Module 6

Final Project

Introduction to Enterprise Analytics

Kalyan Kumar Bhogi

College of Professional Studies,

MPS Analytics,

Introduction

The examination into a hardware company's proposed business plan's conclusions are presented in this report. The business intends to establish a new distribution center in the southeast to effectively distribute its key products to local dealers. The plan calls for renting an office and a warehouse at the same time in the target area. The main objective of this project is to ensure that the essential products of the company are distributed efficiently and to capitalize on consumer demand for those products to boost sales. The first four products the business has selected for the new distribution facility are pressure washers, go-karts, generators, and water pumps. These products were chosen based on the market's present need for them and their likelihood of being profitable. To deal with these issues, we will design a comprehensive plan by taking a number of factors into consideration. The total that can be spent on monthly inventory purchases is $170,000. Making sure that the inventory selections and allocations match the given budget is essential for maximizing profitability.

Making the most of the warehouse's constrained space also requires careful planning. A significant portion of the inventory is allocated to pressure washers and go-karts in order to promote the company's brand-name goods, as well. Due to market demand and strategic objectives, the company also plans to sell at least twice as many generators as water pumps. To achieve these goals, the problem will be formulated as a linear programming model, taking into consideration the costs, selling prices, and available space. While still accommodating space and budgetary needs, the objective will be to maximize revenue. We may offer suggestions that will make the company's successful entry into the southeast market easier by optimizing the inventory allocation and taking the given circumstances into account. The problem's mathematical formulation, an Excel solution step-by-step, and conclusions and suggestions based on the results are all presented in the following sections of this report.

Analysis

Part 1: Budget Friendly Options

Allen's responsibility is to cut costs and shipping times associated with transporting trash barrels from six factories to three disposal facilities. The objective is to lower Rockhill's overall cost by accounting for shipping costs from plants to disposal sites, shipping costs within plants, and shipping costs between disposal sites. Utilizing intermediate shipment hubs, where other vehicles can drop off and pick up loads, is another option. Allen has access to tables that provide vital information, like the anticipated shipping costs per barrel from each facility to each disposal site and the overall volume of waste generated by each plant each week. The waste disposal facilities have a weekly capacity limit. The shipping costs between facilities and between disposal facilities are also mentioned. By analyzing shipping prices and evaluating intermediate shipment ports, Allen seeks to determine the optimum routes and associated costs. Using the results of this analysis, Allen will be able to draft a comprehensive contract proposal for waste disposal that details the most cost-effective means of transportation.

Plant:	*Orangeburg*	*Florence*	*Macon*	*Waste per Week (bbl)*
Denver plant	12	15	17	45
Morganton plant	14	9	10	26
Morrisville plant	13	20	11	42
Pineville plant	17	16	19	53
Rockhill plant	7	14	12	29
Statesville plant	22	16	18	38
Capacity	65	$80	105	

Table 1: transport fees per barrel for waste from six factories to three dumping grounds

Plant:	Waste per week (bbl)
from Denver plant	45
From Morganton plant	26
From Morrisville plant	42
From pineville plant	53
From rockhill plant	29
From statesville Plant	38

Plant:	denver plant	morganton plant	morrisville plant	pineville plant
From Denver plant	$---	$3	$4	9
from Morganton	$6	---	7$	6
From Morrisville Plant	5$	7$	---	3
From Pineville plant	5$	4$	3$	---
From Rockhill Plant	5$	9$	5$	3
From Statesville plant	4$	7$	11$	12

Table 2:the following shipping rates per barrel will be paid between each of the six plants:

Waste_Disposal Site:	*Orangeburg site*	*Florence site*	*Macon site*
Orangeburg Disposal site	---	$12	$10
Florence disposal site	$12	---	$15
Macon Disposal site	$10	$15	---

Table 3: Per barrel of rubbish, shipping costs between the three trash facilities

In addition to the shipping costs between plants and waste disposal sites that have already been provided, the Excel file must be updated to include the expenses associated with transferring each barrel of waste between the three new garbage dumping locations. These projected charges are necessary for a comprehensive analysis of shipping expenses and routes. By include these additional costs in the Excel spreadsheet, Allen will have a more accurate picture of the overall costs connected with the garbage transportation procedure. This information will make it even easier to choose the optimal routes and reduce Rockhill's overall cost. Allen will be able to determine the most cheap ways to transport rubbish, taking into account intermediate shipping points, and perform the necessary calculations using the solver tool and a thorough and updated Excel file. Allen will have access to insightful knowledge that will enable him to produce a remarkable presentation by applying this in-depth research.

contract proposal that satisfies the specific demands and goals of trash disposal while maximizing effectiveness and lowering costs. a contract proposal that, while maximizing efficiency and minimizing costs, satisfies the specific requirements and objectives of waste removal.

