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Introduction

The task is to evaluate an online grocery service, GrocerQuick and look for ways to improve their structure, delivery routes and efficiency. Firstly, the problems need to be understood and investigated, if this is a common issue around delivery services in store or online.

After investigating, it would seem most, and if not, all delivery services are aiming for the same thing. faster delivery with a cost to business as low as possible. Likewise, they all seem to face other issues such as damaged goods and lost packages (1)

Problem Deconstruction Technique and constraints

GroserQuick, this online grocery service is looking to improve its services to customers while reducing fuel consumption. Plus, at the same time improving on delivery times. To start, this needs to be broken down and deconstructed in such a way that each step brings concise, clear instructions on how to proceed. , the Groser needs to understand its variables and how they affect the outcome.

a technique called MoSCoW, can be used, as in this article (2)

"The MoSCoW technique, a tried-and-true framework for prioritising requirements, is used that divides each into Must have, Should-haves, Could-haves, and Won't-haves categories based on how important and consequential they are."

Breaking it down:

-Orders: Each order has a delivery address, with a delivery time window of maximum 30 minutes to get there.

-Vehicles: Each delivery vehicle has capacity (volume/weight), fuel efficiency, and speed. Opting for scooters or small cars with excellent fuel efficiency would be beneficial.

, -Routes: Paths vehicles take to deliver orders, defined by distance, travel time, and sequence of stops. Just like large delivery firms, they try to not crisscross the city, but create more of a geographical circle, this isn't always feasible. (appendix 1)

-Constraints: Delivery deadlines, vehicle capacity, traffic conditions. Unfortunately most of these are unpredictable and uncontrollable, but by being adaptable to changes is key here.

-Objectives: Minimize travel distance (fuel consumption) and ensure timely deliveries. Implementing the above steps should be a great start.

Using the MoSCoW technique allows for clearer and easier understanding of what you (Must, Should, Could, Won't) have in this module

Here is that MoSCoW Technique

Must:

- 1) Efficient allocation of orders to route
- 2) Minimized travel distance (fuel saving) or more fuel-efficient routes
- 3) No delivery more than 30 minutes late

Should:

- 1) Dynamic route adjustments for negotiating traffic/weather
- 2) Balanced workload across drivers
- 3) Real-time tracking of deliveries

Could

- 1) AI powered route analysis and optimisation.
- 2) Integration with customer notifications of driver exact location
- 3) Eco-friendly vehicle assignment (e.g., EVs for short routes)

Won't ,

- 1) Drone Deliveries
- 2) Fully autonomous driving cars

Deconstructing the Problem

Now that this has been broken down, its easier to see the problem and tackle this step by step. Looking at this it is clear that one solution to this problem starts by optimising the route for GroserQuick, this is essentially a Vehicle Routing Problem (VRP) with time constraints. (3), Grigorios D Konstantakopoulos and Gayialis P Sotiris wrote about this in an article called Vehicle routing problem and algorithms for logistics distribution, they suggest the routing of vehicles are of great importance for supply chain Operations.

Identify Relevant Variables:

Variables in a Vehicle routing problem, can be anything that changes from a set amount, this could be a change in delivery address, some of the addresses may be shops or frequent customers, these addresses are unlikely to change compared to everything else.

Other variables could include:

Vehicle Variables

- 1) Vehicle capacity (volume/weight)
- 2) Fuel efficiency (MPG)
- 3) Average Speed (MPH)
- 4) Starting location (depot) or 3rd part involment

Route Variables

- 1) Distance between stops
- 2) Travel time (including traffic)
- 3) Sequence of deliveries
- 4) Number of stops< Target
- 5) Total lateness (minutes beyond promised time)
- 6) Clustering: Orders are grouped geographically to ensure drivers aren't crisscrossing the city.

Proposed Solution

The proposed solution uses a workflow based on the Vehicle Routing Problem (VRP) with time frames that need to be controlled, this will ensure:

- 1, Lower fuel consumption
- 2, Faster and more reliable delivery times
- 3, Efficient allocation of orders to vehicles
- 4, Flexibility to adapt to real-time conditions

Looking at this step by step, there needs to be the initial collection of data, which will enable a sort of base line. Creating a clear understanding of where the company is currently, such as current demand/popularity, average geographical coverage, the minimum and maximum time to deliver to the potential closest and furthest customers.

