

4   Conclusion

The comprehensive business process analysis conducted for Home Burger's order-to-cash system provides an understanding of the existing challenges and potential areas for significant improvement. The detailed conclusions gained from the analyses are as follows:

The analysis identified several critical inefficiencies that affect the overall performance and customer satisfaction levels of Home Burger. Notable issues include misrouted calls, the need for reassignment of website orders, high rates of unanswered calls, and prevalent order inaccuracies.

Both qualitative and quantitative analysis was used to identify the underlying causes of inefficiency. The problems arise primarily from inadequate resource allocation and process design, which become particularly problematic during peak business hours, leading to a cascade of delays and errors.

To address these inefficiencies, we suggest a series of strategic adaptions. These include implementing a double-check system to verify order accuracy, enhancing task specialization to better align skills with responsibilities, and optimizing resource allocation to smooth out bottlenecks. Such interventions are designed to be both corrective and preventive, ensuring that errors are minimized both at the point of occurrence and throughout the process.

The implementation of the proposed redesign actions is expected to result in a significant reduction in process times and error rates at Home Burger. This is likely to lead to enhanced customer satisfaction due to more reliable and faster service. Additionally, the streamlining of operations is projected to improve workforce efficiency and reduce operational costs, contributing positively to the bottom line.

We advise Home Burger to continue monitoring the changes that have been implemented by establishing a structured feedback loop with customers and staff. This will ensure that the processes stay attuned to the real operational demands and customer preferences. Additionally, it recommends regular reviews of process efficiency to remain agile in the face of market shifts or changes in internal business objectives.

In conclusion, this Business Process Analysis represents a critical step in evolving Home Burger's order-to-cash process into an operation that is more efficient, less prone to errors, and more aligned with customer satisfaction. The expected results aim not only to improve the customer experience but also to enhance Home Burger's operational effectiveness and increase its profitability.

5   Appendix

Step	Performer	Classification
Enter phone number into system	Reception / Website	Business Value-Adding
Ask for name	Reception / Website	Business Value-Adding
Ask adress and zip code	Reception / Website	Business Value-Adding
ask for fiscal number	Reception / Website	Value-Adding
Varify data	Reception / Website	Non Value-Adding
Store personal details in system	Reception / Website	Business Value-Adding
Collect order details	Reception / Website	Value-Adding
Ask for special needs	Reception / Website	Value-Adding
Ask for fiscal number 2x	Reception / Website	Non Value-Adding
Agree on payment method	Reception / Website	Value-Adding
Receive payment	Reception / Website	Business Value-Adding
Access website's backend and download store	Reception / Website	Business Value-Adding
import spreadsheet into order's IS	Reception / Website	Business Value-Adding
Invite customer to store	Reception / Website	Value-Adding
Send the spreadsheet to the appropriate store	Reception / Website	Business Value-Adding
Check the form details	Reception / Website	Non Value-Adding
Register order in order's IS	Reception / Website	Business Value-Adding
Check delivery time	Phone Operators	Business Value-Adding
Tell customer delivery time	Phone Operators	Value-Adding
Collect order details	Phone Operators	Value-Adding
Ask for special needs	Phone Operators	Value-Adding
Put order in grid queue	Kitchen Staff	Business Value-Adding
Check the grid with order details	Kitchen Staff	Value-Adding
Fullfill the order	Kitchen Staff	Value-Adding
Tell manager when the order is ready	Kitchen Staff	Business Value-Adding
Send the order to the packager	Kitchen Staff	Value-Adding
Prepare missing items	Kitchen Staff	Non Value-Adding
Check items of the order according to grid	Packager	Non Value-Adding
Tell kitchen to prepare missing items	Packager	Non Value-Adding
Place missing items correctly	Packager	Non Value-Adding
Pack items	Packager	Value-Adding
Change order status at the grid	Manager	Business Value-Adding
Check the delivery adress	Courier	Business Value-Adding
Drive to the customer	Courier	Value-Adding
Hand customer the order	Courier	Value-Adding
Check which items are missing	Courier	Non Value-Adding
Approve payment of reimbursement	Manager	Value-Adding