Plant:	Orangeburg Disposal site	Florence Disposal site	Macon disposal site
Denver	$36	$9	$0
Morganton	$0	$0	$26
Morrisville	$0	$0	$42
Pineville	$0	$53	$0
Rockhill	$29	$0	$0
Statesville	$0	$18	$20

Table 4: Shipping charges for each barrel of waste disposal between the three trash facilities

Combining descriptive, predictive, and prescriptive models was crucial to the investigation of the waste transportation problem. Prescriptive analytics approaches were employed, with an emphasis on risk reduction and transhipments challenges, to explore a variety of prospective transhipment solutions and reduce hazards associated to the transportation process. For each situation, the best options were identified utilizing stochastic improvements and mathematical optimizations. Utilizing predictive analytics in conjunction with other technologies made it easier to make accurate predictions and enabled efficient query processing. Additionally, the most precise future estimates for the transportation of chemical waste between the source and destination locations were generated using prescriptive analytics techniques. The $2,988 least-cost alternative was chosen because to this detailed methodology, which includes descriptive, predictive, and prescriptive models. Allen was able to make informed decisions and produce a compelling contract proposal using these state-of-the-art analytical approaches, maximizing trash transportation while minimizing associated risks and costs.

I applied a variety of innovations and predictive analytics approaches to enhance the analytics process. During this stage, I created a simple linear programming (LP) model using Excel Solver. The LP model takes into account the data presented in the table below. In order to find the optimum solution based on the constraints and objectives given, one that reduces costs or increases efficiency, I used Solver. I was able to get useful information by using this LP model

and Solver to handle the issue of waste transportation.

Min Cost	$2,674		
Subject to:			
Constraint	LHS	Directions	RHS
Orangeburg_Capacity	65	<=	65
Florence_Capacity	80	<=	80
Macon_Capacity	88	<=	105
Denver_Transhipment	0	=	0
Morganton _Transhipment	0	=	0
Morrisville_Transhipment	0	=	0
Pineville _Transhipment	0	=	0
Rockhill _Transhipment	0	=	0
Statesville _Transhipment	0	=	0

The Excel Solver calculations suggest that Allen avoid transferring waste directly from industrial facilities to landfills and instead consider the possibilities of depositing and collecting waste at various facilities and disposal sites. Direct delivery is more expensive ($2,988) than dumping and retrieval ($2,674), making the latter the most cost-effective option. To obtain an accurate result, a breakdown of the transportation costs per barrel of garbage is necessary. By assessing the transportation costs associated with each route and taking into account the amounts of waste being delivered, a more detailed review can be conducted to assist in the decision-making process. These calculations will provide a complete understanding of the financial ramifications and further demonstrate how much more affordable the dumping and retrieval option is than direct delivery. By carefully examining the transportation costs per barrel of trash, Allen may be able to make a decision that maximizes cost effectiveness and ensures sound waste management procedures.

Plant:	Orangeburg	Florence	Macon
Denver plant			
Morganton plant		80	29
Morrisville plant			59
Pineville plant			
Rockhill	65		
Statesville plant			

Table 3: Cost of moving a barrel of trash among the three landfills

The total expenses of the analysis also take into account the fees associated with dropping off and collecting up trash at various disposal facilities. These additional expenditures are included in the overall logistics costs. The $2,674 disposal and retrieval option was determined to be the most cost-effective method of transporting 286 barrels of waste from diverse industries. This conclusion considers all relevant factors, ensuring a full study of the transportation costs and permitting the selection of the most economical way for waste disposal.

Plant:	*Denver plant*	*Morganton plant*	*Morrisville plant*	*Pineville plant*	*Rockhill plant*	*Statesville plant*
Denver plant		45				
Morganton plant						
Morrisville plant						
Pineville plant			17		36	
Rockhill plant						
Statesville plant		38				

2.2 Part 2: Allocating the resources for investments

Predictive, descriptive, and prescriptive analytics were combined throughout this stage in order to enhance asset deployment, boost return on investment, and reduce risk. Finding the best investing plan with the least amount of risk and an initial return projection of 11% was the aim. Historical data was examined using descriptive analytics to understand more about the projected returns of the investment portfolio. To further understand the expected outcomes of this research, the data from the Investments Table was studied. The Solver feature in Microsoft Excel makes this process much

simpler by enabling precise calculations and yielding the results displayed below:

	Bonds	High tech stocks	Foreign stocks	Call options	Put options	Gold
Bonds	0.001	0.0003	-0.0003	0.00035	-0.00035	0.0004
High-tech stocks	0.0003	0.009	0.0004	0.0016	-0.0016	0.0006
Foreign stocks	-0.0003	0.0004	0.008	0.0015	-0.0055	-0.0007
Call options	0.00035	0.0016	0.0015	0.012	-0.0005	0.0008
Put options	-0.00035	-0.0016	-0.0055	-0.0005	0.012	-0.0008
Gold	0.0004	0.0006	-0.0007	0.0008	-0.0008	0.005

Table 1: the returns-covariance matrix for assets

Asset type	Returns
Bonds	0.07
High tech stocks	0.12
Foreign stocks	0.11
Call options	0.14
Put options	0.14
Gold	0.09

The weights in the provided table, which is an excerpt from Microsoft Excel, were determined using the solver tool. Predictive analytics were needed for the investigation of the issue and for identifying the most promising investment opportunities. The documentation included expected return data tables that showed the potential returns each asset in the portfolio may earn if invested, as well as a covariance matrix return table that illustrated the relationship between asset returns and covariance. These tables provided a more in-depth analysis of the decisions needed to determine the optimum investment strategy that would generate the requisite returns and appropriate asset investment opportunities. Extrapolative analytics were used to forecast each investment's results depending on the portfolio.

