
Project Information

Submission Date: 3 August 2025, Sunday

Group Work

Project Scope

This project aims to allow students to apply knowledge acquired through weekly lectures and tutorials into application-based scenario.

Project Requirements

The project will focus on S/X (6) key areas, namely:

- Distribution Centre (DC) Processes
- Resources Planning
- DC Space Calculation and Layout Design
- Operational Costing
- DC Automation
- Safety and Security Management

The following items are to be uploaded into LMS before **3rd August 2025, 0900hr** :

1. Soft-copy of the Final Report (PDF format)
2. Recorded Presentation of the project (mp4 format)

(A) Scenario

TRAVEL PAL PTE LTD (TP) is a well-known E-commerce company which runs an online retail portal for school backpacks. It is currently looking for a new 3PL to help them set up and manage its new distribution centre (DC) in Singapore to serve its customers in the Southeast Asia region. TP has high expectations when it comes to selection of 3PL. It expects the 3PL to be someone who understands and manages DC requirements very well.

As such, TP has approached QUICK-QUICK LOGISTICS (QUICK-QUICK) to submit an operations plan for this new DC as the latter is an internationally well-known provider of DC and transportation services.

As part of the DC Setup Team from QUICK-QUICK, your team has been tasked to determine and evaluate the resources necessary to manage this DC. This set of information is to be compiled into a proposal, and this will be submitted to the management of TP for consideration.

You have been given the operational specifications, the expected volume pattern and TP's business assumptions in Appendix A and Appendix B respectively. These data are to be carefully considered in the solutions that your team will be proposing.

(B) Contents of the Business Proposal

In your proposal, you are required to provide solutions to the following :

- a. QUICK-QUICK needs to determine the expected INBOUND, OUTBOUND and STORAGE volume to plan for the DC resources (manpower and layout). TP requires the 3PL to provide a **service level of 95%** - TP looks at performance on a day-to-day basis.

NOTE: A '**successful**' day is defined as one where all customer orders are fulfilled within the same day.

TP allows up to **5% of the days in a year** to be classified as '**unsuccessful**', meaning some orders are not fulfilled. To meet the target of achieving **95% successful days** annually, QUICK-QUICK intends to establish **maximum capacity thresholds** for **Inbound**, **Outbound**, and **Storage** operations. Resource planning will be based on these thresholds to ensure that daily volumes exceed the DC's capacity on no more than 5% of the days.

Your team is tasked with determining the **maximum capacity (X_0)** that can support this 95% service level.

TP has provided historical daily volume data for the product **BACKPACK** across Inbound, Outbound, and Storage activities over the past year, as shown in **Appendix D**. Using this dataset, recommend the estimated values of X_0 for **Inbound**, **Outbound**, and **Storage** for the BACKPACK product.

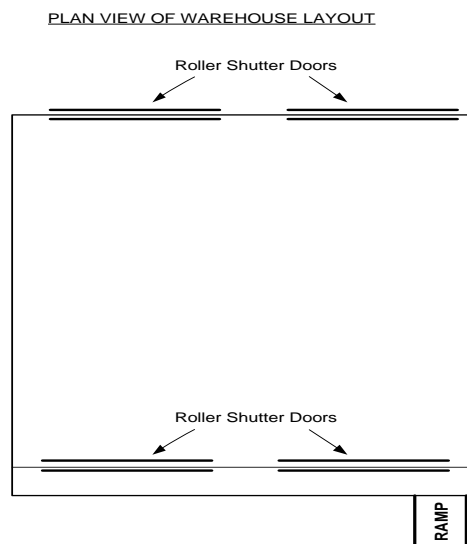
Data Analysis Tools from MS Excel and statistical methodologies should be used to support your recommendation.

- b. TP has decided to have the OUTBOUND operations to be available on a "24-hour/7-day" basis, while the INBOUND operation is to operate from Monday to Saturday 8.30am to 6pm. You need to derive the number of employees to be employed. Your answer should include the following information :
- (i) Number of shifts per day
 - (ii) Start and End-Time of each shift
 - (iii) Number of permanent handlers and supervisors to be employed per shift
 - (iv) Number of temporary staff to be employed (if any)
 - (v) Amount of overtime hours to be done by each staff per week (if any)

Workings, including the usage of the **Manpower Calculation Grids**, should be shown. There should be at least 4 Grids – 1 for INBOUND and 1 for OUTBOUND for manual method; 1 for INBOUND and 1 for OUTBOUND for automated method. 3

- c. Assuming that TP prefers the Automated method, propose the following prices:
- (i) INBOUND price per **pallet**
 - (ii) OUTBOUND price per **piece**
 - (iii) STORAGE price per **piece**
- d. Sketch the possible **layout design** for this DC. The following diagram shows the floor plan of the facility. This facility has a clear ceiling height of 14 meters. (A blown-up version can be found on LMS.)

Recommend the locations of emergency exit doors and CCTV cameras. Suitable walking paths should be included, too.



- e. **Derive the following requirements :**
- (i) Number of Docks required
 - (ii) Area of Working Space and Staging Space (for both Outbound and Inbound)
 - (iii) Estimated total DC space area
- f. TP has the intention to expand into distributorship in 3 years' time. It expects a Pallet-In-Pallet-Out type of operations, and it will represent 30% of the total business. Based on the volume data given, propose the following :
- (i) Suitable type of pallet racking and explain the choice

- (ii) Number of pallet locations in this pallet racking system
- (iii) Estimated standing space area

The following appendices provide the basic information needed to answer Question (a) to (f).

