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## **Managing Inventory (ACEA 7006)**

Module – Engineering Management Leadership

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## **Abstract**

This essay discusses ways in which Toon Air can improve the efficiency of its operations and reduce costs by improving the supply of spares to end-users. The recommended approaches include establishing satellite stores at destination airports, reviewing the inventory management system, centralising purchasing, implementing a supplier management program, and adopting lean inventory management principles. However, these approaches also present challenges and trade-offs, such as potential increased costs, stock-outs, and transportation costs. In addition, outsourcing the management of parts warehouse and supply of parts to the engineering functions can offer benefits, but careful evaluation of potential outsourcing partners and clear definition of the scope of outsourcing are necessary. Effective communication channels and careful management of the transition are also critical to ensure minimal disruption to current operations.

## **Abbreviations**

Key Performance Indicators (KPIs)

Service Level Agreements (SLAs)

Total Cost of Ownership (TCO)

## **Keywords**

Key Performance Indicators (KPIs), Outsourcing, Spares, Inventory Management

## Table of Contents

|                      |    |
|----------------------|----|
| Abstract .....       | 2  |
| Abbreviations.....   | 2  |
| Keywords .....       | 2  |
| Introduction.....    | 4  |
| Question 1 .....     | 5  |
| Question 2 .....     | 7  |
| Question 3 .....     | 9  |
| Recommendations..... | 11 |
| References.....      | 13 |

## Introduction

In today's highly competitive airline industry, efficient and effective management of the supply chain is critical for success. As smaller airlines like Toon Air face increasing competition from low-cost carriers, it is important to carefully evaluate all aspects of their operations, including the purchasing and materials management function. In particular, the supply of spares to the end users is a crucial area for improvement, as delays in obtaining essential parts can lead to costly aircraft downtime.

One potential solution to this problem is outsourcing the management of the parts warehouse and supply of parts to the engineering functions. This would involve partnering with a third-party organisation to manage the inventory management and distribution of spares, freeing up internal resources for other critical functions. However, outsourcing is not without its challenges, and Toon Air would need to carefully evaluate the risks and benefits of such a move.

This essay will critically evaluate how the supply of spares to end users can be improved through outsourcing, considering the potential benefits and drawbacks of this approach. It will also advise the company on what outsourcing involves and what particular areas would require special attention. Additionally, this essay will evaluate what performance measures would need to be implemented for the outsourcing of the parts warehouse, to ensure that the company's goals are being met and that the outsourcing arrangement is delivering the expected benefits. Ultimately, this essay will provide Toon Air with the information and insights needed to make an informed decision about outsourcing their parts warehouse and supply function, in order to improve their overall efficiency and competitiveness in the airline industry.

## Question 1

Toon Air can positively impact their efficiency and profitability through improving the supply of spares to end-users (van Zyl, 2003). This can be achieved by implementing some of the methods listed below.

Given the current situation at Toon Air is that all spares are held centrally at a warehouse which is 30 miles from the nearest airport, it is recommended that establishing satellite stores at destination airports will be beneficial. This will significantly reduce delays in transporting spare parts to the respective airport when they are required for on-site maintenance which will reduce downtime by increasing the speed of the maintenance work. Further research is required into whether this operational change would ultimately increase costs as transport costs would be decreased but there would be an increase in the cost of holding and managing multiple stores, as a central warehouse is a method to ensure the lowest total costs for storing and managing stores (Wang, et al., 2021).

As there is a high rate of technical obsolescence due to design changes as well as changes in aircraft regulations it is recommended that inventory investment is reviewed as it is essential to have an efficient inventory management system. Through reviewing the system any superseded parts will be identified and removed from the spares list, the newer alternatives can then be added (Martorell, et al., 202). This will ensure costs are reduced by ensuring the correct parts only are ordered and not both the obsolete and the newer parts. Reviewing the system will ensure problematic lead times are considered when setting reorder points, demand patterns can also be factored into inventory management (Disney, et al., 2016). This will reduce the likelihood of parts being out of stock when ordered which could reduce downtime by ensuring that spares are readily available for installation.