This is being carried out, because these variables determine which orders can be grouped together and which vehicles can carry them. While providing the customer an ETA or ETD (4) on when the customer is likely to receive their order.

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Collect Vehicle Data

Each vehicle has:

Capacity (volume/weight)

Fuel efficiency (MPG)Average Speed

Starting depot location

Why this matters:

Fuel efficiency influences route assignment.

Generate Initial Routes and the Clarke -Wright Algorithm

A VRP algorithm can be created.

The algorithm that could be utilised is the Clark – Wright Algorithm (5), which is a savings Algorithm designed specifically to solve Vehicle Routing Problems (vrp).

There are other options, readily available such as “Shipday” (6)

The service involves finding the optimal set of delivery routes, this however doesn't always mean the shortest paths, but a combination of the shortest path vs the quicker routes vs fuel efficiency routes. All while keeping within the 30 minutes time window.

Other things that need to be considered is vehicle capacity, if GrocerQuick decide on scooter rather than cars, they may be quicker through traffic, but their ability to hold large capacity is greatly impacted.

Aspects that need to be checked

No vehicle is overloaded, this way no vehicle has to many orders on its route, to enable delivery within the time frame specified, which is 30 minutes

If any failures happen

Orders may be swapped between vehicles, Route sequences can be adjusted if a customer is only available at a given time to accept delivery, or a route may be split into two smaller routes

Optimise for Fuel Efficiency

This step fine-tunes the route by:

Minimising total distance, reducing backtracking as much as possible, another way is to avoid congested areas and assigning fuel efficient vehicles to long routes

Outcome:

Lower fuel consumption and shorter travel times.

Real-Time Adjustment Module

During the day, the system monitors:

Traffic

Weather

Vehicle breakdowns

Driver delays

If a disruption occurs:

The affected route is recalculated

Orders may be reassigned to nearby vehicles

This ensures the “no more than 30 minutes late” rule is maintained.

Dispatch & Monitoring

Drivers receive optimised routes via an app.

The system tracks:

Vehicle location

Delivery progress

Estimated arrival times

If lateness is predicted:

The system triggers a reroute or you can reassign the order to another vehicle

GrocerQuick Delivery and Flowchart

1. Order Intake & Preparation

Start

Receive new orders: The system accepts incoming customer requests.

Collect order details: Information such as size, weight, and delivery location are collected

Check resources: The system looks at current vehicle availability and weight/volume capacity.

2. Routing

Assign orders: Orders are grouped and assigned to specific vehicles based on location and capacity limits.

Calculate best route: Algorithms (5) determine the most efficient path to minimize total distance and time on the road.

External factors: The system checks for real-time traffic updates and weather conditions.

Dynamic adjustment: If traffic or weather poses a risk, the route is recalculated.

3. Execution & Monitoring

Dispatch vehicles: Drivers receive their finalised routes and depart.

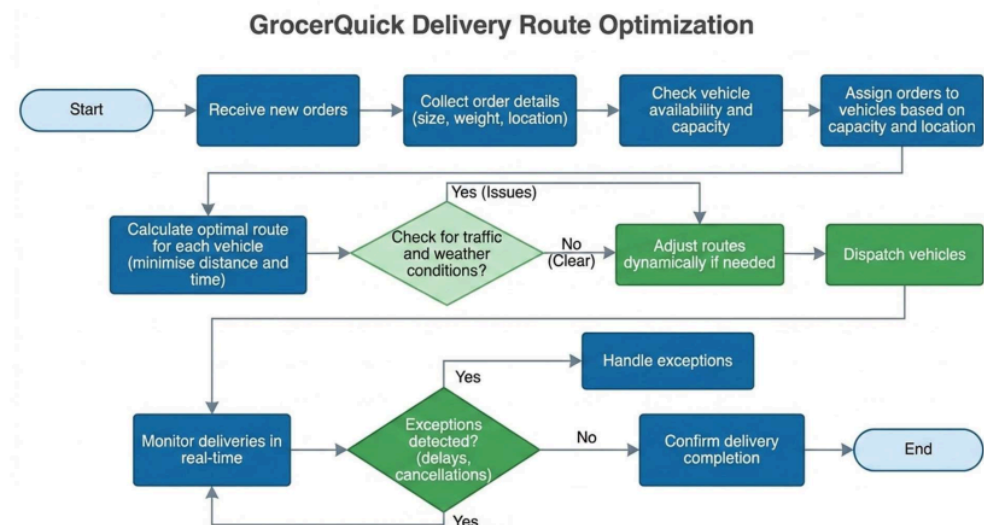
Monitor real-time: Vehicle locations and progress against the schedule. Are tracked