Appendix A : Operational Requirements for Customer TP

Appendix B : QUICK-QUICK's business assumptions

Appendix C : Productivity Guideline (only for the purpose of this project)

Appendix D : Historical data of daily INBOUND, OUTBOUND and STORAGE carton volumes for the past 1 year

ASSESSMENT

(1) Assessment Criteria

The project will be assessed based on the following weightage :

| <u>S/No</u> | <u>Assessment Break-down</u> | |
|-------------|---|-------------|
| (I) | Report | 85% |
| 1. | Layout, Format & Organisation of write-up | 10% |
| 2. | Manpower Resources (Questions a & b) | 25% |
| 3. | DC Pricings (Question c) | 20% |
| 4. | DC Layout Design & Space Requirements; Safety & Security (Questions d, e & f) | 30% |
| (II) | Group Presentation | 15% |
| | Total : | 100% |

(I) Report

For Items 2 to 4, these will be assessed based on the following criteria :

- Relevance of recommended solutions to support operational requirements
 - Clarity in explaining justifications made for recommended solutions
 - Thoroughness in showing the workings for the quantitative figures
- a. Your report must be comprehensive. It must include all the necessary detailed workings, diagrams, Excel outputs, tables and/or charts that you deem necessary to support your answers. Approximate all final answers to 1 decimal place unless otherwise stated.

- b. Your project report must begin with a cover page (attached in BRIGHTSPACE).
- c. Limit your report to less than 15 pages (Arial Font size 12 with 1.5 spacing) excluding tables and graphs. A good report is one that is concise and provides relevant analysis that aids the reader in making decision.

(II) Group Presentation

The team is to conduct a 15-minute presentation about the key points of the proposal. The presentation should include information from ALL sections of the Project.

Presentation slides are to be prepared and shown during the presentation. Every team member will be required to present in the presentation and should have the same amount of air-time.

The group presentation is to be recorded and the duration of presentation should last not more than 15 minutes. It is strongly recommended to use MS Teams for the recording.

You are required to switch on your video cameras and be seen during the presentation, even if it is not your turn to present. All members should be presenting in the same presentation session.

(III) Peer Appraisal

An online peer appraisal will be conducted amongst the group members. Each member will be appraised based on the following criteria:

- i. Attendance and punctuality
- ii. Participation and contribution to discussions
- iii. Commitment and responsibility
- iv. Quality of work
- v. Supportive team player

Please alert your tutor early should there be any potential case(s) of social loafing in your group. Members who do not contribute constructively to the group project will be penalised accordingly.

Penalty for Final Report as follow:

If any student fails or scores badly in the Peer Assessment due to poor contribution to the group project, below penalty to the group project score for that individual student shall apply:

- If Peer appraisal % score for student is A, B or C, there is no penalty.
- If Peer appraisal % score for student is D, there is a 20% deduction from the group project total.
- If Peer appraisal % score for student is F or the student did not do the peer assessment (ie. no. of submission is 0), there is a 40% deduction from the group project total.




(2) Submission Details for REPORT and RECORDED PRESENTATION

a. Please save the Report in PDF format and Presentation in mp4 format.

b. Both items should be named using your TUTORIAL GROUP & GROUP NUMBER as the filename: TBXX_GroupX. Group Leader will represent the group to upload the report and presentation in LMS by the deadline: **3rd August 2025, 0900 hours**.

c. Penalty of 20 marks deduction per day will be imposed for late submission. Submission after Wednesday 6th August 2025, 0900 hours will not be accepted (i.e. accorded ZERO mark).

APPENDIX A**Operational Requirements****Customer TP**

| | | |
|---|---|--|
|  |  |  |
| Inbound Pallet – total 12 Cartons per Pallet | Six (6) backpacks within each Inbound Carton – each backpack is considered a PIECE | One (1) Outbound Shipping Carton to end-Customer : each will contain 1 backpack. |

Pictures from www.rf123.com

| | |
|----------------------------|---|
| Expected business forecast | <ul style="list-style-type: none"> Annual business growth rate = 10% Contract duration: 5 years |
| Order / Cargo Information | <ul style="list-style-type: none"> Handling profile : Pallet-In-Piece-Out Number of SKUs : 30 SKUs, each with equal amount of inventory Inventory should be picked on a FIFO basis Full Pallet dimension and weight – 1.2m (L) x 1.1m (B) x 1.2m (H); 250 kg |
| Inbound Activity | <ul style="list-style-type: none"> Inbound operations: Monday to Saturday, 8.30am to 6pm Import via 40' FCL containers with palletised cargo – each container can hold 20 full pallets maximum – each full pallet is to hold 12 Inbound Cartons of single SKU. Each Inbound Carton contains 6 backpacks. Pallet dimension – 1.2m x 1.1m Arrival of containers at DC : Monday to Saturday, arriving at a constant rate |
| Outbound Activity | <ul style="list-style-type: none"> Outbound function expected to open 24-hour, 7-day-per-week. Daily orders generated in 3 batches daily <ul style="list-style-type: none"> 1st Batch printed at 0700hr; to be completed by 1300hr of the same day (25% of daily volume) 2nd Batch printed at 1300hr; to be completed by 1900hr of the same day (25% of daily volume) 3rd Batch printed at 1900hr; to be completed by 0700hr of the next morning (50% of daily volume) Labels for “Destination Address” to be pasted on the Outbound Shipping Carton before handing over to the Freight Forwarder. Estimated number of Freight Forwarder's Pick-up for whole working day : 80 trucks |
| Storage | <ul style="list-style-type: none"> Inventory stored by per-piece basis – either manual or automated means |