To avoid engineers bypassing the purchasing department and ordering parts directly from suppliers, it is recommended that purchasing become centralised. Centralised purchasing increases control on spending and can ensure that reputable suppliers are used and that the terms and conditions of the purchase are adhered to. The purchasing department are also in a better position to negotiate additional discounts on parts, especially when they have visibility of all orders (Munson & Hu, 2010). On the other hand, it can lead to some delays for the engineers in receiving parts they need.

Establishing a supplier management program can help build good relationships with suppliers which can in turn motivate them to deliver a high-quality service where parts are delivered as agreed on placement of purchase orders. Data captured in a supplier management system can serve to improve compliance, reducing defective parts, ensuring timely deliveries to avoid delays in maintenance (Spiegel, 2011). However, additional resources and commitment to develop and maintain the program is likely required which will mean additional costs to the organisation.

Adopting lean inventory management can reduce inventory holding costs as it will minimise levels to what is necessary to meet the maintenance demands. By doing so, it can improve cash flow for the organisation to invest elsewhere. It can also result in faster turnaround times (Shah & Mittal, 2018), spares can be delivered quickly and will be more reliable which results in increased satisfaction. However, on the other hand there is an increased risk of stockouts if demand spikes with reduced flexibility (Chen, et al., 2013).

There may also be a need for increased resources to manage the system to ensure a high level of planning and coordination is achieved. Transportation costs will be increased as spares may need to be delivered more frequently.

In conclusion, improving the supply of spares to end-users requires a holistic approach that takes into account the entire supply chain. By establishing satellite stores, reviewing the inventory management system, centralising purchasing, implementing a supplier management program, and adopting lean inventory management principles, Toon Air can significantly improve the efficiency of its operations and reduce costs. However, it is important to consider the potential challenges and trade-offs associated with each approach before implementing any changes.

## Question 2

There are several benefits that can present themselves when the company decides to outsource the management of parts warehouse and supply of parts to the engineering functions. On the other hand, there are many challenges that Toon Air will need to be pay special attention to.

Arguably one of the most important aspects for Toon Air will be to choose the right outsourcing partner. Careful evaluation on the potential outsourcing partners needs to be undertaken to ensure they possess the expertise and capabilities to effectively manage the parts warehouse and supply of parts. This may involve evaluating their track record, their financial stability, and their ability to meet service level agreements (Zhang, et al., 2013). They will need to ensure the outsourcing partner has all the appropriate processes and systems in place. These systems will allow them to manage inventory levels which includes considering safety stock to protect against demand variation. They will also handle transactions and track parts accurately and currently. This may involve evaluating their warehouse management system, their quality control processes, and their ability to handle returns and exchanges (Ahmed, 2018). Outsourcing partners that employ personnel that have good knowledge skills in the area will offer a better service (Hsu & Liou, 2013).

Following choosing the outsourcing partner, Toon Air will need to clearly define the scope of outsourcing, this should include the roles and responsibilities of the outsourcing partner, the services that will be provided, and also the key performance indicators (KPI) which will be set and used to measure the success of the partnership (Akkermans, et al., 2019). This way both parties will clearly understand the expectations, it will then reduce the risk of misunderstandings later on. KPIs can be a useful tool for driving continuous improvement and not only to ensure there are no misunderstandings (Kang, et al., 2016). Clear communications channels between Toon Air and the outsourcing partner will need to be established to ensure information can be shared quickly and in an accurate manner.

The transition should be managed carefully to ensure that there is no disruption to the current operations. There will be a strain on resources and possible known and hidden costs during this time as activities take place (Winters, 2006). Such as creating a detailed transition plan that outlines the responsibilities of both parties, the activities of the service provider and the milestones. This will need to be communicated to stakeholders and monitored closely.

