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Project Report

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HISTORY OF THE COMPANY

Coca-Cola, the item that has given the world its best-known taste was born in Atlanta, Georgia, on May 8, 1886. Coca-Cola Company is the world's driving producer, advertiser and merchant of non-alcoholic refreshment concentrates and syrups, utilized to deliver about 400 refreshment brands. It offers refreshment concentrates and syrups to bottling and canning administrators, wholesalers, wellspring retailers and wellspring wholesalers. The Company's refreshment items comprises bottled and canned delicate drinks as well as concentrates, syrups and not-ready-to-drink powder items. In expansion to this, it too produces and markets sports drinks, tea and coffee. The Coca- Cola Company started building its worldwide arrangement within the 1920s. Presently working in more than 200 nations and creating about 400 brands, the Coca-Cola framework has effectively connected a basic equation on a worldwide scale: "Provide a minute of refreshment for a little sum of cash- a billion times a day."

The Coca-Cola Company and its organization of bottlers include the foremost modern and inescapable production and dissemination framework within the world. More than anything, that framework is committed to individuals working long and difficult to offer the items fabricated by the Company. This interesting around the world framework has made The Coca-Cola Company the world's chief soft-drink endeavor. From Boston to Beijing, from Montreal to Moscow, Coca-Cola, more than any other buyer item, has brought joy to parched shoppers around the globe. For more than 115 years, Coca-Cola has made an extraordinary minute of joy for hundreds of millions of individuals each day. The Company points at expanding shareowner esteem over time. It finishes this by working with its trade accomplices to convey fulfillment and esteem to buyers through a around the world framework of prevalent brands and administrations, in this way expanding brand value on a worldwide premise.

- **1923**:Introduce first carton of six-bottle,Robert w.woodruff elected as a President of the company
- **1926**:Foreign Departement is formed to supply products to overseas bottlers.Some of the countries where it supplied include China,Colombia,Germany,Italy and Spain.
- **1938**:Coca-Cola enters South Africa,Norway and Australia.
- **1941**:The first paper cups for coca-cola were introduced in order to maintain the quality standards.
- **1945**:"Coke" registered as a trademarks for the Coca-Cola Company.
- **1959**:A network of 1700 bottlers is now operating in more than 100 countries.
- **1963**:First diet drink is produced by the Company
- **1969**:A new graphical logo is introduced for the Company that featuring a red and white color
- **1976**: First ever sponsorship agreement is done between Coca-Cola company and FIFA(an international sports governing body).
- **1990**:Coca-Cola is sold in East Germany for the first time as the Berlin wall falls down.
- **2001**:Nestle and Coca-Cola create a new company together to serve tea and coffee beverages.
- **2016**:making a net profit of $6,527 and still moving on.

Business Issues and Impact

Over 10 years prior, The Coca-Cola Organization put forth a spearheading objective to recharge the water we use in our beverages furthermore, their creation. We likewise set focuses to proficiently utilize water more also, to treat all wastewater in our creation processes.

In every one of the most recent six years, we met and surpassed our 2020 recharge objective. At similar times, we have proceeded to work on the proficiency of our water use. We currently need just 1.84 liters of water per liter of end result, a 19% improvement contrasted with 2010. While we are pleased with our advancement, this is shy of our objective due to changes in our item and bundling portfolio. For instance, delivering more different item runs and more modest or refillable bundles requires more continuous cleaning and washing, which restricts the water proficiency in packaging creation. Furthermore, the pandemic decreased creation volumes in 2020, diminishing the generally speaking effectiveness of creation lines.

Sugar decrease stays a first concern. As we keep on developing as an aggregate refreshment organization and answer shoppers' cravings for additional decisions across classifications, we are diminishing added sugar while furnishing more beverages with sustenance benefits; enhancing our blend of items; offering more modest bundle decisions; and furnishing customers with clear sustenance data.

We offer a wide scope of refreshments — counting shimmering sodas, water, espresso, tea, dairy, juices, sports drinks and plant-based choices. We track the outcomes of our sugar decrease endeavors, the greater part of which originate from changes to our shimmering refreshment recipes and bundling size decreases.

We have an obligation to help tackle the worldwide bundling waste emergency. That is the reason, in 2018, we sent off an aggressive manageable bundling drive called World Without Waste.

Three years into this excursion, the worldwide discussion about plastic contamination — what's more, calls for dire, cooperative activity — are increasing. We proceeded to gain ground in 2020, regardless of the difficulties from the pandemic.