APPENDIX B**QUICK-QUICK LOGISTICS' Business Assumptions****(1) Pricing**

| | |
|----|--|
| 1. | Length of Business Contract with TP = 5 years; Business Growth rate = 10% per annum |
| 2. | Handlers : Supervisor = 10 : 1 |
| 3. | Each Function per Shift should be led by at least 1 Supervisor. |
| 4. | Monthly Basic Salary : Handler = S\$2,000; Supervisor = S\$2,800 |
| 5. | Temporary Staff Rate : S\$15.00 per hour; subjected to one-day notice for activation |
| 6. | Estimated monthly overhead costs = \$50,000. This is to be split equally between Outbound and Inbound. |
| 7. | Each month has a total of 4 weeks and 30 working days. |
| 8. | Fixed Cost : Automation and Others = \$800,000 |
| 9. | Interest rate = 5% per annum; Profit mark-up = 20% |

(2a) Layout

| | |
|----|--|
| 1. | Length of Business Contract with TP = 5 years; Business Growth rate = 10% per annum |
| 2. | Access Aisle for Working Space = 80% |
| 3. | Access Aisle for Staging Space = 60% |
| 4. | Miscellaneous Space = 25% of (Storage + Working + Staging) |
| 5. | Working and Staging spaces expected to hold 30% of Shift volume at any point in time |
| 6. | 16 Outbound Shipping Cartons equivalent to 1 pallet space |
| 7. | Estimated space taken up by Automation = 10,000 square metres |

(2b) Technical Space per Pallet – for Question (f)**Technical Space per Pallet (m²)**

| No. of Pallet Tier | Floor Storage | APR | Double-Deep | Drive-In | Drive-Thru | Push-Back | VNA | PLS | Mobile |
|--------------------|---------------|------|-------------|----------|------------|-----------|------|------|--------|
| 2 | 1.10 | 1.65 | 1.37 | 0.92 | 0.92 | 0.91 | 1.17 | 0.91 | 0.94 |
| 3 | 0.73 | 1.10 | 0.91 | 0.61 | 0.61 | 0.61 | 0.78 | 0.61 | 0.63 |
| 4 | - | 0.82 | 0.69 | 0.46 | 0.46 | 0.46 | 0.58 | 0.46 | 0.47 |
| 5 | - | 0.66 | 0.55 | 0.37 | 0.37 | 0.37 | 0.47 | 0.37 | 0.38 |
| 6 | - | 0.55 | 0.46 | - | - | - | 0.39 | 0.30 | 0.31 |
| 7 | - | - | - | - | - | - | 0.33 | - | - |
| 8 | - | - | - | - | - | - | 0.29 | - | - |

Assuming Height of DC Facility = 14 metres

APPENDIX C**(1) Productivity Guideline – INBOUND****Productivity Guideline – INBOUND**

| Process Category | Task | Productivity per man-hour | UOM | Activity | Remarks |
|------------------|---|---------------------------|--------|------------|---------------------|
| Receiving | Unload Full Pallets from container | 45 | Pallet | R1, R4, R6 | Manual / Auto |
| Receiving | Take over Full Pallets from delivery truck | 250 | Pallet | R1, R4, R6 | Manual / Auto |
| Receiving | Unload Loose Cartons from container | 300 | Carton | R2, R3, R5 | Manual / Auto |
| Receiving | Take over Loose Cartons from delivery truck | 360 | Carton | R2, R3, R5 | Manual / Auto |
| Movement | Move UOM to Inbound Working Area | 100 | UOM | All | Manual / Auto |
| Quality-Check | Inspect Pallets and sign POD | 120 | Pallet | R1, R4, R6 | Manual / Auto |
| Quality-Check | Inspect Cartons and sign POD | 300 | Carton | R2, R3, R5 | Manual / Auto |
| WMS | Enter Cargo receiving data for Pallet | 200 | Pallet | R1, R4, R6 | Manual - WMS Keying |
| WMS | Enter Cargo receiving data for Carton | 200 | Carton | R2, R3, R5 | Manual - WMS Keying |
| WMS | Enter Cargo receiving data for Pallet | 500 | Pallet | R1, R4, R6 | Auto - RFID |
| WMS | Enter Cargo receiving data for Carton | 500 | Carton | R2, R3, R5 | Auto - RFID |
| Breakbulk | Break Shipping Cartons from Pallet | 180 | Carton | R4, R6 | Manual / Auto |
| Breakbulk | Break Piece from Shipping Carton | 300 | Piece | R5, R6 | Manual / Auto |
| Palletisation | Palletise Cartons | 200 | Carton | R2 | Manual / Auto |
| Shrinkwrap | Shrinkwrap Pallet | 30 | Pallet | R1, R2 | Manual / Auto |
| Labeling | Pasting of Licence Plate Number | 360 | UOM | All | Auto |
| Movement | Move UOM to Inbound Staging Area | 100 | UOM | All | Manual |
| Movement | Move UOM to Inbound Staging Area | 600 | UOM | All | Auto - Conveyor |
| Putaway | Put away Pallet | 60 | Pallet | R1, R2 | Manual / Auto |
| Putaway | Put away Carton | 150 | Carton | R3, R4 | Manual / Auto |
| Putaway | Put away Piece | 180 | Piece | R5, R6 | Manual |
| Putaway' | Put away Pieces into AutoStore (Automation) | 250 | Piece | R5, R6 | Auto |

