|  |  |
| --- | --- |
| Applichem | November 8BUAD 6600 |
| **SCMers**Meagan Frances AyersJames FranksEmelie HallJean-Hubert Trahan | Instructor: Sachin Modi |

**Objective/Scope**

The purpose of this article is to determine whether or not Applichem should keep their production of Release-Ease within their current plants or move production to another location. This new location would be one, or more, of Applichems’ production locations including: Gary (Indiana/USA), Mexico, Frankfurt (Germany/Europe), Sunchem (Japan). To determine this, a cost analysis must be conducted to verify the benefits of keeping production of Release-Ease in their current locations, or moving production to another location. When determining the cost benefits, transportation and production cost differences must be considered.

**Recommendations**

Through careful analysis, it is recommended that Production of Release-ease be maintained in Gary, Indiana. Instead of abandoning the Gary production facility due to its lack of production efficiencies, measures to improve the facility should be implemented.

Ceasing production of Release-ease in Japan is also recommended. Although the plant in Japan is more technologically advanced, its high production costs and low productivity levels are valid reasons for eliminating the Release-ease production lines. It is recommended, however, that the plant continues its current production of the other product it manufactures. The plant will also be useful in conducting R&D for other Applichem products.

Changes in the production volumes among the various plants are also recommended. These changes will increase production to full capacity for some plants while reducing transportation costs.

**Analysis**

*Cost Analysis*

The first observation that can be made about Applichem’s current production is the amount of excess capacity that could be used in its Frankfort, Gary and Mexico plants. (Exhibit 2) Import duty costs, as well as, important transportation costs have to be minimized in order to optimize efficiency of the manufacturing. Three different analyses were performed to evaluate the costs of manufacturing; if Gary was shutdown (Exhibit 3), a cost optimization was calculated (Exhibit 1), and status quo was maintained (Exhibit 2).

At the current level, it costs Applichem $83 million to produce and ship its worldwide production. To shut down Gary, every other plant would have to be used at maximum capacity and total costs would increase by $4 million per year if demand stayed constant. The cost optimization analysis suggested that the Japanese plant should not be used to manufacture the Release-ease product. The cost decrease generated by the plant closure would be around $4 million from its current costs.

By eliminating the production in Japan, volumes would have to be readjusted in the other plants. Both Gary and the Frankfort plants would have to operate at full capacity. Reduction in production at the Mexico plant was forecasted to reduce overall costs. This would give Applichem excess capacity that it could use again in the future if demand were to grow.

Keeping the Gary plant protects Applichem from exchange rate risk when importing in the US. Importing all of the US demand would expose Applichem to a lot of variability in its costs and revenues making it difficult for them to forecast properly. Demand in the US would also be greatly affected if the US dollar were to go low for a long period of time. Since the US market is Applichem’s most important one, the risk is too great to shut down the Gary plant.

*Productivity Analysis*

Two productivity analyses were performed to evaluate which plants were manufacturing more efficiently. (Exhibit 4) The volume per employee analysis confirmed the choice to shut down the Japanese plant since they have the lowest productivity ratio. Since Gary has the second lowest it will be important to improve their efficiency. As for Frankfort, it is the leading plant in employee output and taking a closer look at their operation could be beneficial in improving the US plant.

Same results are given by the volume per utility cost dollar produced analysis. Frankfort is far ahead and Japan is trailing back giving Applichem no other choice but to strongly consider shutting production of Release-ease in Japan.

*Other Advantages of Release-Ease Plants*

Gary:

* The plant has very loyal employees, which can lead to low employee turnover rates. Not only are employees loyal to Applichem as a company, but they are also loyal to the plant manager as well. This can be an implication of how well Gary plant employees will react when new production process and training programs are implemented.

Frankfurt:

* With only 600 employees and about 38 million pounds of ease release made annually, the employees at the Frankfurt plant are more productive than any other plant.
* One piece of equipment used to produce Release-ease was installed between 1971 and 1974, and the other was installed in 1961 and has had major modifications added to increase capacity.
* The employees at Frankfurt implement their own processes to improve Release-ease.
* There are only 2 formulations for Release-ease.
* Release-ease is only produced in one standard size: 50-kilo bags.

Mexico:

* Release-ease is only produced in one standard size: 50-kilo bags.
* Employees at the Mexican plant are able to maintain process improvements suggested by the plant manager in Frankfurt
* Plant equipment used for the production of Release-ease was installed in 1968 with modifications made in 1978.

Japan:

* The plant in Japan only produces one other product for the plastic industry. This allows the plant operators to concentrate on the production and improvement of Release-ease more so than the other plants.
* Release-ease is produced in two standard sizes: 1/2-kilo bags and 1-kilo bags
* The Japanese plant is more technologically advanced than other Release-ease plants. The plant conducts a lot of R&D functions which includes laboratory testing, plastics engineering, and environmentally-friendly process changes.

*Other Disadvantages of Release-Ease Plants*

Gary:

* The equipment used for the production of Release-ease was installed between 1959 and 1964, which is outdated according to an estimated useful technical life of 20 years.
* Gary has 8 different formulations for Release-ease.
* Release-ease is produced in 80 different package sizes.
* The Gary plant produces 19 other products other than Release-ease. The plant was also designed to be a batch operation, not a streamline operation, which causes production to switch between different product lines.

Frankfurt:

* The Frankfurt plant produces 12 other products in addition to Release-ease, which means its production processes are not solely concentrated on the production of Release-ease.

Mexico:

* The Mexico plant produces 6 other products in addition to Release-ease, which means its production processes are not solely concentrated on the production of Release-ease.
* Educational levels of employees are lower in Mexico than in other plants.