We have put forth another objective to diminish our utilization of virgin plastic from non-sustainable sources by an aggregate 3 million metric tons over the course of the following five years. In 2025, contingent upon business development, we project that we will utilize around 20% less virgin plastic than we do today .

Environmental change is a vital issue for our business, and as a worldwide organization, we have a well established system to diminish our carbon impression. We approach this challenge by lessening the effect we have on environmental change; by distinguishing the dangers a changing environment has on our organization; and by working together with key partners to enhance our activities. Our environment technique upholds our maintainable farming, water and World Without Waste techniques. Also, our way to deal with environment administration answers to expanded revenue from financial backers and different partners to give exposures lined up with the Task Force on Climate Related Financial Disclosures (TCFD). Having accomplished our "drink in your grasp" objective to lessen relative fossil fuel byproducts by 25% by 2020, against a 2010 benchmark, we are currently pursuing our 2030 Science-Based Target to decrease outright GHG discharges 25% by 2030. Our aspiration is to accomplish net-zero fossil fuel byproducts by 2050.

Variety, value and consideration (DEI) are at the core of our motivation, values and development procedure. Our desire is to reflect the variety of the business sectors we serve and to be half driven by ladies universally by 2030. We as of late reported that, by 2030, our U.S. worker populace across all work levels will line up with evaluation information by race Also, nationality. We are focused on expanding straightforwardness and divulgence, and we share variety measurements with senior pioneers on a quarterly premise. Beginning with this report, we are openly giving portrayal by race2 and orientation for our by and large labor force and initiative.

CHALLENGES

These days, individuals are focusing closer and more worries in the solid way of life. A decrease sought after of Coca-Cola refreshment is a direct result of progress in the way of life of individuals' dietary patterns and which may be the difficulties looked by CocaCola Company. Shoppers at the senior age are more worried about wellbeing and sustenance expected thus more established individuals progressively center around broadening life. In recent years, clients and wellbeing organizations have been brutally reprimanded for the high sugar content of non-cocktail. Because of wellbeing, cognizant ways of life and high mindfulness towards ecological issues, the business vitality and business climate of carbonated soda pops is expected to change. Wellbeing organizations guarantee that the carbonated soda pops have a few downsides, counting lack of hydration, high sugar admission, weight gain and calcium exhaustion. In the US, there is more than adequate proof that weight gain and corpulence rates equal the rising utilization of refined sugar admission and, most strikingly, added sugars, especially as sugar improved drinks. (Lavie, C., Laddu, D., Field, R., Ortega, F., Alpert, M., and Kushner, R. 2018). For instance, there is 10.6g of sugar per 100ml in Coca-Cola Classic. An around 350ml serving of cola contains 140 calories, weight gain due to you consuming a greater deal of calories than your body consumes. The elements of soft drinks in Coca-Cola refreshment contain high measures of phosphoric corrosive and citrus extract that can clear out the calcium from the bone, drain calcium out of your teeth and cause a downfall of calcium ingestion. Logical proof in both human and creature models support the idea that overabundance sugar utilization has negative metabolic impacts such dyslipidemia, an ascent in incendiary markers, weight gain, expanded risk for type 2 diabetes and other modifications related with NCDs. (Gallagher, et al. 2016). Also, the drink business is profoundly aggressive as more non-heavy drinker refreshment ventures are coming into the market. The fundamental and nearest contender of Coca-Cola Company is PepsiCo which was conceived 12 years after Coca-Cola. The upper hand of PepsiCo over Coca-Cola is Pepsi has made "reciprocal" or "synergistic" business lines. PepsiCo Company broadened into nibble business that helped the organization develop in deals and income. It is too 45 having a tendency to be exceptionally simple for the shoppers to purchase the item from PepsiCo on account of the comparable on their creation, their taste and their costs. With this case, Coca-Cola Company expected serious areas of strength to have systems to beat the rival .

Executive summary of the Problem .

This report has been arranged with a particular reason in mind. It traces the history and current situation of the Coca-Cola Company universally and locally.This study presents the affairs of Coca-Cola Company globally.This report contains brief descriptive details of Coca-Cola Company and the tasks which have been performed to analyze the market of the Company.

We have performed a Linear Programming method(Simplex Method) with the objective to produce quality products for the customers and to maximize their profit.

