



Engineering Management Leadership ACEA7006

Managing Inventory

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List of Abbreviations

- UK - United Kingdom
- MTO - Make to Order
- ATO - Assemble to Order
- MOTS - Make Order to Stock
- BOM - Bill of Materials
- ERP - Enterprise Resource Planning
- RFQ - Request for Quote
- PO - Purchase Order
- SLA - Service Level Agreement
- KPIs - Key Performance Indicators

Executive Summary

This report aims to provide professional consultation in purchasing and materials management to Toon Air, a small UK-based Airline. The company is facing increasing competition from its competitors, the company is striving to cut costs and improve efficiency, particularly in the acquisition, storage, and distribution of supplies, including spares and consumable items.

This report investigates the benefits of outsourcing the management of the parts warehouse and supply of parts to the engineering functions. The company will need to evaluate what performance measures need to be implemented for the outsourcing of the parts warehouse. Outsourcing can be beneficial, but it does carry risks, this report will provide recommendations for selecting and managing outsourcing partners and outlines key performances indicators to monitor the outsourcing company's performance and delivery.

The clear objective for Toon Air is to improve its efficiency, reduce costs and maintain / excel its competitiveness in the aviation industry.

1. Introduction

This report is a critic analysis on Toon Air which is one of the smaller UK airlines. Toon Air has been very successful in its niche market of operating regular flights within the UK and to Several Greek islands. However, over recent years several new low-cost operators (their competitors) have forced Toon Air into ways to cut costs and improving efficiency throughout. The company needs to pay care and attention to how the company operates, and to improve purchasing and materials management.

To make significant developments and improvements to Toon Air then it requires a thorough investigation. It seems apparent that the investigation has identified the company's purchasing and materials management has fallen way side. It is essential that Toon Air's acquisition, storage and distribution of supplies including spares and consumable items is heavily improved.

The investigation has identified that all spares are held centrally at a dedicated warehouse for Toon Air, however this warehouse is located 30 miles away from the nearest airport. The report highlights that the purchasing of spares was done by the engineers going direct to the suppliers rather than using the correct procurement routes via the purchasing department. The level of investment is very high, but much of this investment is unusable as there is a very high rate of technical obsolescence due to design changes and changes in aircraft regulations.

Toon Air should consider strategic methods to combat these issues and areas of concerns. One method could be to outsource the management of its parts warehouse and supply chain, by doing this then it has the potential to improve efficiency and cut costs. Outsourcing requires careful planning and management to make it effective, there can be downsides to outsourcing so these will need to be weighed up against the positives.

2. Question 1

Critically evaluate how the supply of spares to the end users can be improved?

The aviation industry is an extremely competitive and expensive industry, but it can be very lucrative if the company is managed and operated effectively. Toon Air only generates income and increases its turnovers when its aircrafts are in the air and not when they are grounded.

The author will be critically evaluating a variety of methods to ensure that the delay to supply of spares does not have a detrimental effect on the end users but to utilise and maximise their delivery of service.

The first notion to pick up on is the fact that Toon Air's dedicated warehouse is 30 miles from the nearest airport. This degree of distance is not feasible nor practical to maintain a high-quality level of service. It was stated in the brief that "The problem is that when spares are required at one of the destination airports, there are none available for on-site maintenance and there is often a considerable delay in getting parts to the respective airport".

The key component in any business to improve always comes down to communication, there needs to be clear lines of correspondence and communication between all parties, whether that is warehouse staff, on the ground staff, aviation staff in general all employees of the company.

2.1 Hub & Spoke and Point-to-Point Network Models

There a few ways to combat this problem, Toon Air could consider the 'Hub & Spoke' or 'Point-to-Point' models. The Hub & Spoke network connects every location through a single intermediary location called a hub. Point-to-Point network connects directly to a set of locations without interrupting services (e.g. pick up or drop off), even if the route may not be direct. As a network structure, Hub & Spoke allows greater flexibility within the transport system through a concentration of flows.

The Hub & Spoke network would be best suited to Toon Air as they can deliver global (Greek Islands), UK national and regional hubs. The main advantages for Hubs are:

- Economies of scale on connections – Offering a high frequency of services.
- Economies of scale at the hubs – Enable the potential development of an efficient distribution system since hubs handle larger quantities of traffic.
- Economies of scope in the use of shared transshipment facilities – This can take several dimensions, such as lower costs for the users as well as higher quality infrastructures.