A non-disclosure agreement may be required to ensure that data security and confidentiality is maintained to protect any confidential information. Toon Air will need to ensure that the outsourcing partner stores their data in a way that suits as many companies now store data in the cloud which can increase the risk of data becoming vulnerable (Yoosuf & Anitha, 2022). Legal and financial repercussions could result if contractual issues arise if the outsourcing partner doesn't deliver the expected results, or if there are disputes over contract terms.

Ongoing governance should be established for the agreement to ensure the outsourcing partner is meeting its obligations. The performance will be monitored by tracking the KPIs, delivery times, inventory levels and stock-outs. This can include regular meetings with the outsourcing partner and Toon Air to discuss performance, address and issues, and identify any opportunities for improvement. Issues will inevitably arise during the

relationship, a process will need to be in place to respond in the best manner. This process should establish clear roles and responsibilities to those to resolve the issue and should include who will be responsible for managing the process and making final decisions.

Overall, outsourcing the management of parts warehouse and supply of parts to the engineering functions can provide Toon Air with several benefits or challenges, but it requires careful planning, evaluation, and management to ensure success. The potential risks and will need to be carefully weighed.

### Question 3

Outsourcing the parts warehouse at Toon Air can provide them with many benefits, such as savings on costs, an increase in efficiency, and improved service quality. However, to ensure the arrangement for outsourcing does deliver the desired outcomes, it will be vital to introduce the relevant performance measures which will allow for effective tracking of the outsourcing service provider.

One of the key performance measures that is required to be implemented for the outsourcing of the parts warehouse is service level agreements (SLAs). SLAs should be established between the outsourced service provider and Toon Air to outline the expected service levels, such as order processing times from receipt from Toon Air and lead times for the delivery of spares (Katok, et al., 2008). Also, stock availability will require defining as a minimum stock for critical spare parts, defined by Toon Air. The inventory records will need to be accurate, so regular stock takes will be required. Obsolescence of all spare parts will need to be managed and regular reports provided to Toon Air for inventory levels, order fulfilment, lead times and stock availability. These SLAs should be able to be measured and could possibly include penalties for non-compliance or rewards for when the company provides service that is above and beyond what is expected (Hosseinifard, et al., 2022). The SLAs will need to be reviewed regularly and updated when necessary to ensure they stay relevant. Conformance to the SLAs will prove that both parties are committed.

One of the main reasons for outsourcing is usually to reduce overall costs to the business. Taking this into account, measures should be implemented to allow for easy tracking of cost savings through outsourcing. Total cost of ownership (TCO) will give the sum of all the costs associated with performing a function, this will include direct costs such as labour, materials, and equipment, as well as indirect costs such as overheads, training, and maintenance (Visani, et al., 2016). Toon Air can determine whether outsourcing is more cost-effective by comparing the TCO of in-house versus outsourced warehouse management. Cost savings may not be immediate as there are initial costs associated with the transition, therefore thorough cost analysis should take place over a period.

Accurate inventory records will be essential for effective inventory management, performance measures should be implemented to track the accuracy. Back order rate measures how often orders have not been fulfilled, Toon Air can benefit by identifying inventory shortages and take corrective action such as increasing their spares stock levels. Shrinkage rate measures the amount of inventory that is lost due to damage, theft, or other reasons. Tracking this will help Toon Air identify areas where better security or handling procedures may be required (Smith, 2015).

Stock availability measures will need to be implemented to ensure that spares are available when required. Measures that track whether their orders are fulfilled on time, the percentage of stock-outs and percentage of orders that are back-ordered would be beneficial.

