

Diploma in Business

[Computational Thinking Individual Assignment]

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Task 1: Understand the Process and Problem

i. Selection of industry and a relevant cross-departmental process

Guided by the Singapore's Industry Transformation Maps (ITM) under the Ministry of Trade and Industry (MTI), my project focuses on the retail industry with a narrowed scope on the Cotton On Group and its flagship brand, Cotton On. My selected cross-departmental process would be the online order fulfilment process, which demonstrates how Cotton On receives, process and delivers online customer orders through smooth coordination between the Sales and Logistics Department.

This process aligns with MTI's Retail Industry Transformation Map 2025 strategies in 2 ways. Firstly, it supports the strategy of using new experiential concepts and innovations to rejuvenate retail experience. Cotton On achieves this by seamlessly integrating its physical retail stores with its online platform to help create an omnichannel shopping experience for customers. Secondly, it also contributes to jobs and skills transformation and creating quality role for locals. As customer demand grows, increasingly complex order fulfilment process would need Cotton On to fill role with more qualified manpower to keep up with its operational needs.

ii. Description of the selected process

Cotton On's online order fulfilment process begins when the Sales Department receives an online order through its e-commerce platform. Payment is then verified by the Sales Department and if unsuccessful, the order will be cancelled and the customer is notified via email. Once payment is successfully verified, the order details such as product SKUs, quantity of products, delivery address and preferred delivery methods will be sent to the Logistics Department. Subsequently, they will check for stock availability in the warehouse, prepare order and generate a tracking number for customers to monitor their delivery status. If stock is not currently available, customer is notified via email and will be refunded. Thereafter, packages are handed to courier for delivery. For collection in stores, packages will be delivered to the nearest store. Otherwise, they are delivered to customer's home. For home delivery, customers are required to sign off, or if unavailable, courier will deliver package to local post office and leave a notification card for customer to collect package. Once package is successfully delivered to designated location, it is marked as delivered and the process ends.

Task 2: Examine the Current Process (As-Is)

i. Description of my current (As-Is) process using pseudocode

START

RECEIVE online order from e-commerce platform

Sales Department verifies payment's status

IF payment's status passes verification THEN

Sales Department manually signs off

Forwards to Logistics Department

ELSE

Cancel order

Send email to notify customer on cancelled order

ENDIF

Logistics Department reviews order's details and checks inventory

IF all stock is available THEN

Prepare order for dispatch

Generate tracking number

ELSE

Send email to notify customer on unavailable stocks

Once package ready for dispatch, proceed to delivery arrangement.

IF delivery method is "Collection in store" THEN

Deliver to selected store

ELSEIF delivery method is "Home Delivery" THEN

Deliver to stated address

ELSEIF customer is not present at home to sign off delivery THEN

Leave a notification card for customer

Deliver to local post office

ELSE

ENDIF

Mark package as successfully delivered and alert customer via email.

END

ii. Identification of key impediments within the process

One major impediment in the process would be the manual payment verification process resulting in inefficient use of company's resources. By manually checking and signing off on each payment status, it consumes lots of time and effort from the Sales Department. As a result, valuable resources are wasted on these manual, repetitive tasks instead of being used on more productive activities such as generating more sales for Cotton On. Hence, efficiency of the order fulfilment process is reduced which negatively impacts the overall productivity of Cotton On.

Similarly, another impediment would be the manual stock checks, forming a bottleneck in the process. By manually checking stocks for each order item, it becomes very time-consuming to fulfil especially during peak seasons where order volumes are high. Thus, subsequent steps in the process cannot move forward until these tasks are completed, which slows down the process and limits Cotton On's ability to handle high sales volume efficiently.

The last impediment present would be the inefficient handling of customers' absence during home delivery. When customers are absent during home delivery, couriers make a wasted trip down to the stated address and must then reroute to local post office to drop off the package. This redundant step extends delivery time which delays successful order completion and consumes additional resources.