However, it is worth noting that potential disadvantages may also occur, such as additional transshipment as fewer point-to-point services are offered, which may involve delays and potential congestion for some connections as the hub becomes the major transshipment point. (Jean-Paul Rodrigue, 2020).

Figure 1 provides an example of how they work, Point-To-Point network involves 16 independent connections, each serviced by conveyances (cars, trucks, planes, trains, ships) and infrastructures. By using a Hub & Spoke structure, only 8 connections are required.

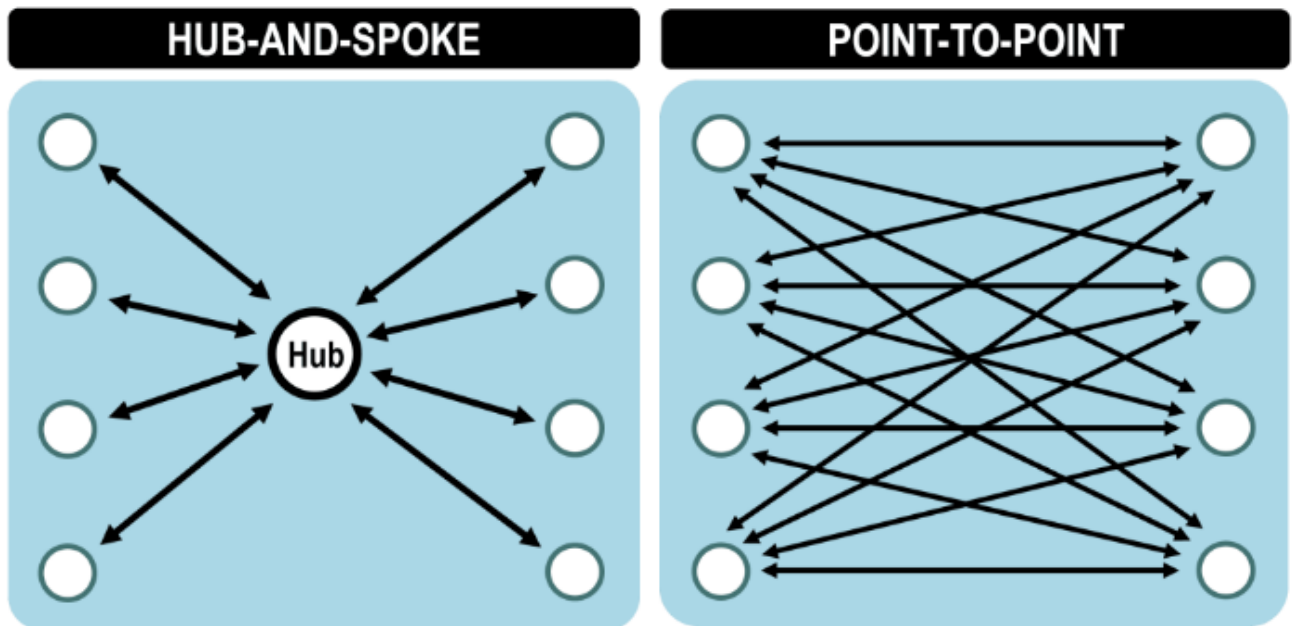


Figure 1: Hub & Spoke and Point-to-Point Model (Jean-Paul Rodrigue, 2020)

2.2 Inventory Management System

Toon Air's current inventory management system (reorder point system) appears to be inadequate and is resulting in a high level of technical obsolescence due to design changes and changes in aircraft regulations. The reorder point system is the minimum level of stock for a specific part or product, basically the company reaches a certain stock level then it activates the reordering of that particular part.

Reorder Quantity and Reorder Point Differences:

- Reorder level is the stock level of a specific product based on which order for new stock is placed. Reorder quantity is the number of units to be ordered while placing a new purchase order.
- Reorder level indicates when to submit a request for the new stock of goods and reorder quantity makes clear the number of goods to order.
- Reorder level is priority. There is need to evaluate stock levels of a product is above or below the reorder level.
- The main risk factor in reorder level is being out of stock, whereas the main risk factor in reorder quantity is the high cost per unit of the inventory ordered.