Handle unexpected changes: Any issues (delays, cancellations, breakdowns) are flagged and managed.

4. Completion

Confirm delivery: Successful drop-off is logged (e.g., via signature or photo).

End



As this is a vehicle routing problem, GrocerQuick should follow this flowchart, while keeping in mind the variables that can seriously impact the plan, the slightest change can make and the knock-on effect to all the other drop-off slots on that route.

Reflection and Justification

Reflecting on this report clearly shows how the ever-changing world we live in, will undoubtedly have massive impact on companies such as GroserQuick. Unless companies such as this, pour serious time and money into developing their means of delivery, they will quickly become obsolete by those who adapt sufficiently.

Automation and Drons:

With the world of A.I Drones, self-driving vehicles and automation playing a big role in our future, GrocerQuick should invest heavily on AI automation for its admin, saving as much time, cost and human resources as possible. Until drones become smarter with governmental backing for large scale use in cities, by which time serious consideration needs to take place in the removal of human interaction in this stage of the delivery.

Looking to the near future: You only need to look at cities like shenzen in China, who already have systems and services in place for delivering groceries (7), hot and cold meals and drinks, this also negates the need for traffic updates and confusing vehicle routes.

If for the time being GroserQuick can most definitely improve its services and become more fuel efficient, if not 0 % emissions. But, unless this company like many others invest in A.I and automation. There may not be a future for them at all.

Reading list

1.

Moran "5 Common Delivery Issues Businesses Face and How to Solve Them"
Available at [5 Common Delivery Issues Businesses Face and How to Solve Them](#) , Posted on Jan/01/2025, accessed 31/12/2025

2,

Shehzadi Nazeem Saleem "Assisted Requirements Selection by Clustering using an Analytical Hierarchical Process," *International Journal of Advanced Computer Science and Applications*, vol. 15, (4), 2024. Available:
<https://www.proquest.com/scholarly-journals/assisted-requirements-selection-clustering-using/docview/3060148284/se-2>. DOI:
<https://doi.org/10.14569/IJACSA.2024.0150403>. 04,2025, access on 28/12/2025

3.

G. D. Konstantakopoulos, S. P. Gayialis, and E. P. Kechagias, "Vehicle routing problem and related algorithms for logistics distribution: a literature review and classification," *Operational research*, vol. 22, no. 3, pp. 2033–2062, 2022, doi: 10.1007/s12351-020-00600-7.

4.

Rene Emery "TA VS WTD: What They Are and Why They Matter, [ETA vs ETD: What They Are and Why They Matter](#) assessable through www.routific.com/blog/eta-vs-etd10/2024, accessed 31/12/2026

5

Clark – Wright, web.mit.edu/urban_or_book/www/book/chapter6/contents6.html
accessible through [Section 6-4-12](#).. accessed 2/1/2026

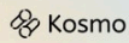
6,

"Shipday " accessible at [www.shipday.com/campaign/route-planning?utm_source=bing&utm_medium=cpc&utm_campaign=570655036&utm_content=1181977003235145&utm_term=delivery%20driver%20route%20planning&matchtype=b&msclkid=73def71eb0f41454e81c9e7d0c2d73c3,\(2020\)](http://www.shipday.com/campaign/route-planning?utm_source=bing&utm_medium=cpc&utm_campaign=570655036&utm_content=1181977003235145&utm_term=delivery%20driver%20route%20planning&matchtype=b&msclkid=73def71eb0f41454e81c9e7d0c2d73c3,(2020)) accessed 2/1/2026

