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DEVELOPMENT OF A METHODOLOGY FOR DETERMINING THE NEED FOR SPARE PARTS IN CAR SERVICE COMPANIES

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ANNOTATION

Balancing the proper service level is an important aspect in this field. It can be argued that for some spare parts, the effect of stock out will significantly be more financially remarkable than "normal" SKUs, and thus has to be considered thoroughly. The intermittent demand coupled with the importance of balancing the service level, makes the planning of spare parts very difficult. In our experience, many production companies struggle to manage their spare part inventories sufficiently due to the high complexity and thus many unnecessary costs are allocated to this area.

Key words: production companies struggle to manage, outmost critical, and might

INTRODUCTION

Managing the spare parts in a proper way, enables companies to maintain a high service level without unnecessary high inventory cost. However, intermittent demand patterns are often characterizing spare parts, having periods of zero demand, with occasional periods with non-zero demands and in addition can be highly variable in quantity size. Furthermore, companies must recognize that some spare parts can be outmost critical, and might have stock-out costs that are disproportionally high compared to the value of the item.

Balancing the proper service level is an important aspect in this field. It can be argued that for some spare parts, the effect of stock out will significantly be more financially remarkable than "normal" SKUs, and thus has to be considered thoroughly. The intermittent demand coupled with the importance of balancing the service level, makes the planning of spare parts very difficult. In our experience, many production companies struggle to manage their spare part inventories sufficiently due to the high complexity and thus many unnecessary costs are allocated to this area.

However, researches have showed that spare parts and related after-sales services accounted for 8% of the US Gross Domestic product (GDP) in 2008 – which illustrates a huge area of spending and revenues for companies, and is thus subject for great effects. This article suggests an approach for managing spare parts more efficiently by aligning supply and demand in regards to maintaining the required service level, but still keeping inventories at a minimum in order to minimize the total cost. Furthermore, it presents a business case from a large global production company where this approach

was applied. Not surprisingly, the economic benefits were significant.

Why are spare parts so special?

It is important to stress that spare parts have different factors and variables affecting them compared to those of "typical" SKUs like finished goods, and thus have to be managed differently.

Companies have often not the competence and knowledge on how to evaluate each spare part, for the purpose of determine what the inventory levels should be – this lack of transparency will eventually lead to costly overstocking, or insufficient service levels. Also, it should be stated, that some of the traditional inventory management tools cannot be applied in this context, e.g., JIT (just-in-time) and ABC analysis for finding most profitable item (e.g. profit per unit/no. of picks).

One of the main problems with the management, forecasting and control of spare part components is due to their lumpy demand characteristics. In the case of spare parts, the demand arises whenever a component fails or requires replacement, and as such it is different from that associated with a "typical" stock-keeping unit. In other words, this type of demand could be characterized as "intermittent", which means that demand arrives infrequently and is dispersed by time periods with no demand at all, and can thus be extremely sporadic. The complexity of spare parts might stretch even more due to the high variability in quantity, size demanded.

Furthermore, spare parts have many factors/variables affecting the way to manage them – there is a huge difference in the level of criticality of the spare parts, some are much more critical than others and might have stock-out costs that are disproportionally high compared to the value of the item. And moreover, items of very low value can be outmost critical for the operation. In many cases, slow-moving and intermittent items will be made-to-order MTO), and thus the lead time might be very long.

Companies must recognize that spare parts often are "specific to employ", which means in most cases spare parts have to be employed only for the specific use and the function for which it has been purchased. This might lead to the risk of accumulating large holdings of obsolete stock that you would not be able to use.

Due to the intermittent nature that characterizes many spare parts, "normal" forecasting principle and techniques may be inapplicable and inaccurate, and thus alternative methods will have to be utilized. This also holds good for the performance measurement tools used for measuring intermittent item.

Often companies have several thousand spare parts to manage, and all of these should obviously not be managed in the same way. Without a structured management approach, it would be extremely difficult to do.

Framework for approaching management of spare parts

The suggested approach for managing the spare parts properly consists of three steps: (1) determining input variables, (2) segmentation, (3) optimization. These steps are illustrated in figure 2, and will be elaborated in the following. It is important to underline that

these steps should not be considered autonomously, but in derived conjunction as illustrated.

1. Input variables

The input variables enable a specification and differentiation of the spare parts, for the purpose of a differentiated management approach. A segmentation/classification enables better decision-making towards each spare part, and thus less unnecessary cost.

The input criteria for the specification and categorization of the spare parts into homogeneous groupings have to be chosen, with the focus on differentiating the forecasting and inventory approach, and thus the criteria have to be chosen according to this. The input variables that need to be considered are: criticality, demand characteristics and supply condition.

Spare part criticality

The criticality is a very important aspect in spare parts management. Obviously, not every spare part is equally important, and should thus be managed accordingly. Spare parts that are crucial for the production to operate will need to have a higher service level requirement and thus larger safety stock, than spare parts of lesser importance. In theory, the criticality is not very difficult to calculate, as it is based on only two variables: the cost of understocking and the cost of overstocking.

In practice however, it will in most cases be impossible to calculate the exact cost of having one unit too little and one unit too much on inventory. In practice, it will often be enough to make qualified subjective assessment of a few degrees of criticality, e.g., highly critical, moderately critical and low critical.

- Highly critical:
- Highly critical spare parts are those, which are absolutely essential for mission success.
- Moderately critical: Moderately critical parts are such that if they are out of stock at the time of demand, it will have only a moderate effect on mission success.
- Low criticality:
- Low criticality parts are not absolutely essential for mission success.

Demand characteristics

The actual characteristics of the demand, is another area that needs to be considered. As stated, spare parts can often be characterized as having very intermittent and lumpy demand patterns, having periods with zero demand, with occasional periods of non-zero demand.

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