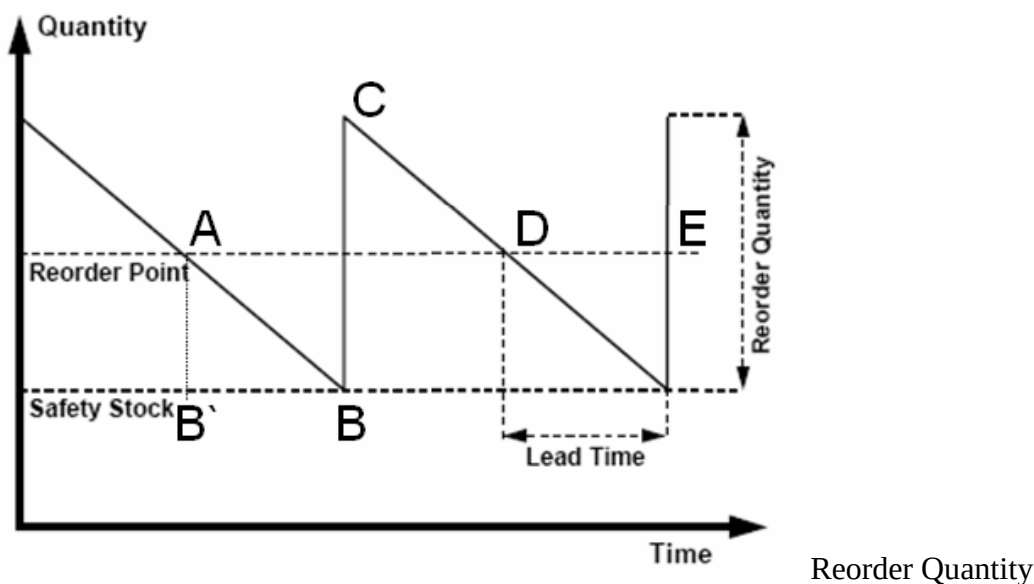


Figure 2: Overview of Reorder Point (Deskera, 2024)

A different approach could be utilising the Kanban model, this method consists of a visual signalling system that uses a card or other markers to indicate when to produce or reorder inventory. The Kanban inventory management system is a way to have only the minimum amount of stock on hand that is necessary at that particular time. This avoids purchasing more than you need and having to allocate space to warehouse the extra inventory.

2.3 [Moving Forward](#)

A possible solution for Toon Air to reduce and avoid delays in delivering parts & materials to their hub airports would be to hire or build warehouses near to certain airports, the chosen airports will be down to their location and accessibility. Understandably, as Toon Air is portrayed as a small aviation company then it might become problematic for them to fund such builds, they could consider rented space. It will not be feasible for Toon Air to have a warehouse at every location / destination so the most popular routes should be given high priority and also how central they are to other destinations.

2.3.1 [Creative Thinking](#)

Inventory Management is defined as the stored accumulation of material resources in a transformation system. There are many ways to determine the success of the inventory management system, influencing factors such as Make To Order (MTO), Assemble to Order (ATO) or Make Order to Stock (MOTS) should be heavily considered. Companies often decide to complete orders ahead of time, this is something that Toon Air should plan for.

- Make to Order – These are deemed as special or bespoke products. MTO response means that inventory will not be held either as part-finished or finished items.
- Assemble to Order – parts can be part-finished beforehand and then complete on receipt of the order. The stage of part-completion reflects the associated value inventory and process lead time reduction that results.
- Make Order to Stock – business is those that complete or purchase items ahead of demand and then meet orders from finished goods inventory.

Parts should be considered in advance, high preparation and planning is required to make sure smooth transition is achieved. Identification of the required parts at early stages will ensure less time is spent or wasted later. If Toon Air has financial backing power then it would be advisable to provide a new inventory system.

Maintenance of the inventory management system is essential, maintenance schedules such as planned or reactive maintenance should be carried out. By carrying out these maintenance tasks then there may be unused parts which can be used for potential breakdown failures. Utilisation of the Bill of Materials (BOM) will make ordering parts and placing orders automatically.

2.3.2 Enterprise Resource Planning

Enterprise Resource Planning (ERP) is a software system that will assist Toon Air to run its entire business, support automation and process niche departments such as finance, human resources, manufacturing, supply chain services and procurement (SAP, 2023).

There are many benefits to an ERP system:

- It assists in achieving lower operational costs.
- Boost efficiency by automating everyday activities.
- Provides exact current time data, true reflection of Toon Air's inventory.