(2) Productivity Guideline – OUTBOUND

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Productivity Guideline – OUTBOUND

| Process Category | Task | Productivity per man-hour | UOM | Activity | Remarks |
|------------------|--|---------------------------|--------|---------------|------------------------|
| Picking | Store Pallet; Pick Pallet | 60 | Pallet | SP1 | Manual / Auto |
| Picking | Store Pallet; Pick Carton | 120 | Carton | SP2 | Manual / Auto |
| Picking | Store Pallet; Pick Item | 100 | Item | SP3 | Manual / Auto |
| Picking | Store Carton; Pick Carton | 150 | Carton | SP4 | Manual / Auto |
| Picking | Store Carton; Pick Item | 120 | Item | SP5 | Manual / Auto |
| Picking | Store Item; Pick Item | 150 | Item | SP6 | Manual |
| Picking | Pick Piece from AutoStore (Automation) | 250 | Item | SP6 | Auto |
| Pick QC | Check Pallet | 60 | Pallet | SP1 | Manual |
| Pick QC | Check Carton | 300 | Carton | SP2, SP4 | Manual |
| Pick QC | Check Piece | 300 | Piece | SP3, SP5, SP6 | Manual |
| Pick QC | Check Pallet | 100 | Pallet | SP1 | Auto - Barcode Scanner |
| Pick QC | Check Carton | 400 | Carton | SP2, SP4 | Auto - Barcode Scanner |
| Pick QC | Check Piece | 500 | Piece | SP3, SP5, SP6 | Auto - Barcode Scanner |
| Pick-WMS | Update storage location information - Pallet | 200 | Pallet | SP1 | Manual - WMS Keying |
| Pick-WMS | Update storage location information - Carton | 200 | Carton | SP2, SP4 | Manual - WMS Keying |
| Pick-WMS | Update storage location information - Piece | 200 | Piece | SP3, SP5, SP6 | Manual - WMS Keying |
| Pick-WMS | Update storage location information - Pallet | 500 | Pallet | SP1 | Auto - RFID |
| Pick-WMS | Update storage location information - Carton | 500 | Carton | SP2, SP4 | Auto - RFID |
| Pick-WMS | Update storage location information - Piece | 500 | Piece | SP3, SP5, SP6 | Auto - RFID |
| Movement | Move UOM to Outbound Working Area | 100 | UOM | ALL | Manual |
| Movement | Move UOM to Outbound Working Area | 500 | UOM | ALL | Auto |
| Pack QC | Check Pallet | 60 | Pallet | SP1 | Manual |
| Pack QC | Check Carton | 300 | Carton | SP2, SP4 | Manual |
| Pack QC | Check Piece | 300 | Piece | SP3, SP5, SP6 | Manual |
| Pack QC | Check Pallet | 100 | Pallet | SP1 | Auto - Barcode Scanner |
| Pack QC | Check Carton | 400 | Carton | SP2, SP4 | Auto - Barcode Scanner |
| Pack QC | Check Piece | 600 | Piece | SP3, SP5, SP6 | Auto - Barcode Scanner |
| Packing | Piece - packed into cartons & labelling | 80 | Piece | CP3, CP5 | Manual / Auto |
| Packing | Carton - secured into Shipping Package and labelling | 80 | Carton | CP4, CP5 | Manual / Auto |
| Packing | Carton - palletised into pallets | 200 | Carton | CP2, CP3 | Manual / Auto |
| Packing | Pallet shrinkwrap & labelling | 20 | Pallet | CP1, CP2, CP3 | Manual / Auto |
| Pack-WMS | Enter Cargo packing data for Pallet | 200 | Pallet | CP1, CP2, CP3 | Manual - WMS Keying |
| Pack-WMS | Enter Cargo packing data for Shipping Package | 200 | Carton | CP4, CP5 | Manual - WMS Keying |
| Pack-WMS | Enter Cargo packing data for Pallet | 300 | Pallet | CP1, CP2, CP3 | Auto - Barcode Scanner |
| Pack-WMS | Enter Cargo packing data for Shipping Package | 400 | Carton | CP4, CP5 | Auto - Barcode Scanner |
| Releasing | Move UOM to Outbound Staging Area | 100 | UOM | ALL | Manual |
| Releasing | Move UOM to Outbound Staging Area | 500 | UOM | ALL | Auto |
| Releasing | Hand Pallet over to Freight Forwarder | 250 | Pallet | CP1, CP2, CP3 | Manual / Auto |
| Releasing | Hand Shipping Package over to Freight Forwarder | 360 | Carton | CP4, CP5 | Manual / Auto |
| Releasing | Loading Pallet into Container | 45 | Pallet | CP1, CP2, CP3 | Manual / Auto |
| Releasing | Loading Shipping Package into Container | 300 | Carton | CP4, CP5 | Manual / Auto |

APPENDIX D (Inbound Cartons equivalent)