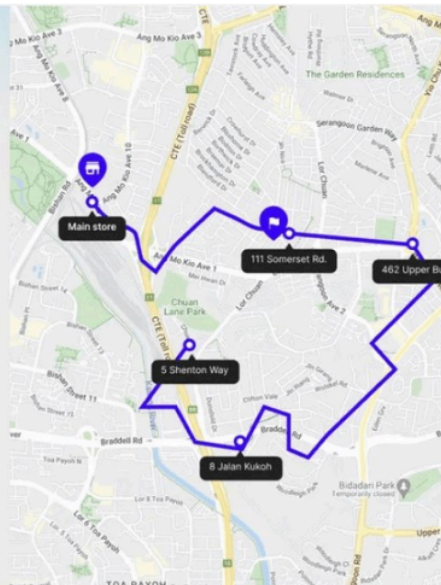
7,

Shenzhen Government online, (5/6/2024) available at [Drone delivery makes its way to park Tech-Shenzhen Government Online](#), accessed on 5/1/2026

Appendix 1.



How to Create the Perfect Delivery Route



FINAL GRADE

The final grade is displayed as a large blue '80' followed by a smaller black '/100'.

GENERAL COMMENTS

Engagement with Literature 11/15

7 sources cited including one strong peer-reviewed journal article, one international journal article (IJACSA) and mix of professional/industry blogs and government sources.

Literature is used to support VRP framing, justify Clarke-Wright algorithm and contextualise ETA/ETD and delivery challenges. Inconsistent IEEE formatting.

Some web sources lack proper bibliographic detail.

Several sources cited descriptively rather than critically. Access dates are missing for all online sources.

Knowledge and Understanding 21/25

In general this report demonstrates a strong Level 4 understanding, clearly above pass threshold. Clear understanding of GrocerQuick's operational context. Explicit use of MoSCoW to prioritise requirements. Requirements, constraints, and objectives clearly distinguished. Logical breakdown into: orders, vehicles, routes, constraints and objectives. There are some repetition across sections. Constraints are sometimes mixed with aspirations (e.g. adaptability vs system limits). MoSCoW categories occasionally blur into solution features.

Wide range of variables is identified: vehicle capacity (volume/weight), fuel efficiency, speed, distance, traffic, lateness. Variables are linked clearly to routing and delivery outcomes but interactions are stated rather than analysed. Some lists lack explanation of relative importance.

Cognitive and Intellectual Skills 15/20

Good reflective awareness for Level 4, though slightly unfocused. Problem-solving techniques are clearly named (MoSCoW, decomposition, VRP

Clarke–Wright algorithm). Reflection demonstrates awareness of trade-offs and acknowledges complexity and real-world variability. Assumptions are clearly stated and limitations acknowledged. Justification for VRP and algorithm choice is reasonable. But some assumptions contradict earlier MoSCoW “Won’t have” items (e.g. real-time tracking). Justification could be tighter and more grounded in literature.

Practical Application Skills 25/30

Strong practical application, clearly above average. Complete, readable flowchart is included. Correct flowchart conventions is used. Decision points, exception handling and monitoring loops are included. Understanding of system-level process, not just input handling is clearly demonstrated. However, the flowchart is ambitious for Level 4 and slightly over-complex. Some steps verge on system architecture rather than abstract logic. Optimisation logic is implied rather than explicit. Explanation aligns well with flowchart but sometimes restates the diagram. Clear step-by-step narrative. Explicit links to time, distance, and fuel efficiency. Limited justification at key decision points.

Transferable Skills 8/10

Clear structure and contents page. Logical sequencing. Generally professional academic tone. Visuals integrated effectively. Some grammar and punctuation issues. Some informal phrasing. Reflection section becomes rhetorical rather than analytical.

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