This report also contains a brief description of competition and the challenges that are affecting the growth of Coca-Cola Company.

Extend of the Problem

Coca-Cola has been a victory for more than 120 a long time.On The other hand, Pepsi Co (established at roughly the same time) did not become a genuine competitor until after World War II, when it came up with the thought to offer its item in bigger parcels for the same cost as Coke. The “cola wars" picked up speed within the mid-1960s and have not decreased since. Nowadays the two American companies wage war basically on worldwide fronts. Whereas the battle sometimes develops revolting, with allegations of anti competitive behavior, by and large the two companies remain civil.

For the primary time in history, general store deals of Pepsi surpassed Coke’s grocery store sales in 1979. It wasn’t until early 2006, in any case, that PepsiCo enjoyed an advertised esteem greater than Coca-Cola for the primary time. Pepsi’s technique of centering on nibble nourishment and innovative approaches within the non-cola refreshment showcase has made a difference the company pick up, advertise share and surpass Coca-Cola in by and large execution.

However, within the 1990s and 2000s destitute choices, fumble, and affirmed misconduct cast a shadow over the company. In 2000 Coca-Cola fizzled to create the top ten of Fortune’s annual “America’s Most Appreciated Companies” list for the first time in ten years. In 2001 the company vanished from the best 100 of Commerce Morals magazine’s yearly list of “100 Best Corporate Citizens.” For a company that had been on both records for a long time, this was disillusioning but not startling given its later moral emergencies.

The foremost harming of Coca-Cola’s crises—and a circumstance feared by each company—began in June 1999 when around thirty Belgian children got sick after consuming Coke items. In spite of the fact that the company issued a confined item review, the issue was raised. The Belgian government in the long run requested the review of all Coca-Cola products, which incited authorities in Luxembourg and the Netherlands to review Coke items as well. Coca-Cola at last decided

that the ailments were the result of an despicably handled clump of carbon dioxide. Coca-Cola was moderate to issue a reaction to the issue, taking a few days to address the media. The company had at first judged the issue to be minor and did not instantly explore the degree of the issue.

Amid the 2005–2007 retreat PepsiCo's expansion procedure kept on paying off, which made a difference in developing the company into the largest snack-maker within the world. On the other hand, a few financial specialists fear for Coca-Cola's long-term prospects since of the company's reliance on universal deals and a solid dollar. Combined with a worldwide financial downturn, these are liabilities which will harm Coca-Cola's long-term benefit. Since PepsiCo does 60 percent of its business in North America, a strong dollar does not unfavorably influence the company as much because it does Coca-Cola.

In early 2006 Coca-Cola once once more confronted problems—this time on its domestic front. Fifty-four of its U.S. bottlers recorded claims against Coke and the company's biggest bottler, Coca-Cola Enterprises (CCE). The suit looked for to piece Coke and CCE, both based in Atlanta, from extending conveyance of Powerade sports drinks specifically to Walmart distribution centers rather than to individual stores. Bottlers affirmed that the Powerade bottler contract did not allow stockroom conveyance to huge retailers. They claimed that Coke breached the agreement by committing to supply stockroom conveyance of Powerade to Walmart and by proposing to use CCE as its specialist for conveyance. The biggest issue was that Coke was endeavoring to step away from the century-old convention of direct-store conveyance (DSD), in which bottlers deposit drinks at person stores, stock racks, and construct promoting shows. Bottlers claimed that on the off chance that Coke and CCE went forward with their arrangement, it would incredibly decrease the value of their trade.