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| | IN | OUT | BAL | Monday | IN | OUT | BAL | Tuesday | IN | OUT | BAL | Wednesday | IN | OUT | BAL | Thursday | IN | OUT | BAL | Friday | IN | OUT | BAL | Saturday | IN | OUT | BAL | Sunday | OUT | BAL |
|---------|------|------|------|--------|------|------|------|---------|------|------|------|-----------|------|------|------|----------|------|------|------|--------|------|------|-----|----------|----|-----|-----|--------|-----|-----|
| Week 1 | 1800 | 1456 | 944 | 1440 | 1377 | 1007 | 1221 | 1216 | 1920 | 862 | 1741 | 1880 | 1920 | 1738 | 2062 | 1800 | 1920 | 1800 | 2182 | 0 | 1806 | 376 | | | | | | | | |
| Week 2 | 1920 | 1145 | 1151 | 1920 | 1800 | 1271 | 1440 | 1495 | 1216 | 1920 | 862 | 1741 | 1880 | 1920 | 1738 | 2062 | 1800 | 1920 | 1800 | 2182 | 0 | 1806 | 376 | | | | | | | |
| Week 3 | 1920 | 1374 | 848 | 720 | 1300 | 268 | 1200 | 1290 | 178 | 960 | 1004 | 134 | 1920 | 1476 | 578 | 1920 | 1480 | 1018 | 0 | 723 | 295 | | | | | | | | | |
| Week 4 | 1920 | 1042 | 1173 | 1440 | 1865 | 748 | 1200 | 1150 | 798 | 1200 | 1363 | 635 | 1440 | 1190 | 885 | 1200 | 912 | 1173 | 0 | 634 | 539 | | | | | | | | | |
| Week 5 | 1680 | 1165 | 1054 | 240 | 995 | 299 | 1440 | 1115 | 372 | 720 | 878 | 214 | 1440 | 1115 | 299 | 1920 | 1032 | 1187 | 0 | 756 | 431 | | | | | | | | | |
| Week 6 | 1200 | 1139 | 492 | 1920 | 1270 | 1142 | 1440 | 1052 | 1530 | 720 | 1479 | 771 | 1920 | 724 | 1967 | 1680 | 736 | 2911 | 0 | 1344 | 1567 | | | | | | | | | |
| Week 7 | 1200 | 990 | 1777 | 1440 | 1131 | 2086 | 720 | 1172 | 1634 | 1440 | 701 | 2373 | 720 | 1146 | 1947 | 480 | 1349 | 1078 | 0 | 873 | 205 | | | | | | | | | |
| Week 8 | 1680 | 1445 | 440 | 1920 | 1427 | 933 | 720 | 1253 | 400 | 1920 | 1401 | 830 | 1440 | 885 | 1385 | 1440 | 1121 | 1704 | 0 | 1161 | 543 | | | | | | | | | |
| Week 9 | 960 | 1100 | 403 | 1200 | 1019 | 584 | 480 | 681 | 383 | 1920 | 1094 | 1209 | 1920 | 788 | 2341 | 720 | 941 | 2120 | 0 | 1167 | 953 | | | | | | | | | |
| Week 10 | 1680 | 1467 | 1166 | 1200 | 631 | 1735 | 720 | 1186 | 1269 | 240 | 1023 | 486 | 1920 | 683 | 1723 | 1920 | 1258 | 2385 | 0 | 1110 | 1275 | | | | | | | | | |
| Week 11 | 1920 | 1403 | 1792 | 1680 | 1376 | 2096 | 1920 | 887 | 3129 | 720 | 1082 | 2767 | 480 | 1088 | 2159 | 1200 | 641 | 2718 | 0 | 886 | 1832 | | | | | | | | | |
| Week 12 | 240 | 1254 | 818 | 1200 | 888 | 1130 | 1200 | 927 | 1403 | 1920 | 1440 | 1883 | 960 | 1446 | 1397 | 1680 | 1464 | 1613 | 0 | 738 | 875 | | | | | | | | | |
| Week 13 | 480 | 1069 | 286 | 1680 | 1426 | 540 | 960 | 1368 | 132 | 1440 | 985 | 587 | 960 | 682 | 865 | 1200 | 749 | 1316 | 0 | 806 | 510 | | | | | | | | | |
| Week 14 | 1200 | 1070 | 640 | 1440 | 894 | 1186 | 1200 | 1479 | 907 | 1440 | 895 | 1452 | 960 | 952 | 1460 | 1680 | 676 | 2464 | 0 | 1410 | 1054 | | | | | | | | | |
| Week 15 | 1200 | 624 | 1630 | 1440 | 1168 | 1902 | 1680 | 751 | 2831 | 240 | 947 | 2124 | 480 | 1046 | 1558 | 1440 | 1222 | 1776 | 0 | 1496 | 280 | | | | | | | | | |
| Week 16 | 960 | 1035 | 205 | 1680 | 1249 | 636 | 960 | 1460 | 136 | 1920 | 1476 | 580 | 1920 | 874 | 1626 | 1200 | 779 | 2047 | 0 | 780 | 1267 | | | | | | | | | |
| Week 17 | 1920 | 1374 | 1813 | 1200 | 763 | 2250 | 1440 | 1257 | 2433 | 1200 | 1246 | 2387 | 1200 | 1456 | 2131 | 1680 | 935 | 2876 | 0 | 1045 | 1831 | | | | | | | | | |
| Week 18 | 1200 | 845 | 2186 | 480 | 1112 | 1554 | 720 | 1227 | 1047 | 1920 | 933 | 2034 | 960 | 1170 | 1824 | 1440 | 1148 | 2116 | 0 | 897 | 1219 | | | | | | | | | |
| Week 19 | 1920 | 1072 | 2067 | 1680 | 768 | 2979 | 720 | 1126 | 2573 | 480 | 958 | 2095 | 960 | 1066 | 1989 | 960 | 1029 | 1920 | 0 | 813 | 1107 | | | | | | | | | |
| Week 20 | 1920 | 628 | 2399 | 480 | 880 | 1999 | 720 | 931 | 1788 | 1200 | 1187 | 1801 | 1680 | 845 | 2636 | 960 | 1033 | 2563 | 0 | 1126 | 1437 | | | | | | | | | |
| Week 21 | 960 | 982 | 1415 | 1200 | 921 | 1694 | 240 | 1286 | 648 | 1200 | 1087 | 761 | 1440 | 880 | 1321 | 1680 | 1450 | 1551 | 0 | 606 | 945 | | | | | | | | | |
| Week 22 | 1440 | 652 | 1733 | 720 | 802 | 1651 | 480 | 1023 | 1108 | 480 | 779 | 809 | 1440 | 818 | 1191 | 1680 | 1120 | 1751 | 0 | 1117 | 634 | | | | | | | | | |
| Week 23 | 720 | 1116 | 238 | 960 | 985 | 213 | 1440 | 983 | 670 | 1440 | 941 | 1169 | 720 | 1096 | 793 | 1920 | 911 | 1802 | 0 | 1476 | 326 | | | | | | | | | |
| Week 24 | 960 | 794 | 492 | 1680 | 1342 | 830 | 1440 | 1227 | 1043 | 1920 | 1211 | 1752 | 1680 | 922 | 2510 | 1440 | 1494 | 2456 | 0 | 874 | 1582 | | | | | | | | | |
| Week 25 | 1440 | 1357 | 1665 | 1680 | 1295 | 2050 | 1200 | 985 | 2265 | 1680 | 743 | 3202 | 1680 | 818 | 4064 | 960 | 1428 | 3596 | 0 | 794 | 2802 | | | | | | | | | |