Overtime, these impediments translate into longer waiting time for customers which can then lead to customer dissatisfaction and potentially loss of repeated business.

iii. How CT elements were applied in this process

S/N	Element of Computational Thinking	Explain where you applied this element in development of the As-Is Pseudocode.	Explain how relevant/irrelevant this element is in the development of the As-Is Pseudocode
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1	Decomposition	I broke down the whole order fulfilment process into 3 smaller, distinct tasks to focus on, which were payment verification, order preparation and delivery.	This is highly relevant as it makes it easier to get an overview of the entire process and then subsequently structure the pseudocode logically to identify where impediments could have occurred.
2	Pattern Recognition	I identified recurring patterns in the outcomes of conditional steps such as “Confirmed” vs “Unconfirmed” payments and in-stock vs out-of-stock items.	This is highly relevant as it helps ensure consistency in decision-making across all orders and would be a good foundation for automation.
3	Abstraction	I focused solely on key operational information such as payment and order details, stock availability and delivery methods, while leaving out less relevant ones like packaging type.	This is highly relevant as it highlights only the important information needed to be included in the pseudocode. By doing so, it helps to minimise unnecessary complications in pseudocode, making the flow clean and concise to analyse for improvements.
4	Algorithm Design	I sequenced the process into a logical step-by-step pseudocode by defining a clear trigger and end point, using process inputs to link steps, convert decisions points into conditional statements and specifying the overall expected outcome.	This is highly relevant as it helps to ensure that the pseudocode flows logically and accurately represents the sequence of actions and process dependencies to reflect the actual order fulfilment process. With an accurate algorithm, it allows targeted improvements to be introduced with a higher chance of success.

Task 3: Interpret and Improve the Process (To-Be)

i. Description of my improved (To-Be) process using pseudocode

START

RECEIVE online order from e-commerce platform

READ payment_status

READ order_details

EXTRACT product_sku, ordered_quantity, delivery_method, delivery_address

EXTRACT stock_quantity from database

```
IF payment_status = "Confirmed" THEN
    Approve order for processing
ELSE
    Cancel order
    Send email to notify customer of cancelled order
ENDIF
```

Logistics Department reviews order's details and checks inventory

```
IF stock_quantity >= ordered_quantity for all product_sku=TRUE THEN
    Prepare order for dispatch
    Generate tracking number
ELSE
    Send email to notify customer on unavailability of stocks
```

Once package ready for dispatch, proceed to delivery arrangement.

```
IF delivery_method = "Collectioninstore" THEN
    Deliver to selected store
ELSEIF delivery_method = "Homedelivery" THEN
    Deliver to stated address
ELSEIF customer is not present at home to sign off delivery THEN
    Leave package in a safe place at stated address
ELSE
ENDIF
```

Mark package as successfully delivered and alert customer via email.

END

ii. Distinguish the improvements made

Firstly, manual payment verification is now automated. The system reads the payment status from the online order and triggers consequential actions automatically. If it reads “Confirmed”, system will approve the order for processing. If it reads “Unconfirmed”, it will cancel the order and send an email to notify customer. With automation, it helps eliminate the need for human intervention, thus freeing up valuable resources for higher value tasks and improving productivity of Cotton On.

Secondly, stock checking is also now fully automated. The system extracts real-time stock levels from Cotton On’s database and compares it to ordered quantity using comparison operators. If outcome = “TRUE”, it will alert Logistics staff to prepare order for dispatch. Otherwise, if outcome = “FALSE”, it will send an email to notify customer about unavailability of stock. By having an automated inventory checking system, it helps speed up process, allowing Cotton On to handle more orders particularly during peak sales season.

Lastly, by replacing the previous “deliver to local post office” with “leave package in a safe place at stated address” helps eliminate unnecessary reroutes which results in a shorter delivery completion time, more efficient use of resources and operational cost savings. Furthermore, this improvement ensures that package is successfully delivered without requiring customer to travel to collect their package thus, making their experience more convenient.

However, the only manual task that I did not automate was the order preparation step because retaining some human involvement would help ensure better product quality checks, especially in spotting damages and defects. Plus, this would help avoid the implementation of costly and complicated automation machinery.