Figure 1: Value-Added Analysis

Issue	Priority	Description	Data & Assumptions	Qualitative Impact	Quantitative Impact Calculation	Impact p.a.
Varify data	Low	Check if the entered data is already in the systems		Monotonous process, employee gets annoyed, easily makes mistakes		
Ask for fiscal number 2x	Low	Additional safety step to verfiy that the VAT number is correct				
Check the form details	Low	Check if the website's spreadsheet complies with ZIP and order is valid		Monotonous process, employee gets annoyed, easily makes mistakes		
Prepare missing items	Low	If items of the order are missing the kitchen needs to prepare them	7min for each order, 15% of orders have missing items	Bad reputation, Food gets cold	7 * 0.15 * 5250 * (6.38€/60min) =	703.40 €
Check items of the order according to grid	Low	The packager needs to check if the order is complete according to the IS		four eyes principle		
Tell kitchen to prepare missing items	Low	If the order is not complete, the manager needs to tell the kitchen		Employees feel embarrased and accuse each other.		
Place missing items correctly	Low	Packager need to place the items which were originally missing to the order				
Check which items are missing	Low	The packager check if the order is complete according to the IS		Employee feels embarrassed and has to apologise to customer		
Transferring calls between stores	Medium	Occupies phone operators	15% of calls		15% * 700€ * 12months =	1,260 €
Transferring website orders between stores	Low	Occupies website manager	10% of website orders		10% * 700€ * 12months =	840 €
Motion of couriers	Medium	Couriers need to get TPA, and return for orders with missing items	2x a day, 5 min to get TPA, 8 couriers	Couriers need to do unnecessary ways	2 * 5min * 8 * 365 (3.5€/60minutes) =	1,703.33 €
WIP items	Low	Products in steps "Registered", "Prepared / quality control", and "On the way" are idle		Employees are idle		
Unanswered calls	High	25% of calls are not answered	25% of calls, 57% of orders are via phone	Missing out on revenue, customer are not satisfied	25% * 57% * 5250 orders * 23.81€/order * 12 months =	213,754.28 €
Registering a customer	Medium	Entering details during the ordering process delays the entire transaction	1.5 minutes, 25% of callers new customers		1.5 minutes * 57% * 25% * 5250 orders * 12 months * (3.8€/60minutes) =	8,528.62 €
Waiting for kitchen	Low	Preparing an order takes the kitchen some time				
Missing Items	Medium	Missing items force courier to return to restaurant	15% of orders, 80% home delivery, 50 minutes for drive back and forth	Bad reputation, redundant steps needed	15% * 80% * 5250 orders * 12 months * 50 minutes (3.5€/60minutes) =	22,037.40 €
Wrong orders on website	Low	Website orders are placed for the wrong store	5% of website orders	Employeed get annoyed to handle task which could be automated	5% * 700€ * 12 months = p.a.	420 €
Handling specific request	Low	On the phone customers can ask for special needs				
Double check website orders	Medium	Due to non integration of the website, orders need to be manually checked	1 minute 5 seconds +/- 45 seconds	Monotonous process, employee gets annoyed, easily makes mistakes	1.08 minutes (+/- 075) * 5250 orders * 28.5% * (3.8€/60minutes) * 12 months =	1,221.66 €
Asking critical questions too late	Low	Questions that lead to order cancellation are not asked at the very beginning		Time could be saved		