| Week 26 | 1200 | 862 | 3140 | 960 | 1050 | 3050 | 480 | 1124 | 2406 | 720 | 870 | 2256 | 1920 | 1327 | 2849 | 960 | 1101 | 2708 | 0 | 1459 | 1249 | | | | | | | | | |
| Week 27 | 1920 | 731 | 2438 | 480 | 916 | 2002 | 720 | 1301 | 1421 | 1200 | 863 | 1758 | 1440 | 1324 | 1874 | 1680 | 1269 | 2285 | 0 | 1162 | 1123 | | | | | | | | | |
| Week 28 | 480 | 1480 | 123 | 1440 | 920 | 643 | 1440 | 1467 | 616 | 960 | 1112 | 464 | 1200 | 1035 | 629 | 1920 | 1053 | 1496 | 0 | 776 | 720 | | | | | | | | | |
| Week 29 | 1440 | 1310 | 850 | 960 | 1312 | 498 | 1200 | 1059 | 639 | 1200 | 933 | 906 | 960 | 740 | 1126 | 1920 | 711 | 2335 | 0 | 957 | 1338 | | | | | | | | | |
| Week 30 | 960 | 1086 | 1212 | 1200 | 1006 | 1406 | 1680 | 1241 | 1845 | 1680 | 995 | 2530 | 1680 | 1317 | 2893 | 720 | 1410 | 2203 | 0 | 795 | 1408 | | | | | | | | | |
| Week 31 | 960 | 1048 | 1320 | 1680 | 663 | 2337 | 1920 | 1396 | 2861 | 960 | 1209 | 2612 | 1440 | 1249 | 2803 | 1200 | 1132 | 2871 | 0 | 1001 | 1870 | | | | | | | | | |
| Week 32 | 960 | 652 | 2178 | 1440 | 1120 | 2498 | 1440 | 1716 | 2222 | 1200 | 1356 | 2066 | 1440 | 837 | 2669 | 960 | 914 | 2715 | 0 | 656 | 2059 | | | | | | | | | |
| Week 33 | 960 | 797 | 2222 | 960 | 1185 | 1997 | 1680 | 773 | 2904 | 480 | 887 | 2497 | 480 | 827 | 2150 | 1200 | 740 | 2610 | 0 | 1272 | 1338 | | | | | | | | | |
| Week 34 | 960 | 1045 | 1253 | 1440 | 604 | 2089 | 960 | 1102 | 1947 | 1200 | 1202 | 1945 | 960 | 891 | 2014 | 1200 | 1485 | 1729 | 0 | 1010 | 719 | | | | | | | | | |
| Week 35 | 1680 | 1381 | 1018 | 1200 | 783 | 1435 | 720 | 1392 | 763 | 960 | 1014 | 709 | 1680 | 879 | 1510 | 1920 | 1336 | 2094 | 0 | 898 | 1196 | | | | | | | | | |
| Week 36 | 960 | 1049 | 1107 | 1200 | 1116 | 1191 | 1920 | 702 | 2409 | 960 | 878 | 2491 | 1200 | 1399 | 2292 | 720 | 1391 | 1621 | 0 | 1061 | 560 | | | | | | | | | |
| Week 37 | 1920 | 1124 | 1356 | 1920 | 1314 | 1962 | 960 | 695 | 2227 | 1200 | 890 | 2537 | 720 | 1376 | 1881 | 720 | 866 | 1735 | 0 | 1245 | 490 | | | | | | | | | |
| Week 38 | 720 | 770 | 440 | 960 | 831 | 569 | 1680 | 970 | 1279 | 720 | 1367 | 632 | 1920 | 713 | 1839 | 1680 | 1092 | 2427 | 0 | 861 | 1566 | | | | | | | | | |
| Week 39 | 1440 | 638 | 2368 | 960 | 1047 | 2281 | 1440 | 1029 | 2692 | 1440 | 1413 | 2719 | 1200 | 855 | 3064 | 480 | 1041 | 2503 | 0 | 851 | 1652 | | | | | | | | | |
| Week 40 | 1200 | 756 | 2096 | 960 | 1068 | 1988 | 480 | 673 | 1795 | 720 | 714 | 1801 | 1680 | 1469 | 2012 | 720 | 1037 | 1695 | 0 | 719 | 976 | | | | | | | | | |
| Week 41 | 1920 | 682 | 2214 | 1200 | 687 | 2727 | 960 | 1196 | 2491 | 720 | 1251 | 1960 | 1200 | 756 | 2404 | 480 | 865 | 2019 | 0 | 738 | 1281 | | | | | | | | | |
| Week 42 | 960 | 985 | 1256 | 1920 | 700 | 2476 | 960 | 1226 | 2210 | 720 | 687 | 2243 | 1440 | 1370 | 2313 | 720 | 1275 | 1758 | 0 | 830 | 928 | | | | | | | | | |
| Week 43 | 960 | 1221 | 667 | 1920 | 691 | 1896 | 960 | 846 | 2010 | 720 | 751 | 1979 | 1440 | 1123 | 2296 | 960 | 675 | 2581 | 0 | 786 | 1795 | | | | | | | | | |
| Week 44 | 1440 | 1007 | 2228 | 960 | 1161 | 2027 | 480 | 1185 | 1322 | 1680 | 877 | 2125 | 960 | 1398 | 1687 | 1440 | 656 | 2471 | 0 | 1389 | 1082 | | | | | | | | | |
| Week 45 | 1920 | 1124 | 1878 | 960 | 1202 | 1636 | 720 | 1274 | 1082 | 1680 | 972 | 1790 | 1920 | 1472 | 2238 | 1200 | 1061 | 2377 | 0 | 928 | 1449 | | | | | | | | | |
| Week 46 | 1440 | 1117 | 1772 | 1440 | 1165 | 2047 | 1200 | 653 | 2594 | 1200 | 978 | 2816 | 1200 | 1272 | 2744 | 480 | 718 | 2506 | 0 | 774 | 1732 | | | | | | | | | |
| Week 47 | 1200 | 603 | 2329 | 720 | 698 | 2351 | 1920 | 1732 | 2539 | 720 | 1173 | 2086 | 1200 | 1348 | 1938 | 1680 | 1637 | 1981 | 0 | 1322 | 659 | | | | | | | | | |
| Week 48 | 1200 | 916 | 943 | 1680 | 1198 | 1425 | 960 | 1132 | 1253 | 1920 | 1269 | 1904 | 1920 | 1808 | 2016 | 1440 | 1061 | 2395 | 0 | 852 | 1543 | | | | | | | | | |
| Week 49 | 1680 | 778 | 2445 | 1440 | 1800 | 2085 | 1440 | 918 | 2607 | 960 | 861 | 2706 | 1200 | 1500 | 2406 | 720 | 1223 | 1903 | 0 | 668 | 1235 | | | | | | | | | |
| Week 50 | 1680 | 1429 | 1486 | 1440 | 607 | 2319 | 1440 | 1322 | 2437 | 1200 | 1122 | 2515 | 1200 | 1064 | 2651 | 720 | 1452 | 1919 | 0 | 668 | 1251 | | | | | | | | | |
| Week 51 | 1200 | 1165 | 1286 | 960 | 882 | 1364 | 1200 | 1282 | 1282 | 1920 | 1270 | 1932 | 1680 | 667 | 2945 | 720 | 1467 | 2198 | 0 | 1238 | 960 | | | | | | | | | |
| Week 52 | 1680 | 1037 | 1603 | 720 | 851 | 1472 | 1920 | 1410 | 1982 | 1680 | 1241 | 2421 | 1200 | 1325 | 2296 | 960 | 1056 | 2200 | 0 | 1336 | 864 | | | | | | | | | |
| Week 53 | 1920 | 1172 | 1612 | 1200 | 804 | 2008 | 1440 | | | | | | | | | | | | | | | | | | | | | | | |

