SUPPLY CHAIN STRATEGIES TO MANAGE FASHION PRODUCT IN APPARELS

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Summary:

One of the major supply chain challenges for companies dealing with fashion products is to ensure operational efficiency at competitive cost while possessing a large product variety. By using a global apparel manufacturer as a case study, this project proposes a decision making model that optimizes the amount of variety to introduce each year in order to effectively manage the trade-offs between higher product variety benefits and lower operational costs.

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KEY INSIGHTS

1. To pursue different strategies for different brands
2. Higher profit margins can be realized if the overall SKU's or variety is reduced
3. By re-negotiating the supplier contracts on raw material MOQ requirements and surcharge costs, net profits can be further increased

Introduction

The concept of intimate apparel has evolved in terms of meaning as well as function over the recent decades. Technical advances in the field of manufacturing has led to remarkable increase in product variety in terms of styles, designs and fabrics. Lingerie or intimate apparels are now marketed as a 'fashion product' opposed to its earlier notion of a basic support function as an undergarment (Tsarenko & Mavondo, 2008). There is tremendous amount of uncertainty and variability associated with fashion products in terms of consumer demand, upcoming fashion trends, consumer purchase behavior and short product lifecycle. In response to such complexities, fashion companies introduce a wide variety of products every fashion season or six months to reach out to a wider customer base thereby hoping to improve their market share and remain globally competitive. However, owing to short product life, these fashion products are at a high risk of obsolescence and thereby it is a challenging task to ensure operational efficiency while maintaining a high variety. Due to this reason, in operations and supply chain, higher product variety is often associated with diseconomies of scale and higher production cost. In addition, the SKUs introduced every fashion season comprising variation in style, color and size, increase the total number of SKUs exponentially. This increase in SKUs has a high impact on inventory and when coupled with the short product cycle poses a huge obsolescence risk. Therefore, to effectively manage variety, decisions are required at different organizational levels. The negative effects on the costs by the increase in variety can be mitigated by these decisions along with defining clearly the variety constraints a company can deal with (Caridi & Cigolini, 2010). The objective of this project is to propose a decision making model that helps to determine:

1) How does cost and revenue trade-offs created by product variety impact the net profitability of a firm?
2) How does MOQ and surcharge costs impact the net profits and the subsequent decision making process on the amount of product variety to offer to its customers?

Methodology

The data collected from the sponsor company was analyzed to determine the product variety that was offered by four selected brands in three consecutive years. In the research, product variety is being measured in the form of number of colors, styles, greige and SKU's that are introduced every year in the supply chain.

Initial findings: The company introduced 40+ unique varieties in color alone in the year 2016 and faces a major challenge on the supply chain side to manage this high variety across brands. The company experienced high raw material liabilities at the end of

each fashion season owing to uncertainty in demand, long lead times of approximately six months and the small order quantities not meeting fabric MOQ, which together resulted in increased overall operations cost. Therefore, from the above findings, it was evident that obsolete raw material inventory which is dependent on fabric MOQ and surcharge cost/100 meters fabric order below MOQ levied by the supplier, was critical and required better management.

The Model

A model spreadsheet was designed to calculate the expected net profits/SKU for two brands 'D' and 'P', given the demand data for the year 2016. The demand was distributed in six production orders spanning over an year and on the basis of the fabric required per color and greige per order, raw material was calculated by the model. Again, the raw material ordered was dependent on the MOQ constraint, resulting in either ordering in excess or the exact amount with the surcharge cost. At the end of six production orders, total fabric liabilities were calculated which were then subtracted from the revenues to arrive at expected net profits/ SKU. In the final solution, the model removed SKUs that yielded negative net profits at the end of the year, giving the ideal number of SKUs to be produced.

The Analysis

The analysis was performed in two phases:

PHASE I

Sensitivity analysis: Keeping the model as base, sensitivity analysis were performed to study the impact on net profits by varying two parameters i.e. fabric MOQ and surcharge cost per 100 meter of fabric order below MOQ.

Figure 1: Net profits Vs varying MOQ

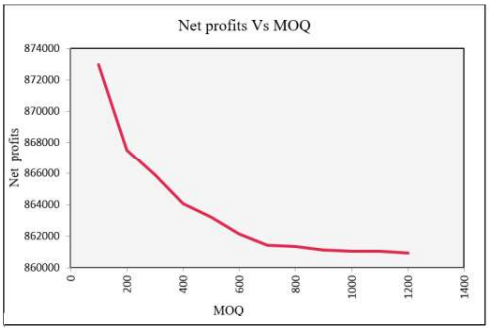
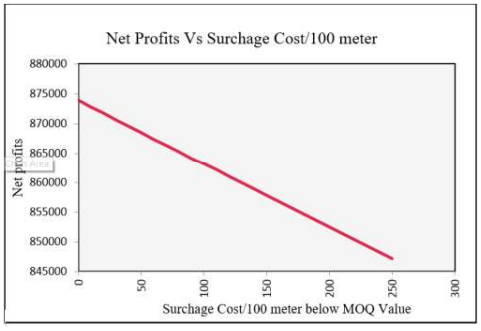


Figure 2: Net profits Vs Surcharge cost/ 100 meter fabric below MOQ



Findings: From Figure 1, MOQ is inversely proportional to net profits. This is because the volume per SKU remained unchanged while the MOQ increased and hence, material liabilities also increased, thereby decreasing the net profits. Secondly, there is an inverse linear relationship between the surcharge cost and the net profits for the two brands. Also, since the slope is very steep in Figure 2, it was also concluded that surcharge cost clearly had a more pronounced impact on net profits than MOQ.