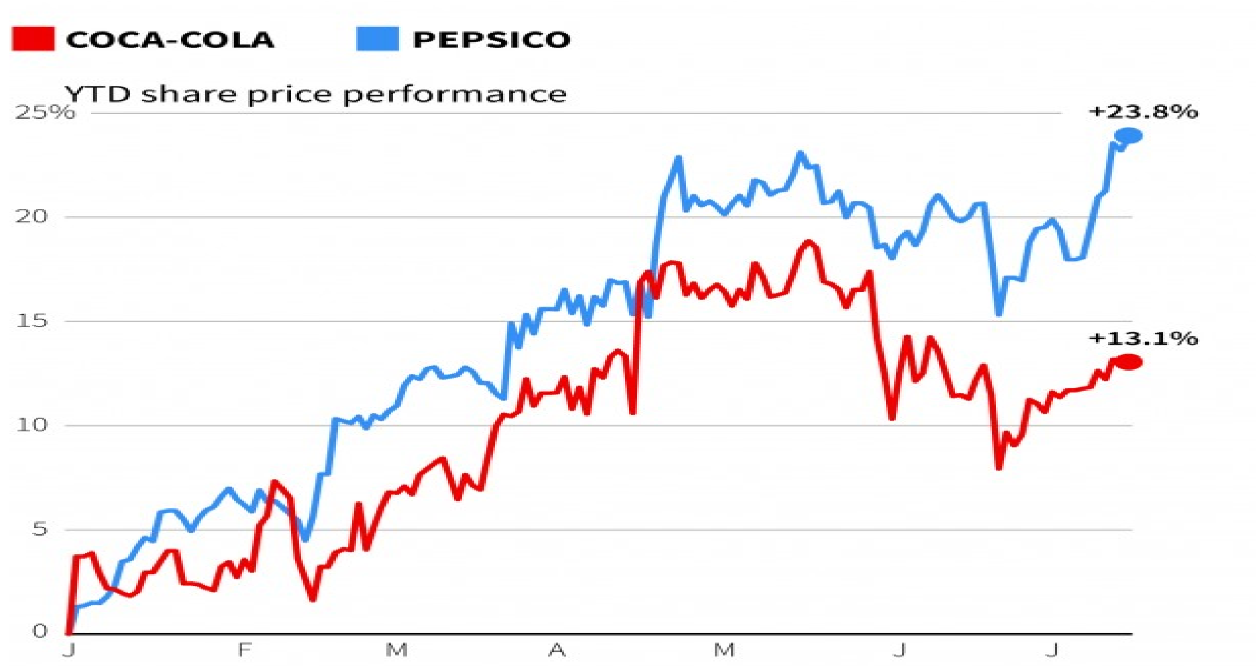
Review of previous Research

Nowadays, individuals are paying more consideration and more concerns within the solid lifestyle. A decline in requests for Coca-Cola refreshment is because of the altered lifestyle of people's eating habits and which can be the challenges confronted by Coca-Cola Company. Customers at the senior age are more concerned about wellbeing and nutrition required as a result more seasoned individuals progressively center on expanding life. Within the past few a long time, clients and wellbeing organizations have made unforgiving criticism within the high sugar substance of non-alcoholic refreshment. Due to health-conscious ways of life and high mindfulness towards the natural issues, the commerce key and business environment of carbonated delicate drinks required to alter.

Three million tons of plastic are utilized by Coca-Cola Company for bundling in a year. Huge amounts of plastic items are disposed-off inside the environment. Among these, plastic squander bottles possess more noteworthy extent such as mineral water bottles and refreshment bottles. Contamination has a tremendous negative effect towards the normal environment because plastic isn't biodegradable, and it is made from harmful compounds. Plastic waste has been eaten by marine creatures causing death and harmed due to plastic ingestion. Other than, harming arrival and diminishing in quality of arrival surface are another negative affect caused by plastic contamination. It is since when plastic responds with water it will frame harmful chemicals. In spite of the fact that Coca-Cola Company investigates numerous strategies to illuminate the plastic squander issues, there are continuously persistent advancements to be created. The Central Contamination Board communicated that slime from the Coca-Cola manufacturing plant was sullied with tall levels of cadmium, lead, and chromium. The groundwater supply has been undermined by the dry season, numerous villagers in rustic regions are blaming Coca-Cola Company for disturbing the populace and groundwater depletion issues. Since that point, Coca-Cola Company has taken action to alleviate this drawback by attempting a water substitution program, in any case once dry storms the water deficiency proceeds to be a genuine issue.

Loss Incurred to company

The pressure from competitive sellers caused a great loss for Coca-Cola.
PepsiCo and Cadbury are the largest competitors of Coca-Cola Company with a global presence. Although Coca-Cola owns four of the top five Soft drinks brands(Fanta, Sprite, Diet Coke, Regular Coke). But as compared to PepsiCo, it had very low sales in 2006.PepsiCo dominated North America with record sales of $22billion, whereas Coca-Cola had only about $7billion.
Customers have expected to look for quality in their drinks because of being health-conscious. This causes a decrease in the carbonated potation or the consumption of soda. For the first time in 20 years, the number of sodas sold in the US decreased to 10.2 billion which is a 0.7%decline in 2005. And the volume of Coca-Cola was down to 2 percent.
The rising price of sugar and packaging material also had a direct impact on Coca-Cola products. Due to the high increase in price the profit revenue of the company would come under pressure.