Figure 3: Enterprise Resource Planning System (Projectline,2024)

2.3.3 Procurement & Purchasing

Procurement & Purchasing is an important cog in the company's wheel, in order for Toon Air to be successful then their procurement & purchasing department needs to be functioning at full capacity. All ordering of parts needs to be made through the supply chain. It is noted in the brief that Toon Air engineers are approaching suppliers directly, this should be prevented at all costs. The purchasing department will need to place all order of parts, this will increase control and transparency. There are clear chains for purchasing, there are the following:

1. Create a purchase order.
2. Send out multiples for quotation - Request for Quote (RFQ)
3. Analyse and select a supplier.
4. Negotiate contract and send PO.
5. Receive goods / Services.
6. Receive and check invoice (3-Way Matching)
7. Authorise invoice and pay the supplier.
8. Record Keeping
9. Purchase order closure

Figure 4 outlines the flow of a purchase order process.

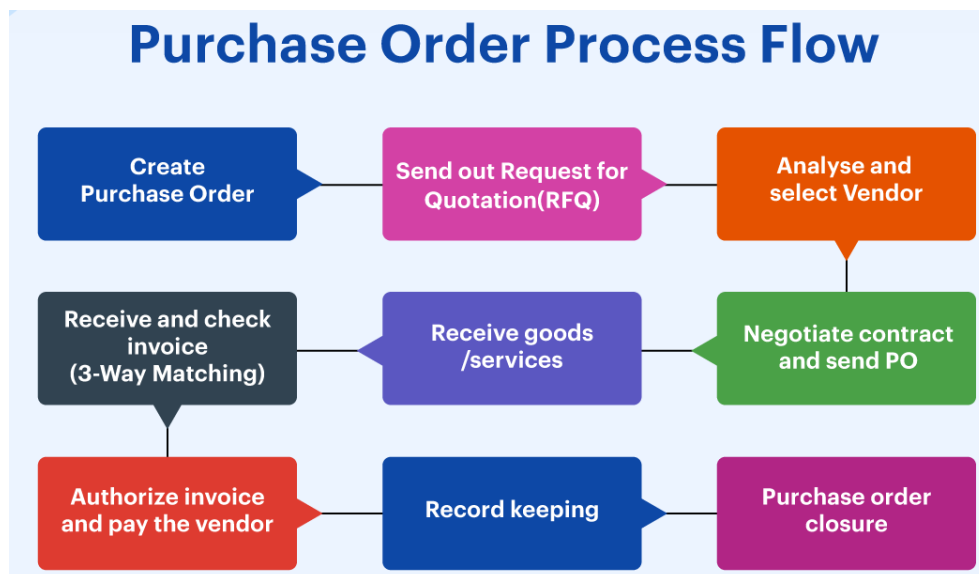


Figure 4: Purchase Order Process Flow (Kissflow,2024)

3. Question 2

The company is considering outsourcing the management of parts warehouse and supply of parts to the engineering functions. Advise, the company on what outsourcing involves and what areas would require special attention.

The author will be conducting research in outsourcing, and how outsourcing can benefit the management of parts warehouse and supply of parts to the engineering functions.

3.1 Outsourcing Background

Outsourcing was first recognised as a business strategy in 1989 and then became an integral part of business economics through the 1990s (Gallimore, 2022).

Outsourcing is the retention of responsibility for the delivery of services by an organisation but passing the responsibility for the day-to-day performance of these services to an external organisation, under a contract with agreed standards. Outsourcing involves contracting out a business function or service to a third-party provider.

3.2 Outsourcing Benefits

Outsourcing is a business practice that would be beneficial to Toon Air as it hires a third-party company to perform tasks, handle operations and provide specific services for them. There are many areas / departments in Toon Air that could be outsourced i.e. Customer Support, Payroll, Human Resource, Digital Marketing, Operating Staff but the area that requires the most attention is the management of the parts warehouse, by outsourcing this department then it will help to:

- Reduce and control operating costs.
- Improve Toon Air's drive and focus.
- Gain access to world capabilities.
- Free internal resources which can assist other departments.
- Accelerate re-engineering benefits.

Outsourcing the parts warehouse will take pressure of Toon Air so that they can focus on other areas of the business which might be struggling or falling behind. Outsourcing can bring many other benefits such as:

- Reduced operating costs.
- Increased capacity which leads to faster and more flexible supply.
- Reduced capital employed. By doing this then Toon Air can reduce their workforce which will provide huge cost savings.
- More accurate operating costings. This will allow Toon Air to put aside the capital required for the contract and then they can channel funds elsewhere more clearly.
- Greater focus on core business activities.



Figure 5: Advantages of Outsourcing (GaffersID,2023)

3.3 Outsourcing Process

Outsourcing involves a series of complex steps and mechanisms:

Need Identification

The process commences with a thorough assessment of the third-party company's internal capabilities and requirements. The identification of tasks that could be effectively outsourced is a crucial first step, in this instance then Toon Air will look to outsource the Parts Warehouse.