Further, a consolidated analysis of varying MOQ and surcharge cost for the two brands were performed. Every point in the below figures represent the expected net profits for the combination of MOQ value and surcharge cost.

Figure 3: Net profits Vs varying MOQ and surcharge cost for 'D'

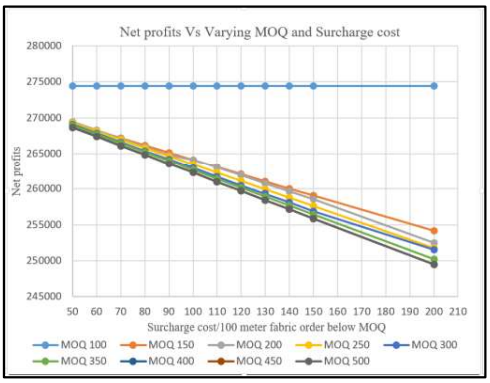
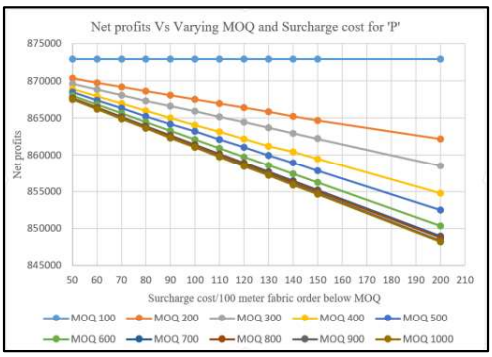


Figure 4: Net profits Vs varying MOQ and surcharge cost for 'P'



Findings: With MOQ of 100, both brands showed constant maximum profits as surcharge cost is not applicable at this point. For brand 'D', net profits were not significantly affected by varying the MOQ at different surcharge costs. However, for brand 'P', significant net profits could be realized for the same.

PHASE II

This phase discusses the results of the model that was developed and the subsequent new approach adopted to further refine it.

The model results are summarized in Table 1.

Table 1: Results of Model formulation

	Present scenario		Model solution	
Brand	SKU	Net Profits	SKU	Net Profits
D	76	262262	70	264207
P	88	861044	84	862653

*Net Profits is in Euros

Therefore, by removing SKUs giving negative profits, an increase of 1% in total net profits was realized for the respective two brands. However, the solution still had a fair number of SKUs that were contributing very less in total net profits but were positive and hence, were kept in the solution.

Also, with the above model solution, the demand for the products that were now not being manufactured due to negative net profits was also lost. In the real world, this demand could either be lost completely due to unavailability of the desired product or it may get transferred among other available SKUs. Therefore, another approach was adopted where a new model was developed namely,

Demand re-distribution model: At first, Pareto graphs for the selected brands 'D' and 'P' were plotted to understand the contribution of each SKU towards net profit. It was observed that 80% of the net profits were generated by only 40% of the SKUs.

Further, the least profitable SKU's were removed and their demands re-distributed among remaining SKU's. This exercise was repeated to observe the impact on net profits every time by removing various sets of existing SKUs.

Also, the impact of varying MOQ on reduced number of SKUs was measured while the surcharge cost was kept constant at 100 Euros.

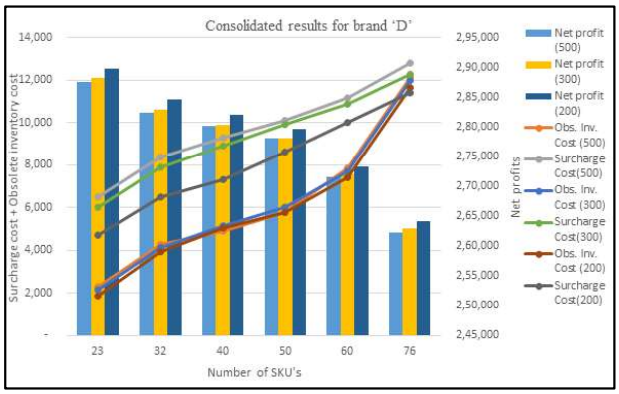
Model assumptions: While re-distributing the demand, it was assumed that the demand was 100% retained for the SKUs that were not being manufactured because of negative profits. And hence, their demand was re-distributed among the top performing SKUs that were of the same product price or closer in unit value.

Therefore, the model represents the best case scenario i.e. no demand was lost when product variety or SKUs were reduced.

Later, the results achieved from phase I and II were compared to look for differences and similarities to arrive at common results and recommendations.