Optimization methodology

A linear programming model can be formulated and solutions derived to determine the best course of action within the constraint that exists. The model consists of the objective function and certain constraints. For example, the objective of Coca-cola Company is to produce quality products needed by its customers, subject to the amount of resources (raw materials) available to produce the products needed by their respective customers who should also not violate National Agency for Food and Drug Administration Control (NAFDAC) and Standard Organization of Nigeria (SON). The problem then is on how to utilize limited resources to the best advantage, to maximize profit and at the sometime selecting the products to be produced out of the number of products considered for production that will maximize profit.

The research is aimed at deciding how limited resources,raw materials of Coca-cola Company, Ilorin plant , Kwara State would be allocated to obtain the maximum contribution to profit. It is also aimed at determining the products that contribute to such profit. The scope of the research is to use Linear Programming on some of the soft drinks produced by Nigeria Bottling Company, Ilorin plant. The data on which this is based are quantity of raw materials available in stock, cost and selling prices and therefore the profit of crate of each product. The profit constitutes the objective function while raw materials available in stock are used as constraints. If demands which must be met are to be available, such can be included in the constraints. The data is secondary data collected in the year 2007 at the Coca-cola Company , Ilorin plant, Kwara State.

The Simplex method, also called Simple technique or Simplex Algorithm, was invented by George Dantzig, an American Mathematician, in 1947. It is the basic workhorse for solving Linear Programming Problems up till today. There have been many refinements to the method, especially to take advantage of computer implementations, but the essential elements are still the same as they were when the method was introduced (Chinneck, 2000; Gupta and Hira, 2006).

The Simplex method is a Pivot Algorithm that transverses through Feasible Basic Solutions while Objective Function is improving. The Simplex method is, in practice, one of the most efficient algorithms but it is theoretically a finite algorithm only for non-degenerate problems (Feiring, 1986). To derive solutions from the LP formulated using the Simplex method, the objective function and the constraints must be standardized .

$$\textbf{Maximizing } Z = \sum_{j=1}^{r} C_j X$$

$$\textbf{Subject to} \quad \sum_{j=1}^{r} a_{ij} X_j + S_i = b_i \text{ , } i = 1,2,3,\dots, m$$

X_j >= 0 , j = 1,2,3,...,n
S_i >= 0 , i,1,2,3,...,m

Any vector X satisfying the constraints of the Linear Programming Problems is called Feasible Solution of the problem .

Algorithm to solve linear programming problem:

(i) See that all i bs are positive, if a constraint has negative b multiply it by 1 to make i b positive.

(ii) Convert all the inequalities by the addition of slack or by subtraction of surplus variables as the case may be.

(iii) Find the starting Basic Feasible Solution .

(iv)Testing for optimality of Feasible solution

(v) To make strides on the Fundamental Feasible Arrangement, we find the essential matrix. The variable that compares to the foremost negative of **Zi-Ej** is the Incoming vector whereas the variable that compares to the minimum ratio **bi/aij** for a specific j, and aij>=0, i=1,2,3,....,m is the Outgoing vector.

(vi) the pivot element is determined by considering the Intersection point between the bolts that compares to both approaching and outgoing vectors. The key component is utilized to generate the following table. Within the following table, the pivot element is changed by unity, whereas all other elements belonging to the pivot column change by zero.

by using the following relation,we find the new values of all other elements in the remaining rows of that first column.

new rowelement in old rows-(intersection element of old rows *element of changed row)

THE TESTED PROBLEM

Table 1 below shows the Quantity of raw materials available in the stock

Raw Materials	**Quantity available**
Concentrates	4332 units
Sugar	467012 kg
water	16376630 liter
Dicarbon Monoxide	8796 vol/press

Table2 below shows the quantity of raw materials needed to produce a crate of each product listed :

Flavors	Concentrate	Sugar	Water	Dicarbon Monoxide
Coke 35cl	0.00359	0.54	6.822	0.0135
Fanta Orange 35cl	0.00419	1.12	7.552	0.007
Fanta Orange 35cl	0.00217	0.803	4.824	0.005
Fanta Lemon 35cl	0.0042	1.044	7.671	0.0126
Schweppes	0.00359	0.86	6.539	0.0125
Sprite 50cl	0.00359	0.73	7.602	0.0133
Fanta Tonic	0.00359	0.63	6.12	0.0133
Krest soda 35cl	0.0036	0.89	7.055	0.0146
coke 50cl	0.00438	0.23	7.508	0.0156

