Filatoi Riuniti Cost Expenditure Reduction Executive Memo

We at Milan Consulting Group Inc. (MCG) have proceeded with our cost analysis and optimization for Filatoi Riuniti following a review of the production and transportation costs of our current operations. We have concluded that Fialtoi should proceed with improving the outsourcing of their production to the six local spinning mills of Ambrosi, Brescia, Castri, De Blasi, Estensi, Giuliani, and our own production centers, hereafter denoted as A, B, C, D ,E, F, and G. In our optimized model, we found that Filatoi could reduce their monthly expenditure down to $1,382,544 in addition to the $200,000 in expected savings from our previously discussed measures including reducing machine down time through improved inspection strategies, differential scheduling of machine maintenance, and different management of overtime on production shifts.

Our results found the optimal outsourcing strategy to be the following:

Ambrosi	- 6,250 Kg/month of Fine Yarn
Bresciani	- 4,286 Kg/month of Extrafine Yarn
Castri	- 3,704 Kg/month of Extrafine Yarn
De Blasi	- 2,040 Kg/month of Medium Yarn
Estensi	- 3,846 Kg/month of Extrafine Yarn
Filatoi R.	- 13,164 Kg/month of ExtraFine Yarn
	- 19,750 Kg/month of Fine Yarn
	- 18,817 Kg/month of Medium Yarn
	- 28,000 Kg/month of Coarse Yarn
Giuliani	- 7,143 Kg/month of Medium Yarn

With this optimized strategy, we can meet our current market demand for Extrafine, Fine, Medium, and Coarse Yarns of 25,00 Kg/month 26,00 Kg/month, 28,00 Kg/month, and 28,00 Kg/month respectively as derived by the marketing and sales manager at Filatoi, Sofia. This takes into account the operating capacity of each mill by ensuring the total amount produced at each mill of each type of yarn based on the amount of time spent per hour per Kg of yarn falls within their maximum available capacity of machine hours. These production capacities, again given in machine hours per month, were calculated by our associate, the plant manager Roberto.

Previously, of the total 104,500 Kg of yarn demanded of Filatoi, 32,000 Kg per month was outsourced to the six local mills. Of this yarn, all 29,000 Kg/month of Coarse Yarn were outsourced, as well as 13% of the Medium Yarn. In the upcoming month, we expect demand to drop slightly to 107,000 Kg/month, with our optimized strategy dividing all types of yarn among the 6 locals mills, as well as maintaining a level of in house production, in contrast to Filatoi's previous stance of maintaining production of all Fine and Extra Fine yarn. Previously demand had been met by using the lowest priced mills to the maximum of their capacity, which led to sub-optimal outsourcing decisions, having optimized only one decision at a time, as opposed to

optimizing all outsourcing simultaneously. Our models were as follows:

Our Objective function is the sum product of the **(product bought from each supplier in Kg/month * cost of production in dollars/Kg) + (product bought from each supplier in Kg/month * cost of transportation in dollars/Kg)**

Our calculation for the constraints of each mills operating capacity were the sum product of **all levels of yarn produced at a given mill * machine hours at required per level of yarn at a given mill**

Given this information we propose the above mentioned breakdown of outsourcing various levels of yarn production to the 6 local mills, having taken into account the optimization for all variables simultaneously. Please see below for our breakdown of possible future scenarios.

Case Study Filatoi Answers

Question A) - Our Objective function is the sum product of the **(product bought from each supplier in Kg/month * cost of production in dollars/Kg) + (product bought from each supplier in Kg/month * cost of transportation in dollars/Kg)**

Our calculation for the constraints of each mills operating capacity were the sum product of **all levels of yarn produced at a given mill * machine hours at required per level of yarn at a given mill**

Our calculation for the constraint of each level of yarns demand came directly from the **Demand To Meet** table and is given in Kg/month, seen here:

Extrafine	Fine	Medium	Coarse
25,000	26,000	28,000	28,000

Question B) - See excel Solver File

Question C) - No, we would not recommend renting the upgrade. The shadow price for Filatoi's machine hours is -2.117647059, this times 600 is roughly −$1270.588, or around $1270.59 in savings. These savings do not make up for the rental price of $1600.