RUBRICS (REPORT & PRESENTATION) - Total : 100 marks; Weightage : 30%

1) LANGUAGE, ORGANISATION AND FORMATTING - 10 MARKS

| Proficient 10.0 to 8.0 | Developing 7.5 to 5.0 | Underperforming 4.5 to 0.0 | Max |
|---|--|---|-----|
| No spelling or grammatical errors. | Some spelling or grammatical errors but does not impede comprehension. | Numerous spelling and grammatical errors such that it is difficult for the marker to understand the key points. | 10 |
| Written in formal English and without slipping into conversational English. | Writing is inconsistent; switching from formal to informal English. | Report is written in informal and/or conversational English throughout eg. Typical of social media chats. | |
| Usage of appropriate capitalisation, punctuation and proper sentence structure. | Attention was paid to ensure capitalisation, punctuation and proper sentence structure even though there were some signs of shorthand commonly used in social platforms. | There was a lack of appropriate capitalisation, punctuation and proper sentence structure. | |
| Cover page was duly filled and Appendix was appropriately utilised. | Cover page was incomplete; Header and footer omitted. | Communication lacks clarity and attention to the basics of writing. | |
| Report followed the conventional writing structure and was organised with an Introduction, body and conclusion. | Report followed conventional writing structure but the lack of headings and sub-headings or the poor choice of headings or sub-headings resulted in paper that did not have a strong logical flow. | Cover page was omitted / incomplete or lacked accuracy. | |
| Header and footer were used. | Lack of paragraphs resulted in lack of focus. | Appendix was not utilised or inappropriately used. | |
| Headings and sub-headings were used to enhance the structure and flow of the report. | Overall report was tidy with some inconsistencies. | Header and footer were omitted. | |
| Overall report was tidy, consistent and professional. | Resources used were cited and referenced with omissions. APA standards not applied. | Report did not adhere to conventional writing structure. | |
| Resources used were consistently cited and referenced. APA standards applied. | | Omission of headings and sub-headings and lack of paragraphs resulted a lack in organisation and focus. | |
| | | Overall report showed a lack of attention to organisation and formatting. | |
| | | Resources used were not cited and reference was incomplete/missing. APA standards not applied. | |

2) MANPOWER RESOURCES (Questions a & b) - 25 MARKS

| Proficient 25.0 to 20.0 | Developing 19.5 to 12.5 | Underperforming 12.0 to 0.0 | Max |
|---|---|---|-----|
| <u>Question a</u> Insightful and thorough explanations that demonstrate clear understanding of the service level. | <u>Question a</u> Reasonable explanations that demonstrate somewhat clear understanding of the service level. | <u>Question a</u> Unclear explanations about the service level. | 25 |
| Excellent thoroughness in showing the workings and/or visuals to derive the answer. | Satisfactory workings and/or visuals shown to explain how the answers are derived. | Poor and/or unclear workings and/or visuals shown to explain how the answers are derived. | |
| <u>Question b</u> Insightful and thorough explanations in deriving the work-hours and manpower calculations; with clear links to course materials. | <u>Question b</u> Reasonable explanations in deriving the work-hours and manpower calculations; with somewhat clear links to course materials. | <u>Question b</u> Poor level of explanations in deriving the work-hours and manpower calculations; with unclear links to course materials. | |
| Excellent thoroughness in showing the workings and/or visuals in deriving the answers. | Satisfactory workings and/or visuals shown to explain how the answers are derived. | Poor level and/or messy workings and/or visuals shown to explain how the answers are derived. | |
| | | | |
| | | | |