Table 3 below shows the cost and selling price of the crate of each product

Product	Average cost price	Average selling price	Profit
Coke 35cl	358.51	690	331.49
Fanta orange 35cl	370.91	690	319.09
Fanta Orange 50cl	489.98	790	300.02
Fanta Lemon 35cl	368.67	690	321.33
Schweppers	341.85	690	348.15
Sprite 50cl	486.04	790	303.96
Fanta Tonic 35cl	322.09	690	367.91
Krest soda 35cl	266.72	690	423.28
Coke 50cl	489.89	790	300.11

Model Formulation

Maximize Z

Z=331.49X1 +319.09X2 +300.02X3 +321.33X4 +348.15X5 +303.96X6 + 367.91X7 +323.28X8 +300.11X9

Subject to:

0.00359X1 +0.00419X2 +0.0021X3 +0.0042X4 +0.00359X5 +0.00359X6 +0.00359X7 +0.0036X8 +0.00438X9<=4332

0.54X1 +1.12X2 +0.803X3 +1.044X4 +0.86X5 +0.73X6 +0.63X7 +0.89X8 +0.23X9<=467012

6.822X1 +7.552X2 +4.82X3 +7.671X4 +6.539X5 +7.602X6 +6.12X7 +7.055X8 +7.508X9<=16376630

$0.0135X_1 +0.007X_2 +0.005X_3 +0.0126X_4 +0.0125X_5 +0.0133X_6 +0.0133X_7 +0.0149X_8 +0.0156X_9 \leq 8796$

$X_i \geq 0$ for $i=1,2,3,......,9$

Now,adding slack variable to remove inequalities,it gives;

Z$=331.49X_1 +319.09X_2 +300.02X_3 +321.33X_4 +348.15X_5 +303.96X_6 + 367.91X_7 +323.28X_8 +300.11X_9$

Subject to:

$0.00359X_1 +0.00419X_2 +0.0021X_3 +0.0042X_4 +0.00359X_5 +0.00359X_6 +0.00359X_7 +0.0036X_8 +0.00438X_9+X_{10}=4332$

$0.54X_1 +1.12X_2 +0.803X_3 +1.044X_4 +0.86X_5 +0.73X_6 +0.63X_7 +0.89X_8 +0.23X_9+X_{11}=467012$

$6.822X_1 +7.552X_2 +4.82X_3 +7.671X_4 +6.539X_5 +7.602X_6 +6.12X_7 +7.055X_8 +7.508X_9+X_{12}=16376630$

$0.0135X_1 +0.007X_2 +0.005X_3 +0.0126X_4 +0.0125X_5 +0.0133X_6 +0.0133X_7 +0.0149X_8 +0.0156X_9+X_{13}=8796$

$X_i \geq 0$ for $i=1,2,3,......,9$

where;

X_1=Coke 35cl

X_2=Fanta Orange 35cl

X_3=Fanta Orange 50cl

X_4=Fanta Lemon 35cl

X_5=Schweppes

X_6 =Sprite 50cl

X_7=Fanta Tonic 35cl

X_8=Krest soda 35cl

X_9=Coke 50cl

Variables	Value
X1	0.00000
X2	0.00000
X3	462547.21890
X4	0.00000
X5	0.00000
X5	0.00000
X6	0.00000
X7	0.00000
X8	0.00000
X9	415593.00000

Z=263,497,283 **X3** =462,547 and **X9** =415,593

PERFORMANCE AFTER OPTIMIZATION

By using the software management Scientist version 6.0,the optimum solution which is derived from the model shows that if we produced 462,547 crates of 50cl coke and 415,593 crates of 50cl Fanta Orange,this will gives the maximum profit of ₦ 263,497,283.

Conclusion

Based on the examination carried out in this inquire about and the result appeared, Nigeria Bottling Company, Ilorin plant ought to deliver Fanta Orange 50cl and 35cl,Coke 50cl and 35cl, Fanta lemon 35cl, Sprite 50cl,Schweppes,Krest pop 35cl but more of Coke 50cl and Fanta Orange 50cl in arrange to fulfill their clients. Too, more Coke 50cl and Fanta Orange 50cl ought to be delivered in order to accomplish the greatest benefit since they contribute for the most part to the benefit earned.

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