An extremely important performance measure is the quality of service that is being provided, this can be measured through customer satisfaction ratings, service request response times and the number of customer complaints (Feng, et al., 2019). By using methods such as benchmarking, KPIs and regular performance reviews, Toon Air can identify areas where improvements can be made. KPIs and SLAs also assist when tracking contract

compliance. It is important to establish clear expectations and requirements in the contract, as well as to monitor and measure performance against those requirements. Compliance can also be tracked by undertaking regular audits and providing regular reports on performance and compliance to ensure the outsourcing partner is meeting their contractual obligations (Morgan, et al., 2018). Any changes required should be managed through a change process, it should also be documented and approved by both parties.

To conclude, many benefits can be achieved through outsourcing the part warehouse. However, to ensure the service provider delivers the expected outcomes, appropriate performance measures should be established. By implementing performance measures such as KPIs, SLAs, cost reduction tracking, inventory accuracy, stock availability, quality of service, and contract compliance, Toon Air can effectively monitor the performance of the outsourced service provider and make any necessary adjustments to the outsourcing arrangement.

## Recommendations

Following the initial investigation of Toon Air's purchasing and materials management process, it is suggested that several recommendations can be implemented. The recommendations will require careful planning, investment, and commitment from Toon Air. The company should involve all stakeholders in the process to ensure buy-in and commitment, and to mitigate any potential human, financial, or operational issues that may arise during implementation.

Enhance forecasting and planning, it is recommended that Toon Air should improve forecasting and planning to ensure optimised levels of inventory, whilst ensuring that Toon Air are not overstocking or understocking critical spare parts. Advanced inventory management tools and techniques will need to be implemented which will require significant investment of time, resources and effort but will result in increased efficiency and reduced costs. This can be achieved by conducting an inventory analysis which includes strengths and weaknesses of the current system and identifies inventory levels, lead times, demand patterns and stock-out rates. The next step would be to define inventory policies to guide the process. The policies should specify the target inventory levels, re-order points and safety stock levels. An automated system should then be implemented which is able to track the inventory levels, re-order points, lead times and is able to generate reports and provide accurate, real-time visibility. The system should be integrated with a demand forecasting tool that will help to predict future demand patterns. The demand forecasting tool should be based on historical sales data, market trends, and other relevant data to help optimise inventory levels and reduce the risk of stock-outs. All of the above within the system should be monitored and the performance measured which includes KPIs that are reviewed regularly. KPIs will provide the company with visibility into its performance and help identify areas for improvement.

Robust purchasing procedures should be developed and implemented that will clearly define stakeholders' roles and responsibilities of all stakeholders. This will ensure that purchases are authorised and have a purchase order to assist with cost controls and tracking. A well-defined process can help Toon Air identify cost savings through better negotiation with suppliers, standardising procurement, and reducing inefficiencies in the process. The risk can be mitigated through the purchase of goods as it can be checked that the adequate insurance coverage is in place which complies with legal and regulatory requirements.

Toon Air should also consider establishing satellite stores for critical parts at the destination airports. Service levels will be improved as satellite stores located at or closer to the airports can ensure that essential spares are to hand which will help to minimise aircraft downtime during maintenance, increase aircraft utilisation, and reduce the cost of maintaining an excess inventory of spare parts. Inventory levels could be maintained more efficiently as it is possible to maintain lower levels of inventory than a central warehouse. Through implementing satellite stores the cost of transportation is also reduced.

Investment into training and development of employees at Toon Air should be undertaken, in particular in purchasing and materials management. This will enable employees to reduce the time and effort required to manage inventory, reduce errors as they will be aware of the correct procedures, and increased productivity.

Toon Air should carefully evaluate the option of outsourcing the management of parts warehouse and supply of parts to the engineering functions. The benefits and drawbacks should be identified, some benefits could include potential cost savings, improved focus on other objectives, reduced risk as responsibility is with others and they will have access to specialised skills that may not be available in-house. Some drawbacks could include loss of control, potential communication barriers, security concerns, and hidden costs. The company should evaluate the outsourcing provider's experience, expertise, and ability to meet its requirements.

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