

THE EFFECT OF METHODS OF OPERATION RESEARCH IN OBTAINING THE BEST RESULTS IN THE TRADE

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Abstract. This study aims to determine the most effective method in operation research regarding the potential to reduce the cost in a minimum time and achieving more profit. In this study, three methods were used : Simplex method, Simplex method and transportation problems and Simplex method, transportation problems, and critical path method. A sample of 10 traders, who work in the same field and import the same commodities, participated in the study. Three models were applied to evaluate the result and compare between them, actual result from these models and randomly

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results. After that the researchers applying the survey to find the degree of traders satisfaction for these models and results.

The Statistical Package (SPSS) software was used for data analysis. The results of this study indicated that a three methods were a better. Also the results of questioner are linked to the satisfaction of traders on the three methods.

Keywords: operation research methods, traders satisfaction, mathematical models.

1. Introduction

The commerce field is developing and growing rapidly, and increasing the aware competency between all organizations in the world, and striving to be more successes, survival and achieving to a competitive advantages. Therefore, all organizations seek to minimize the cost and time, and increase their margin profit. For these reasons, this study aims to link this important filed with mathematical approaches including operation research, like some: Simplex method, Transportation problems, and Critical path method. For more details about the application of the operation research in a new fields refer to (V.N. Mishra, L.N. Mishra, 2012), (L.N. Mishra, 2017) and (Deepmala, 2014).

2. Literature review

Operations research as a science has been used to help solve decision problems using mathematical and statistical models for a long time, and it has been develop in many scientific fields such as : Mathematics, Engineering and Management. It is one of the areas that has contributed to solving many of mathematical problems and management problems: simplex method, Transportation problems and the network.

The first book of operations research appeared in 1946 As "Methods of Research Operations" for Morris and Campbells, the most important discoveries were in this. In (Dantezig, 1949) developed a method of problem solving in the Simplex Method, which had the greatest effect in obtaining results in a clear mathematical style, also in (Dantezig, 1951) discussed a Proof of the Equivalence of the Programming Problem and the Game Problem. In 1952, the Society of Research published its first journal of operations research and the publication of another journal, which helped to develop this area and its use in decision making. Then Taylor, Fayol, Gilbert, and Mayo used scientific methods and applied the principles of assignment problems.

In (Walker and Kelly, 1959) developed a critical method that helped resolve many of the problems that created the way for solution in terms of distance and time.

(Dantzig, 1963), discussed a Linear Programming and Extensions, and (Giant, 1966) used the principle of drawing to solve various problems in many projects but this mothod is not enough to solve all problems, for example, we cannot use this method for three variables or more. In (Khachian, 1979) proposed a new method of solving the linear program, but theoretically only. In

(Karmarkar, 1984) developed a new polynomial-time algorithm for linear programming and introduced an algebraic method with high results but the rest of the simplex is the easiest. In (Lucey, 1994) discussed a quantitative technique in the operation research, also (Kolman and Robert, 1995) introduced a new application about the linear programming and applied a different branch in operation research.

The applications continued to be widely period-intensive until (Hillier, 2001), (Winston, 2004), (Khobragade, 2005), and (Hamdy, 2007) presented a new application in operation research, particularly in Simplex and transportation problems, and they discussed an alternative approach about simplex method.

Later, (Hashamdar, 2011), (Khobragade, 2012), (Vaidya, 2012), introduced new information to find an alternative approach to the simplex, method Optimum solution to the simplex method, and optimize analytical condition in structural analysis. In the recent years, (Kedia, 2013), (Vaidya, 2014), and (Jervin, 2015) discussed a New Variant of Simplex to solve a game problem using a quick simplex method. In (Vaidya and Kasturiwale, 2016) discussed a new approach while solving two phase simplex method, and they discussed this subject with respect to a number of iteration.

Since the applications remained separate and all studies discussed the evolution of simplex method, this study attempts to investigate the application of more than one mathematical model in problem solving and work on diffusion.

3. The problem of the study and questions

Due to the previous studies were based on separate mathematical models and did not apply some of models on the same problem. Therefore, it is necessary to form and apply several mathematical models in order to compare the results and determine the most appropriate model of the solution.

Question 1: Is there a difference between the actual results and the expected results?

Question 2: do the best results depend on the model of operation research?

Question 3: which is the best model?

Question 4: are the traders significantly satisfied ?