Task 4: Apply Automation Concepts with Power Automate

i. Description on using Power Automate to automate part of the process

<u>Pseudocode (To-Be)</u>	<u>Power Automate Descriptions (To-Be)</u>
START RECEIVE online order from e-commerce platform READ payment_status // Read system-generated input READ order_details EXTRACT product_sku, ordered_quantity, delivery_method, delivery_address // Read individual fields from order_details EXTRACT stock_quantity from database // Retrieve real-time updated inventory for products from database	Trigger: When a new record is created in Cotton On's e-commerce database Action: Get record details – retrieve outcome of “Payment” from order data Action: Get record details – retrieve “Order Details” (product SKU, ordered quantity, delivery method and delivery address) from order data Action: Initialize variable Variables: • payment_status = string // Initialize as string since statuses, unconfirmed and confirmed, are text values • product_sku = array (dynamic content: database) // Initialize as array as it consists of the list of products the store has and allows multiple different products to be in an order • stock_quantity = int (dynamic content: database) // Initialize as integer as number of items in inventory is whole and to allow logical comparison during condition checks • ordered_quantity = int (dynamic content: ordered_quantity) // Initialize as integer as number of items ordered is whole and to allow logical comparison during condition checks • delivery_method = string // Initialize as string since delivery options are text values

```
// Check condition to ensure payment is
received before order gets process
IF payment_status = "Confirmed" THEN
    Approve order for processing
ELSE
    Cancel order
    Send email to notify customer
ENDIF
```

```
// Check condition to ensure purchased
stock is available for delivery
IF stock_quantity >= ordered_quantity
for all product_sku = TRUE THEN
    Prepare order for dispatch
    Generate tracking number
ELSE
    Send email to notify customer of
```

- delivery_address = string (dynamic content = delivery_address)
// Initialize as string since addresses have a combination of letters, numbers and symbols

Condition 1: Payment Received

Condition: variable(payment_status) = "Confirmed"

- If Yes: Order gets processed
- If No: Order gets cancelled and Cancellation email is sent to customer

// Order preparation will only happen if payment has been received by Cotton On

Send Cancellation Email

Action: Send an email (V2)

To: Customer's email (from order details)

Subject: Cancelled Order Notification

Body:

Dear Customer,

Your order has been cancelled as we were unable to process your payment.

Please try again or contact us for help.

Regards,
Cotton On Sales Team

Condition 2: Stock Availability

Condition 2: variable(stock_quantity) >= variable(ordered_quantity) for all variable(product_sku) = TRUE

- If Yes: Prepare order accordingly then generate tracking number for each package
- If No: Out of stock email is sent to customer

// Preparation of order depends on current stock availability

unavailable stocks and initiate refund ENDIF	Send Out of Stock Email Action: Send an email (V2) To: Customer's email (from order details) Subject: Unavailable stock Notification Body: Dear Customer, We regret to inform you that 1 or more items in your order is currently out of stock. Payment made for those items will be refunded in 3 days. Regards, Cotton On Sales Team
// Check first condition: collection in store IF delivery_method = "Collectioninstore" THEN Deliver to selected store	Condition 3 – Tier 1: Collection in Stores Condition 3: variable(delivery_method) = "Collectioninstore" • If Yes: Deliver to variable(delivery_address) • If No: (Proceed to next condition)
// The next condition will be outside the first condition ELSEIF delivery_method = "Homedelivery" THEN Deliver to stated address	Condition 3 – Tier 2: Home Delivery (inside Tier 1 "If No" branch) Condition: variable(delivery_method) = "Homedelivery" • If Yes: Deliver to variable(delivery_address) (Proceed to next condition) • If No: (No action)
// The next condition will be inside the second condition ELSEIF customer is not present at home to sign off delivery THEN Leave package in a safe place at stated address ELSE ENDIF	Condition 3 – Tier 3: Present at home (inside the Tier 2 "If Yes" branch) Condition: Is customer not present at home to sign off delivery? // Step is not applicable for automation, courier will handle this step manually • If Yes: Leave package in a safe place at variable(delivery_address) • If No: Hand package over to customer at variable(delivery_address) // Determines package delivery based on preferred delivery method chosen

Mark package as successfully delivered and send email to customer. END	Send Confirmation Email Action: Send an email (V2) To: Customer's email (from order details) Subject: Package Delivery Notification Body: Dear Customer, Your package has successfully been delivered to variable(delivery_address). Please check that your order is correct and contact us for any further enquiries. Thank you! Regards, Cotton On Sales Team
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ii. Example of a CO-STAR prompt used to enhance my design

Context	Cotton On receives a new online order from its e-commerce platform. System reads the order details and supports the order fulfilment process. It helps verify payments, check for stock availability and determine flow of package deliveries. Thereafter, the outcome of these actions will automatically trigger consequential actions such as sending out emails to notify customer on cancelled/out of stock/successful delivery order.
Objective	Create a new Power Automate flow to help enhance my design and focus mainly on allowing customers to have a better experience with online ordering at Cotton On.
Style	Professional, creative, user-friendly
Tone	Helpful and engaging
Audience	Cotton On Sales and Logistics Team
Response	Provide a detailed, step-by-step flow design with improvements made according to the above.