Selecting an Outsourcing Partner

Once then need is established, the company embarks on a quest to identify and select an outsourcing partner. This process typically involves conducting extensive research, soliciting proposals, and evaluating potential service providers based on criteria such as expertise, reputation, past performance, and cost-effectiveness.

Defining Scope and Requirements

A critical aspect of outsourcing is the clear definition of the scope of work. Both the client and the outsourcing provider collaborate to establish service-level agreements, expectations, performance metrics, and quality standards. These parameters form the foundation of the outsourcing relationship.

Transition Phase

Following the agreement on the scope of work, the outsourcing provider initiates the transition phase. This phase involves the transfer of knowledge, setting up infrastructure, and recruitment or training of personnel as required to ensure the seamless execution of outsourced functions.

Ongoing Management

The client company typically retains an active role in managing the outsourcing relationship. This entails regular communication, performance monitoring, and necessary adjustments to ensure that the outsourcing partner continues to meet the established standards.

Quality Control

Ensuring that the outsourced functions consistently meet the agreed-upon quality standards is a crucial component of outsourcing. Regular audits and evaluations help maintain the quality of the services provided.

Continuous Improvement

The relationship between the client company and the outsourcing partner is characterised by a commitment to continuous improvement. Both parties work collaboratively to identify opportunities for process optimisation, cost reduction, and enhanced efficiency (GraffersID, 2024)

3.4 Outsourcing Downside

Outsourcing can offer many benefits to Toon Air, however there can also be a few challenges and drawbacks too. There is a possibility that Toon Air could experience that the time and resources spent on devoting to manage those relationships rivals the resources devoted to the tasks that were outsourced, thereby possibly negating many, if not all, of the benefits sought by outsourcing.

Companies that outsource could also face heightened security risks, as they exchange with their third-party providers the company's proprietary information or sensitive data that could be misused, mishandled or inadvertently exposed by the outsource provider.

Additionally, Toon Air might encounter difficulties in getting their own employees to communicate and collaborate effectively with those working for third-party providers, this could relate to Toon Air if they appoint a company that operates overseas (TechTarget, 2024).

Toon Air could realise that they might lose control over aspects of the outsourced tasks or services, for example if parts become obsolete or discontinued then it will be down to the third-party company to make sure these parts are not used as it will be difficult to replace them. If the third-party company doesn't maintain the high standards of quality control as Toon Air then this will lead to customer complaints, potential refunds and damming the reputation it has worked so hard to achieve.

The disadvantages of outsourcing can be:

- No access to suppliers' expertise.
- No control over future price rises.
- Loss of in-house knowledge, perhaps irretrievably.
- Loss of quality control.
- Under-utilisation of in-house assets.
- Risk of continuity of supply.

- The cost and difficulty of managing the supplier.
- Risk of commercial secrecy or confidentiality.

Figure 6 below illustrates an extensive list of disadvantages to outsourcing.



Figure 6: Disadvantages of Outsourcing (DevonSoftware,2024)

3.5 Outsourcing Outcome

Following on from reviewing the positives and negatives about Outsourcing then the advice would be for Toon Air to heavily consider outsourcing the parts warehouse management. Due care and attention should be considered on what third-party they should enter contract with a comprehensive contract will need to be agreed by all parties, the contract will need to outline expectations, terms and conditions on payment, performance measures and should leave all parties feeling satisfied. Toon Air will need to have reassurance that the third-party company has expertise and a wealth of experience in supplying parts. The supplier selection must be rigorous and include supplier appraisal, tender process or negotiation is based on a specification, the outsourcing partner should agree to appropriate terms and conditions, including means of termination.

4. Question 3

Evaluate what performance measures would need to be implemented for the outsourcing of the parts warehouse.

The author will be evaluating a variety of methods to highlight what performances measures should be in place to ensure that the outsourced third-party company is performing accordingly.

4.1 Service Level Agreement

Driving home performance measures is critical to ensure the success of outsourcing the parts warehouse management. To effectively manage the outsource arrangement, companies generally put in place a Service Level Agreement (SLA) and performance metrics.

An SLA is a key part of a contractual agreement between a customer and a supplier to identify upfront performance (i.e. service) levels expected. This is a legally binding contract. Potential suppliers will have to first qualify by meeting those criteria and / or performance expectations defined in the SLA before they are given proper consideration. (Mangan, Lalwani, 2008).