Value-Added Analysis
Waste Analysis
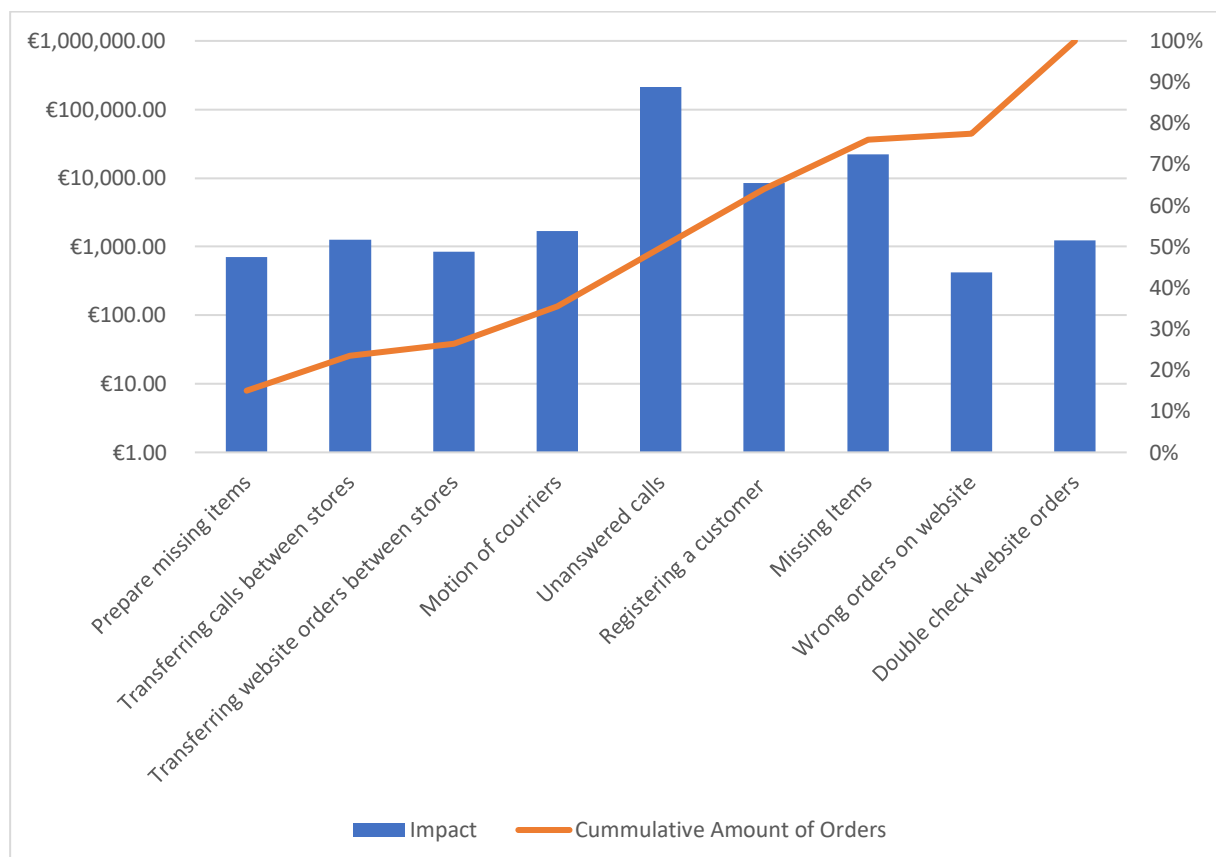
Figure 2: Issue Register