Japan:

* There are a large number of employees at the Japan plant, which increases labor costs.
* Employees at the Japan plant are subject to more regulations. For example, they are required to have a license to handle flammable materials. Also, employees who work the third shift must be allowed 2 hours of sleeping time.

*Use of Japanese Plant*

Due to the low levels of production per employee and high operating costs of the Japan plant (see exhibit 4), it is highly ineffective to continue production at this plant. Therefore, the Japan plant should cease to produce Release-Ease and only continue with the production of their second product. This should not be an issue since Applichem is the only company whose product has been approved by Japanese regulators. Subsequently, only exporting to Japan rather than producing the product in Japan should not be an issue

Once production in the Japan plant has ceased, the most beneficial use of this plant would be to use it as a Research & Development facility. This is recommended because the employees of this location do more Research & Development than any other location because they have a product test laboratory and a plastics engineering lab on hand.

This is not a detrimental choice because if the plant is needed in the future for the production of Release-Ease, production can begin again if needed. If necessary, these decisions can be reversed if they prove to be disadvantageous.

**Alternatives**

When looking at the case prior to conducting a cost analysis, the most logical assumption would be to make Gary more productive by updating their technology in order to run more efficiently. This is due to the fact that the US demand is 26.4 million pounds and the next biggest demand is in Europe at 20 million pounds. With a total demand of 79.9 million pounds, 33% of the demand comes directly from the United States. Therefore, minimizing transportation costs by having a plant in the US which produces the product would make the most sense. However, the case did not provide any costs associated with updating technology; therefore, an analysis was not able to be conducted.

Another option would have been the possibility of stopping production in Japan because it requires the highest cost to produce the product. If this were the case, the technology currently in Japan could be sent to the Gary plant to help make production more efficient. However, again the case did not provide any costs associated with updating technology; therefore, an analysis was not able to be conducted.

If an observer only looked at the exhibits provided, they would most likely assume that the most logical way to save money would be to send as much production as possible to Frankfurt where cost of production is cheapest and then sending the remainder of production, after this location was maximized, to Mexico. However, the cost analysis did not agree with this assumption.

Building a new factory is also an option. However, at an estimated $20-$25 million for construction of a new factory, this should be evaluated as a last resort option.

**Assumptions**

Due to the lack of information on the Venezuela and Ontario plants, they are not included in the productivity analysis.

**Implementation** **Plan**

In order to maintain a production presence in the United States where demand is the highest for Release-ease, Applichem must update or replace its manufacturing facility in Gary, IN. Because the cost of building a new factory is estimated to be $20-$25 million, it is recommended that all other alternatives be evaluated first.

Creating a dedicated production line for Release-ease would increase efficiency in Gary. The plant is designed to run batches of one product at a time. This requires change over time and increased overhead costs for setup each time a different product is made.

The plant in Gary, IN also needs to assimilate process efficiencies that are used in Frankfort and Japan to benefit from increased productivity and waste recovery. Bringing managers from other factories around the world together to discuss and share innovations as Joe Spadaro suggested could help to cross facilitate ideas and efficiencies throughout Applichem’s supply chain. These changes in Gary will require investments in property, plant, and equipment. It will also be necessary to train employees along the way to make use of the cost cutting technologies Applichem will bring to Gary.

The Gary, IN plant also runs 8 formulations of Release-ease and sells them in 80 different sized packages. Decreasing the number of formulations to 2 and offering 2 sizes of packages would streamline the production process. Consideration to customer demands for shelf life and concentration of active ingredient should be taken when making this decision.

Once the Gary, IN plant has shown satisfactory improvement production of Release-ease can be stopped in Japan. The cost of production there is high, and ceasing production would optimize company-wide efficiency as shown in Exhibit 1. The Japanese factory would still be left open for production of the other product that is made there as well as R&D as they have excellent technology and development skills. If demand rises and more production capacity is needed, the plant in Japan can again be considered for Release-ease manufacturing at that time.

This plan will be monitored in the future to ensure that it proves to be cost beneficial as expected. If this plan does not prove to be beneficial, changes will be made accordingly in the future.

**Appendix**

*Exhibit 1*



*Exhibit 2*



*Exhibit 3*



*Exhibit 4*

|  |
| --- |
| **Productivity Analysis Per Employee** |
|  |  |  |  |  |
|  | **Plants** |
| **Labor (Number of Workers)** | *Mexico* | *Frankfurt* | *Gary* | *Sunchem* |
| *Direct* | 20 | 46 | 24 | 14 |
| *Indirect* | 25 | 40 | 34 | 17 |
| *Total* | 45 | 86 | 58 | 31 |
|   |  |  |  |   |
| **Production Volume (In millions)** | 17.2 | 38 | 14 | 4 |
| **Volume Per Employee** | 0.382222 | 0.44186 | 0.241379 | 0.129032 |

**Utility Cost Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Plant Production** | **Total Utility Costs ($ per million pounds)** | **Volume Per Utility Cost Dollar** |
| *Mexico* |  17,200,000.00  | $12,012.00 |  1,431.90  |
| *Frankfurt* |  38,000,000.00  | $11,116.00 |  3,418.50  |
| *Gary* |  14,000,000.00  | $19,365.00 |  722.95  |
| *Japan* |  4,000,000.00  | $36,675.00 |  109.07  |

*Exhibit 5*

**Capacity Levels**

|  |
| --- |
| **1982 Capacity Levels (in millions)** |
| *Plant* | *Current Capacity* | *Max Capacity* | *Excess Capacity Available* |
| **Gary** | 14 | 18.5 | 4.5 |
| **Frankfurt** | 38 | 47 | 9 |
| **Mexico** | 17.2 | 22 | 4.8 |
| **Sunchem** | 4 | 5 | 1 |