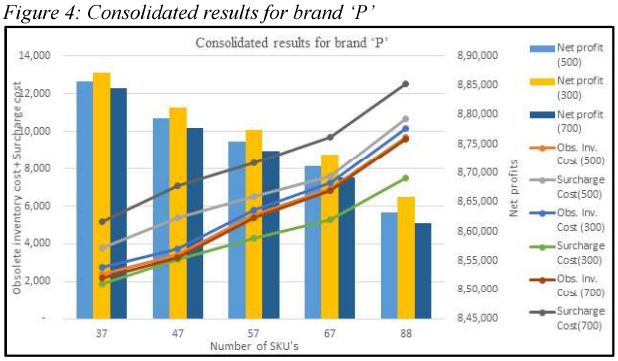
Results

Figure 3: Consolidated results for brand 'D'



- Keeping the number of SKU's constant, there were no significant increase in profits when varying the MOQ alone, especially from 500 to 300. However, MOQ 200 yields highest profits throughout because the current order quantities for this brand best satisfy the MOQ 200 requirement thereby resulting in comparatively lower material liabilities at the end of the year.
- Impact of MOQ on net profits was not affected significantly by the number of SKUs and hence these two approaches could be pursued independently
- Obsolete inventory followed the same declining trend with varying MOQ as the number of SKU's were reduced. However, a sharp decline could be observed when the SKU total was reduced from 76 to 60. This behavior could be explained by the fact that at 76 SKU's, the last 20% had very low volumes and contributed the most in terms of obsolete inventory cost. Also, from Table 1, it was concluded that the optimal quantity to produce is 70 as the rest 6 SKU's gave negative profits.
- The rate of decrease of surcharge cost was same throughout. However, a lower MOQ of 200 resulted in reduced surcharge cost

Figure 4: Consolidated results for brand 'P'



- As observed in case of 'D' brand, for brand P as well the net profit margin increased as the total number of SKU's reduced with the increase being fairly linear
- MOQ of 300 is most favorable for this brand as maximum net profits can be seen irrespective of the number of SKUs being produced at any given point in time. This is because the current order quantities best satisfy the MOQ 300 requirement, hence, yielding lowest material liabilities at the end of the year
- It was observed that the surcharge cost could be sharply reduced at MOQ 300 compared with the current MOQ of 500 i.e. keeping the total number of SKU at 88, surcharge cost was reduced by 3200 euros at MOQ 300
- In case of obsolete inventory, behavior was similar to brand 'D'. Obsolete inventory followed a declining trend with not much significant difference made by the varying MOQ
- Unlike in the case of brand 'D', here both the costs i.e. obsolete inventory cost and surcharge costs reduced drastically when the least profitable 20% of SKU's were removed

Conclusion

The key takeaway from this research is to pursue different strategies for different brands. Taking que from the two brands studied, it was observed that they behaved differently under same constraints of MOQ and surcharge costs. This was attributed to the differences in the brands demand, fabric

requirements for production, unit product cost and the amount of variety introduced per brand.

However, one thing that held true for both the brands was that higher profit margins could be realized if the overall SKU's/ variety were reduced. It was evident that having higher variety with low volume per SKU resulted in higher material liabilities at the end of the year in the form of surcharge cost and obsolete inventory cost.

Based on the results achieved in the research, it is concluded that by reducing approximately 20% of SKUs from each of the brands 'D' and 'P', net profits were increased by 3.5% and 1% respectively. Further, if the company is able to re-negotiate supplier contracts on reducing the MOQ requirement and surcharge cost, more savings can be realized. Keeping in mind that these are fashion products and it is very challenging to forecast the demand, these products are expected to always have lower order quantities compared to functional or basic products, however, by reducing the number of SKUs or variety by less than a quarter, interests of both, the marketing and supply chain teams can be aligned to a common goal i.e. to maximize profits with lower operations cost and at the same time offering enough product variety to attract the masses.

Recommendations

The decision regarding the amount of variety to offer for a product should be dependent on:

- Company's business strategy and vision regarding the products, i.e. does it want to capture the market irrespective of the costs or does it want to focus on reducing its cost and improve efficiency
- The amount of variety the organization can handle efficiently

Further, a minimum order quantity could be set for the customer per SKU to avoid taking very low volumes for certain styles as these are expected to end up costing more in the future. In cases where the volumes persist to be low for a few SKU's, then those SKUs should be marketed at a higher price than the rest, accounting for some cost of the obsolescence inventory expected in the future.

Lastly, for a portfolio of products, the companies should try share resources like raw material amongst products as much as possible to leverage on economies of scale. For e.g. in case of the sponsor company, sharing the greige between brands would help to meet the higher MOQ and better price negotiations for the fabric with the suppliers.

References

Caridi, M., & Cigolini, R. (2010). Modelling the allocation of protective capacity to design unbalanced production lines. *International Journal of Manufacturing Technology and Management,20 (1–4)*, 59–74.

Tsarenko, Y., & Mavondo, F. (2008). Psychological, product-related and situational influences in purchasing intimate apparel. *American Marketing Association*, 154–160.