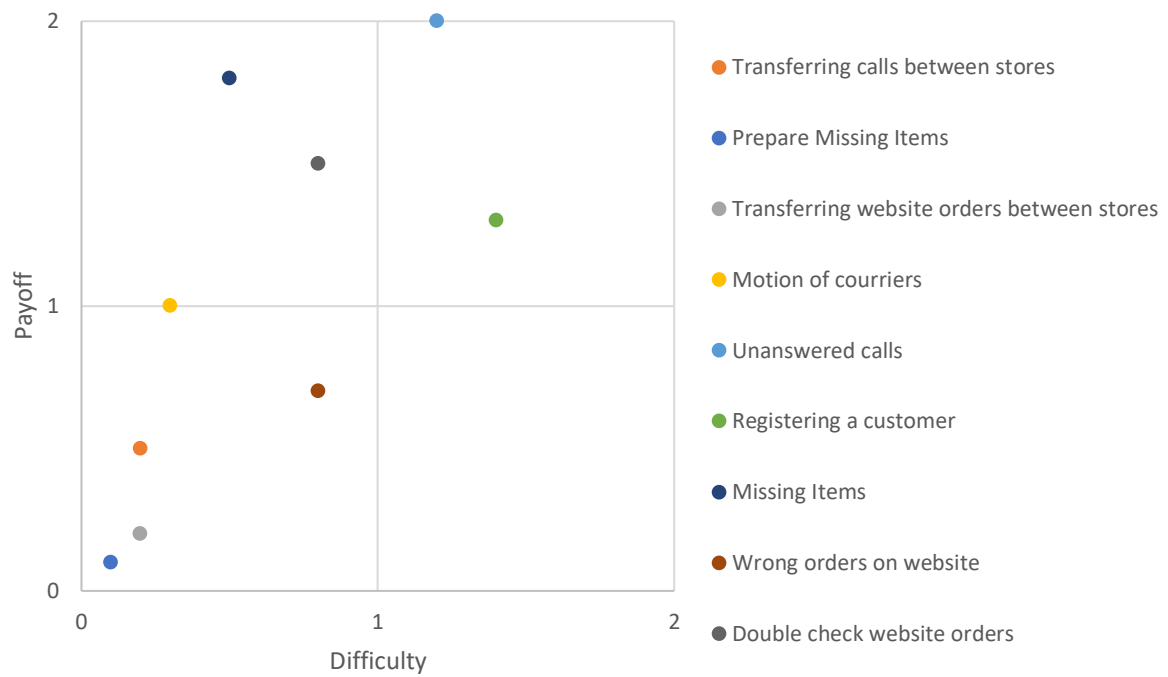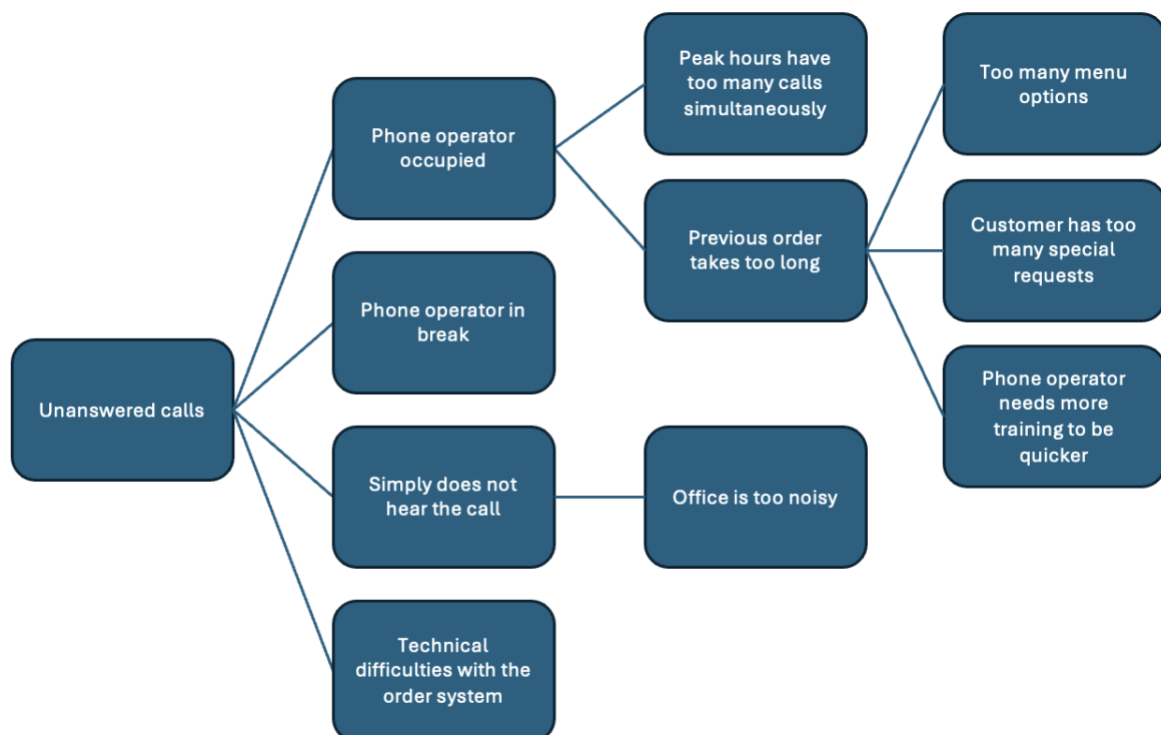
Figure 3: Pareto Chart Analysis

Figure 4: PICK Chart

Figure 5: Why Why Analysis for Unanswered Calls Issue

Figure 6: Why Why Analysis for Missing Items Issue