4. The importance of study

This study aims to encourage traders to use mathematical applications in the process of comparison between random application and mathematical application.

5. Methodology and procedures

The Study population: It refers to all traders who were importing the same commodities.

The Study Sample: The traders who were importing the same commodities in Aqaba-Jordan.

Study Tool: This study prepared and applied mathematical models to compare results.

1. Collect the actual data from traders to apply the models.
2. Calculate the results of the models for all traders.
3. Choose the best result of each trader.

6. Models of operation research

1. Simplex method .
2. Simplex method and transportation problems.
3. Simplex method, transportation problems, and critical path method.

7. The results

This study aims to investigate if the mathematical models are effect of a results on a commerce problem. So we will present the results in two parts:

7.1 Part 1

the researchers here discussed the answers of the following questions:

Question 1: Is there a difference between the actual results and expected results?

Question 2: do the best results depend on the model of operation research?

Question 3: which is the best model?

The following table represents the values of minimum costs, maximum profits, and minimum time in two columns . The first column represents the actual results that take from the traders, while The second column represents the expected values of operation research models.

as shown by previous tables, there is a difference in results between the real results and expected results. The models were better than the real results, moreover the best result depends on the type of model. But there exist a difference in the result of model, because there is a different way in transportation problems. Also it is noticeable that the last model is the best one.

Table 1: Results of Models

	The actual results	The results, If the trader applied the three models		
	without models	model 1	model 2	model 3
Trader1	Max. profit(10000), Min. cost(15000), Min. time(25 days)	Max. profit(10500), Min. cost(14400), Min. time(24 days)	Max. profit(11200), Min. cost(14100), Min. time(23 days)	Max. profit(12000), Min.cost(13500), Min. time(20 days)
Trader2	Max. profit(13000), Min. cost(11000), Min. time(30 days)	Max. profit(13500), Min. cost(10700), Min. time(26 days)	Max. profit(13600), Min. cost(9000), Min. time(23 days)	Max. profit(14000), Min. cost(9600), Min. time(19 days)
Trader3	Max. profit(18000), Min. cost(12000), Min. time(29 days)	Max. profit(17000), Min. cost(11000), Min. time(28 days)	Max. profit(10000), Min. cost(10300), Min.time(25days)	Max. profit(10000), Min. cost(10000), Min. time(20 days)
Trader 4	Max. profit(8000), Min. cost(6000), Min. time(15 days)	Max. profit(8300), Min. cost(5800), Min.time(13 days)	Max. profit(9000), Min. cost(5200), Min.time(11 days)	Max. profit(12000), Min. cost(4500), Min. time(10 days)
Trader 5	Max. profit(9000), Min. cost(8000), Min. time(15 days)	Max. profit(9200), Min. cost,(7600), Min. time(14 days)	Max. profit,(9600), Min. cost(7300), Min. time(13 days)	Max. profit(10000), Min. cost(7000), Min. time(11 days)
Trader6	Max. profit(16000), Min. cost(10000), Min. time(22 days)	Max. profit(17000), Min. cost(9500), Min. time,(19 days)	Max. profit(17500), Min. cost(9200), Min. time(17 days)	Max. profit(18000), Min. cost(8800), Min. time(16 days)
Trader7	Max. profit(14000), Min. cost(4000), Min. time(18 days)	Max. profit(14500), Min. cost(3950), Min. time(18 days)	Max. profit(14700), Min. cost(3800), Min.time(16 days)	Max. profit(14900), Min. cost(3700), Min.time(15 days)
Trader8	Max. profit(23000), Min. cost(7000), Min. time(17 days)	Max. profit(23400), Min. cost(6700), Min. time(15 days)	Max. profit(24000), Min. cost(6500), Min. time(14 days)	Max. profit(24600), Min. cost(6200), Min. time(13 days)
Trader9	Max. profit(7000), Min. cost(5000), Min. time(12 days)	Max. profit(7300), Min. cost(4900), Min. time(11 days)	Max. profit(7500), Min. cost(4700), Min. time(10 days)	Max. profit(8000), Min. cost(4300), Min. time(9 days)
Trader 10	Max. profit(20000), Min. cost(11000), Min. time(30 days)	Max. profit(20100), Min. cost(10900), Min. time,(27 days)	Max. profit(20500), Min. cost,(10600), Min. time,(24 days)	Max. profit(21000), Min. cost(10000), Min. time(22 days)

7.2 Part 2.

In this part we discuss the answer of the following question:

Question 4: are the traders significantly satisfied ?