Models had a strong predictive power for the average return across a number of asset classes. The division of the portfolio among various assets to reach a minimum benchmark return of 11% while taking potential for risk and growth into account was another issue that was handled through factual modelling. The prescriptive strategy was also employed to analyze the data in order to address the profitability of the investment project, in addition to descriptive and predictive methodologies.

Prescriptive analytics was utilized to recommend the optimal course of action with the aim of maximizing return on investment while meeting the distribution requirements for each portfolio. Predictive and descriptive study conducted in Microsoft Excel with the benchmark return of 11%

taken into consideration determined the distribution of investments.

	Weights	*Investment_allocation*
Bonds	0.189807292	$ 1,898.07
High-tech stocks	0.108630255	$ 1,086.30
Foreign stocks	0.270827739	$ 2,708.28
Call options	0.047942564	$ 479.43
Put options	0.254469971	$ 2,544.70
Gold	0.128322811	$ 1,283.23

The portfolio's return, according to the solver's results, was 0.11, and its variance, according to the results, was 0.000736. The weights of the portfolio were calculated automatically. The variance was multiplied by four to determine the portfolio's standard deviation, which came out to be 0.027122579. The table below provides a summary of these results and calculations:

portfolio_return	0.11
portfolio_variance	*0.000735634*
portfolio_Standard Deviation	0.027122579

Predictive analytics was required to address a number of issues, including identifying lucrative business opportunities and figuring out the average rate of return. It involved examining the slopes of segments that showed asset changes and the non-diagonal entries that reflected covariance between different asset groupings. The conventional returns on investment table's data was used in conjunction with expected assessments through the use of descriptive analytics. Applying the strict analytics technique and comprehending the data's patterns were necessary for making informed decisions.

Conclusion:

1.Budget Friendly Options

After careful investigation and analysis of the available data, the best routes for rubbish transportation have been identified. Before reaching the destination, one of the routes uses Rockhill as a connection between Morrisville and Pineville. Another incredibly cost-effective route discovered by the analytics is the one that goes from Denver to Morganton and then to Florence. This route stands out among the many excellent options available. Additionally, it is advantageous to send barrels from Statesville to Denver since it eliminates the need to ship them from their origin to their destination, making Denver a convenient drop-off location. In comparison to other places,

It was discovered that it was less expensive to ship chemicals from Denver to Orangeburg. The cost of transshipping waste from Morganton to Florence was found to be cheaper than that of transporting waste to Macon and Orangeburg. Morrisville to Macon travel was more expensive than to Florence and Orangeburg. The cost of transportation was higher from Rockhill to Orangeburg than it was from Rockhill to Macon. When determining the costs of the best potential routes, expenditures for routes like Morganton to Statesville, Denver to Morganton, Pineville to Morrisville, Morrisville to Pineville, and Rockhill were taken into consideration. Notably, it was found that hauling barrels between waste sites along specific routes was more cost-effective.Transporting goods from Florence to Orangeburg, then from Orangeburg to Macon, and then from Macon to Orlando, for instance, resulted in lower transportation costs. This concept highlights the potential benefits of using the same areas where waste is disposed of as recycling drop-off points. After accounting for each of these factors, it was determined that $2,674 would be the most affordable amount to pay to transport 286 barrels of trash between sites. This extensive study ensures a cost-effective and effective rubbish transportation strategy.

2. Allocating The Resources For Investment

An analysis of the links between the return rate and the anticipated outcomes was conducted, and a graph displaying the residuals for each data point was produced. The differences between the actual observed values and the anticipated results are represented by the residuals. A random pattern could be seen in the residuals on the graph, with some residuals being positive and others being negative. Despite the random variance, the straight-line model provided a good fit to the data. This demonstrates that the model accurately captures the general relationship between the return rate and the projected outcomes, despite the fact that there may be some inherent ambiguity or noise in the data.Based on the forecasts and the goal of achieving a base return of 11% while lowering risk, the investor should distribute their assets as follows: With a $10,000 investment, the following investments were made: $2,708.28 in high-tech stocks, $1,898.06 in bonds, $2,708.28 in foreign stocks, $2,544.70 in put options, $1,283.23 in gold, and $479.43 in call options. These allocations were determined by applying predictive analytics to the covariance matrix and expected returns of the assets. It is crucial to keep in mind that decisions regarding asset allocation should take an investor's risk tolerance, investing goals, and market conditions into account. When attempting to maximize return and reduce risk, the suggested allocation provides a place to start. However, investors should regularly review and adjust their portfolios in light of changing market conditions and their own financial goals. The application of predictive and descriptive analytics in this process allowed the investor to gain additional knowledge about the expected returns and risk profiles of various asset classes. By being aware of these traits and using prescriptive analytics to determine the appropriate asset allocation, the investor can make well-informed decisions to optimize investment returns while effectively managing risk.

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