An SLA will need to agree between Toon Air and the third-party outsourcing company, specific terms and conditions such as level of service, performance measures and actual stock records will be included in the contract. The outsourcing company will be monitored regularly to ensure they are performing under the SLA.

4.2 Performance Measures

Performance measures are often used to increase the competitiveness of and profitability of companies through the support and encouragement of productivity improvements. The performance measure that are reviewed are compared in terms of how easily they are derived from strategic objectives, how easy they are to understand and whether they help form a long-term view of performance. (emerald insight, 2024).

Performance measures in outsourcing to Toon Air will aid controls of operations, the performance measurement can lead to performance improvement, individual managers can be motivated by a requirement to achieve key performance indicators (KPIs), performance measurements are an important tool for communication with stakeholders and performance measurements are vital for accurate business planning. As well as evaluating supplier performance, the nature of the relationship with the supplier must be evaluated. Evaluation of the supply relationships strength will be guided by the initial objectives established for the outsourcing process.

There can be downside to performance measures such as it is a complicated task to establish a suitable performance measurement system, a performance measurement system takes time, money, and labour to operate. The need for managers to achieve their own KPIs can lead to dysfunctional behaviour i.e. it's not always going to be popular with all employees and lastly too many KPIs can lead to information overload.

4.2.1 Performance Measures and Metrics

An operations strategy that influences the performance of a supply chain, has become an important component of global operations management. An effective global sourcing strategy helps companies (Toon Air) to manage the flow of parts and finished products in meeting the needs of overseas and domestic markets. Outsourcing reduces the cost of assets, facilitates core competencies to reduce reduction costs, lead to strategic flexibility and reduces administrative and overhead costs. (Kakabadse and Kakabadse, 2005).

4.3 Managing Performance

Toon Air should desire to keep precise inventory records, this will guarantee the availability and Just in Time of the appropriate parts. It is essential for the outsourced company to provide accurate inventory information at given times, this will deem to show how well the parts warehouse is being managed. One of Toon Air's objectives for outsourcing is to reduce costs, and improve delivery service to customers, after all without customers then Toon Air will be no longer be able to trade.

Toon Air will need to conduct regular audits of the outsourced company, this will assist Toon Air to have accurate readings of inventory count and storage of parts. Quality control measures should be implemented to assess the outsourced company's ability to meet quality standards for the stored parts. Key stakeholders such as customers, shareholders, employees, suppliers. Regulators and pressure groups need to be well advised of the outsourcing company.

Customer satisfaction is essential for Toon Air's continued success, they pride themselves on being a small UK airline that delivers high standards and expectations. Toon Air will need to have regular reviews with the maintenance engineers, aircraft staff and the parts warehouse outsourced company. Toon Air can carry out customer satisfaction surveys, monitor regular uses and customer retention rates.

Measuring the percentage of customers who place additional orders is an efficient way to track repeat business. Similarly, customer retention rates can be evaluated by measuring the percentage of customers who continue to do business with the company over time (Somnath Lahiri, 2022).

The driving point for Toon Air is to minimise aircraft downtime and increase aircraft utilization, reducing lead times is essential. Toom Air will need to measure the average lead time for parts delivery and collaborate with the outsourcing company to continually enhance this metric. The SLA will need to be review so that the outsourced company is fulfilling their agreement.

5. Recommendations

This report recommends that efficient management of parts and supplies is essential to make sure that Toon Air operates at full capacity and maintains their high standards of service. Throughout this report it has highlighted the advantages and disadvantages of outsourcing, it would be fair to say that the advantages come on top, however it should be mentioned that outsourcing does involve risks but if there is strategic planning with management then the risks should be acceptable.

Toon Air should consider outsourcing the management of its parts warehouse and supply chain, by doing so then it could potentially significantly improve the efficiency of service and reduce / cut costs.

Toon Air will need to carry out due diligence in selecting the most suited outsourcing company, they need to develop robust service level agreements, and monitoring performance to ensure that the outsourcing partner is delivering and hitting their objectives. The SLA should state exactly what Toon Air wants to achieve out from outsourcing the management of its parts warehouse and supply chain, they should state exact roles and responsibilities of all staff which includes training, chain of command and open line of communications.

Lastly, to continue Toon Air's success, then then all parties involved in the company and outsourcing partner should embrace a culture of delivering high standards, continual improvement in all departments, to ensure that the materials management function is constantly moving forward, all stakeholders and shareholders need to well informed, and feedback should be encouraged.

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