iii. Interpret how CO-STAR prompt supported CT or automation logic

For my CO-STAR prompt, I emphasized on customer experience, which allowed me to step back and evaluate the flow from a customer perspective. Through that, it made me more fully aware on how each step of the process would impact a customer's experience and how I can thus improve on it to ensure a quick and smooth online ordering process. One part I realized I could improve on after using CO-STAR was the notification logic. Currently, customers only get notified if their order is cancelled, out of stock or successfully delivered. However, it would be more

engaging if they were to receive timely updates at each stage in the process, be it successful payment verification, order dispatched etc. By doing so, it helped increase my confidence in handling conditional flaws in my logic. In general, this reflection highly reinforced algorithmic thinking as it allowed me to carefully map out each step in the process to determine when and how customers are updated. This helped reinforced my critical thinking skills as I needed to ensure that each step adds customer value rather than just function mechanically. Thus, in conclusion, the CO-STAR prompt not only enhanced my logic, but also enabled me to apply computational thinking while going beyond the technical flow to design an engaging, user-friendly experience for customers.

Task 5: Evaluate the Outcome and Reflect

i. Identify relevant SMART success metrics for my proposed solution

The goal of automating Cotton On's online order fulfilment process is to ensure timely order fulfilment while improving operational efficiency. To monitor whether goal is being met we will monitor average order fulfilment time and efficiency gained.

To achieve timely fulfilment of order, start tracking the average time taken from order placement to successful delivery of package by logging timestamp at each main workflow step (payment verification, order preparation, dispatch, delivery). Next, measure the duration for each step and calculate monthly averages. Aim is to reduce average time taken for each step by 30% within the next 6 months. This helps to monitor whether the proposed solution is quick enough to meet the expected fulfilment timeframe, aligning directly with the main goal. Thus, target 90% of orders are to be fulfilled within the timeframe of 3 working days by the end of the year.

Another main goal is to increase operational efficiency via automation. To find out whether efficiency has improved, we can compare the numbers of orders processed per hour now (automation) vs then (manual) by focusing mainly on previously manual steps such as payment verification and stock checks. Currently, the manual process handles an average of 40 orders/hour. Thus, using system logs, automatically count the average numbers of orders processed per hour after automation and calculate the percentage improvement in processing capacity. Aim for a 25% increase in orders processed per hour with the implementation of

automation. This helps to check whether automation has helped improve operational efficiency which thus allows Cotton On to better handle higher sales volume during peak periods. Hence, target to maintain 25% improvement or higher by the year end sales period, which would be Christmas.

ii. Describe any assumptions, risks or limitations that could affect the process outcome

Firstly, the proposed solution assumes that all extracted data inputs are updated and accurate. This includes order data such as payment status and delivery address from e-commerce platform and inventory levels from database. If this assumption fails, condition checks may be triggered incorrectly, leading to inappropriate actions. For example, if a payment status is not accurately updated in time, system would read it as “Unconfirmed” and wrongly cancel a valid order. Repeated errors like this could result in order fulfilment errors, customers dissatisfaction and loss of trust. To mitigate this, implement real-time data synchronisation and automated alerts to detect such discrepancies early and prevent such situations from happening.

Secondly, with most of the process now automated, there is definitely a risk of technical errors or system failures occurring. Such disruptions may cause significant delays in the online order fulfilment process, potentially preventing Cotton On from meeting its promised delivery timeframe. This risk is further amplified during peak seasons where high order volumes would place additional strain on the system, increasing the likelihood of slowdowns or breakdowns. Ultimately, such experiences will erode customers’ trust during crucial periods when reliability and performance are most critical. In order to reduce this risk, there should be regular load testing and contingency protocol should be established to enhance process’ resilience.

Lastly, a limitation of this solution is that it only operates based on predefined rules which thus limits decision-making ability. Complex scenarios, such as unique customer requests or split shipments, that fall beyond the system’s rules will not get processed. In such cases, manual intervention will be required, which would likely slow down the process and reduces Cotton On’s productivity. Overall, it is able to improve efficiency in routine tasks but is unable to fully replace human judgement in unexpected cases, which highlights the boundary of automation.

References

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