Question D) - Yes, we would recommend renting the extra machine for medium only yarn at a rental rate of $3000. The machine can produce 300 more hours a month, the current cost is $11.40/Kg and the reduced cost of the new machine would be only $5.70/Kg, this means that each Kg of yarn would save Filatoi $5.70. The machine operations at 0.425 Hours/Kg, so the additional production would be (300/0.425) = 705.88 Kg a month. 705.88 * 5.70 = $4023.52 in savings per month. These savings are greater than the cost, with Filatoi reducing their costs in total by $1023.52 per month. The allowable increase for medium yarn is 5388.445977, meaning this extra increase in quantity could be met by demand.

Question E) - The absolute minimum Filatoi could charge would be **$73,800 for 6000/Kg** of yarn, though this would not provide any profit whatsoever as this would just meet the shadow price of 6000 additional units of yarn. The shadow price being $12.30 means each additional unit of yarn costs **$12.30** to produce and make available for purchase, the company would charge a higher price than this however with the expectation of making a profit.

The maximum allowable increase in production of medium yarn however is only **5388.445977**, meaning that at most they could sell the client **5388 Kg/month** using a tiered pricing structure, in which case we would re-run our optimizer with a new demand for medium yarn of 34000 Kg/month, finding a new shadow price of **$13.76** and selling the remaining **612 Kg/month** at this price. This would amount to (5388 * $12.30) + (612 * $13.76) = $66,272.40 + $8,421.12 = **$74,693.52**. This total price however could be given as a fixed price by dividing the total cost of $74,693.52 by 6000 units, leading to a per unit price of **$12.45**, avoiding the need for a tiered

pricing structure, while having the exact same result on Filatoi's expenditures but reducing the complexity of the transaction.

We would need to ask the client if they are willing to pay this tiered pricing or the higher constant per unit pricing for the complete order of 6000 Kg/month, or if they would be willing to accept just the 5388 Kg/month at the base price of $12.30. As well, this price would **only break even** on Filatoi's costs, in reality, no company would be willing to break even on a sale and a profit would need to be earned. For example, to earn a 10% profit margin, Filatoi would need to sell this order to this new client at a cost of **$82,162.87**, which would amount to selling all 6000 Kg/month at a fixed price of **$13.70**.

Question F) - When accounting for the 5% range of possible increases or decreases in filatoi's production costs, we considered the worst case scenario of a 2.5% increase in production costs and found very little change in our optimized solution. For this reason we would not change our recommendation. The actual distribution of production for each of our outsourced mills did not change, with the only difference being an increase in costs of $24,463. This is not a significant amount in terms of Filatoi's overall profits, with their yearly profits coming in around $15,000,000 according to the historical data. This would only be a 0.1667% decrease in their overall profits. Along with that, the shadow price of each type of yarn changes by a very small amount in Fine and Extra Fine yarn, remaining constant for Medium yarn, and actually decreasing slightly for Coarse yarn ever so slightly.

Question G) - Again we do not recommend changing our recommendation. Even considering the highest extreme of a 10% increase in cost of production at the De Blasi yarn mill, our expenses only increase by around $2000 dollars, basically a non-issue given our previous yearly profits of $15,000,000

Question H) - The total expenditure to Filatoi with Ambrosi being able to produce fine yarn is $1,382,544 per month. If they cannot produce fine yarn, then the expenditure rises to $1,384,912 per month. This would be a loss of $2,368 per month for Filatoi. The one time cost in this month could potentially be taken on fully by Filatoi up to a cost of $28,416, as the yearly loss to us would be a total of $28,416 (2368 * 12). If the ramping up cost were any higher than that, any extra expenditure would need to be taken on by Ambrosi to be worth Filatoi investing in this.

Question I) - Our model did change, all of the production orders previously given to De Blasi have been moved to Giuliani. While the cost of production is higher due to the overtime rates, the savings gained in the lowered transportation costs more than make up for the initial cost in per unit production.