3) DC PRICINGS (Question c) - 20 MARKS

| Proficient 20.0 to 16.0 | Developing 15.5 to 10.0 | Underperforming 9.5 to 0.0 | Max |
|--|--|---|-----|
| Insightful and thorough explanations in deriving the pricings; with clear links to course materials. | Reasonable explanations in deriving the pricings; with somewhat clear links to course materials. | Poor level of explanations in deriving the pricings; with unclear links to course materials. | 20 |
| Excellent thoroughness in showing the workings and/or visuals in deriving the answers. | Satisfactory workings and/or visuals shown to explain how the answers are derived. | Poor level and/or messy workings and/or visuals shown to explain how the answers are derived. | |

4) LAYOUT DESIGN & SPACE REQUIREMENTS (Questions d, e & f) - 25 MARKS

| Proficient 30.0 to 24.0 | Developing 23.5 to 15.0 | Underperforming 14.5 to 0.0 | Max |
|---|---|---|-----|
| <p><u>Question d</u></p> <p>Solutions recommended were suitable and effective for layout, safety and security.</p> <p>Clear illustrations and legends were presented to demonstrate the effectiveness of the solutions.</p> <p><u>Question e & f</u></p> <p>Insightful and thorough explanations in deriving the layout values; with clear links to course materials.</p> <p>Excellent thoroughness in showing the workings and/or visuals in deriving the answers.</p> | <p><u>Question d</u></p> <p>Solutions recommended were fair but limited in the effectiveness for layout, safety and security.</p> <p>Relevant illustrations and legends were superficially presented to demonstrate the effectiveness of the solutions.</p> <p><u>Question e & f</u></p> <p>Reasonable explanations in deriving the layout values; with somewhat clear links to course materials.</p> <p>Satisfactory workings and/or visuals shown to explain how the answers are derived.</p> | <p><u>Question d</u></p> <p>Solutions were badly constructed and not effective for layout, safety and security.</p> <p>Illustrations and legends were absent or minimally shown.</p> <p><u>Question e & f</u></p> <p>Poor level of explanations in deriving the layout values; with unclear links to course materials.</p> <p>Poor level and/or messy workings and/or visuals shown to explain how the answers are derived.</p> | 30 |
| | | | |

1) STRUCTURE OF PRESENTATION - 5 MARKS (Shared mark for all group members)

| Proficient | Developing | Underperforming | Max |
|---|---|---|-----|
| 5.0 to 4.0 | 3.5 to 2.5 | 2.0 to 0.0 | |
| The Presentation had no grammatical, spelling or formatting error and were consistent in style. | The Presentation had detectable grammatical or spelling but did not impede communication. | The Presentation had glaring grammatical, spelling or formatting error such that it was distracting. | 5 |
| Content had a logical flow from one part / presenter to another. | Some formatting error or were inconsistent in style but not too distracting. | Content flow from one part / presenter to another was a bit abrupt or random. | |
| Images and visual tools enhanced the communication value of the presentation. | Content had a logical flow from one part / presenter to another. | Images and visual tools were used but either too many; served very little purpose other than to cover up any lack in substance, or too few such that the audience had to rely on the Presenter to make sense of the content or 'imagine' what the Presenter is trying to communicate. | |
| Overall, the slides were audience-centric, persuasive and professional. | Images and visual tools were used appropriately but some slides were too wordy or some images were superfluous to the presentation. | Overall, the slides appeared to be hastily put together without vetting or careful thought. | |
| | Overall, the slides were informative. | | |

2) PACE AND INTONATION OF SPEECH, PROJECTION OF VOICE AND PRONUNCIATION OF WORDS - 5 MARKS (Individual)

| Proficient | Developing | Underperforming | Max |
|--|--|---|-----|
| 5.0 to 4.0 | 3.5 to 2.5 | 2.0 to 0.0 | |
| Natural but not conversational / informal presentation. Proper English language. | Affected; artificial, pretentious, and designed to impress. Too performative. | Monotonous; dull, repetitive, lacking in variation in tone or pitch. Unable to maintain formal presentation language, frequent use of Singlish. | 5 |
| Audible and well-paced; not too fast or slow and consistent. | Sounded like broadcaster or emcee for an event. Accidental use of Singlish but not distracting. | Inaudible and unable to project voice despite being asked to speak up (no physical ailments or pre-condition). | |
| | Audible (or inaudible but able to self-correct when there are cues from the audience) and either too fast or too slow. | | |

3) CONFIDENCE, PERSUASIVENESS AND EXPRESSION - 5 MARKS (Individual)

| Proficient | Developing | Underperforming | Max |
|--|---|---|-----|
| 5.0 to 4.0 | 3.5 to 2.5 | 2.0 to 0.0 | |
| Highly persuasive; Natural; not overly rehearsed or contrived and communication was logical and clear. | Persuasive, nervous but managed such that it does not distract the audience and communication was achieved. | Not persuasive. Unable to maintain composure and confidence. | 5 |
| Expression is pleasant / open and alert throughout presentation. | Occasionally, unaware of expression and comes across as distracted or preoccupied but able to self-correct. | Unaware of expression and its impact on presentation (no physical ailments or pre-condition). | |