This part was concerned with the enumeration of the variables that called for the application of the mathematical models that were enumerated in this study and were divided into two axes so that each axis contained a set of questions.

This questionnaire was introduced after the mathematical models were applied to the data collected from the study sample and observation results.

7.3 Question axes:

The first axis: Evaluation of models in terms of the importance, quality and features available. This axis has been covered in the following questions Q1, Q2,, Q7.

The second axis: the spread of mathematical models and to the attempt to apply and comprehensiveness and level of empowerment. This axis has been covered in Q8, Q9,, Q12.

Table 2: Results

		Frequency	Percent	Valid Percent	Cumulative Percent
Q1	Agree	6	30	30	30
	Strongly agree	14*	70	70	100
	Total	20	100	100	-
Q2	Agree	8	40	40	40
	Strongly agree	12*	60	60	100
	Total	20	100	100	-
Q3	Disagree	1	5	5	3
	Agree	6	30	30	35
	Strongly agree	13*	65	65	100
Q4	Total	20	100	100	-
	Disagree	1	5	5	5
	Agree	9	45	45	50
Q5	Strongly agree	10*	50	50	100
	Total	20	100	100	-
	Agree	11*	55	55	55
Q6	Strongly agree	9	45	45	100
	Total	20	100	100	-
	Disagree	1	5	5	5
Q7	Agree	8	40	40	45
	Strongly agree	11*	55	55	100
	Total	20	100	100	-
Q8	Disagree	1	5	5	5
	Agree	13*	65	65	70
	Strongly agree	6	30	30	100
Q9	Total	20	100	100	-
	Disagree	3	15	15	15
	Agree	10*	50	50	65
Q10	Strongly agree	7	35	35	100
	Total	20	100	100	-
	Disagree	2	10	10	10
Q11	Agree	7	35	35	45
	Strongly agree	11*	55	55	100
	Total	20	100	100	-
Q12	Disagree	1	5	5	5
	Agree	6	30	30	35
	Strongly agree	13*	65	65	100
Q13	Total	20	100	100	-
	Agree	6	30	30	30
	Strongly agree	14*	70	70	10
Q14	Total	20	100	100	-
	Agree	6	30	30	30
	Strongly agree	14*	70	70	100
Q15	Total	20	100	100	-

8. The questionnaire results

The following table represents the frequency distribution of all the questions asked and the higher frequency and percentages for each frequency were determined.

The previous table presents the distribution of data pertaining to the percentage and frequency of all questions that used in study, and we notice that the maximum percentage of the results was at strongly agree and agree items.

Table 3: My caption

	Q	Measure	Strongly Agree	Agree	Disagree	mean	st. dev.	Result
First Axis	Q1	Frequency %	14 70	6 30	- -	2.7	0.470162	Strongly agree
First Axis	Q2	Frequency %	12 60	8 40	- -	2.6	0.50262	Strongly agree
First Axis	Q3	Frequency %	13 65	6 30	1 5	2.6	0.598243	Strongly agree
First Axis	Q4	Frequency %	10 50	9 45	1 5	2.45	0.60481	Strongly agree
First Axis	Q5	Frequency %	9 45	11 55	- -	2.45	0.51042	Strongly agree
First Axis	Q6	Frequency %	11 55	8 40	1 5	2.5	0.60698	Strongly agree
First Axis	Q7	Frequency %	6 30	13 65	1 5	2.25	0.55012	Agree
	First Result	Frequency %	75 53.5	61 43.5	4 3	2.51	0.25163	Strongly agree
Second Axis	Q8	Frequency %	7 35	10 50	3 15	2.2	0.55012	Agree
Second Axis	Q9	Frequency %	11 55	7 35	2 10	2.45	0.69585	Strongly agree
Second Axis	Q10	Frequency %	13 65	6 30	1 5	2.6	0.68633	Strongly agree
Second Axis	Q11	Frequency %	14 70	6 30	- -	2.7	0.47016	Strongly agree
Second Axis	Q12	Frequency %	14 70	6 30	- -	2.7	0.47016	Strongly agree
	Second Result	Frequency %	59 59	35 35	6 6	2.53	0.22734	Strongly agree

Table 4: Likart Scale

Weighted average	Degree of approval
1 - 1.66	Disagree
1.67 - 2.33	Agree
2.34 - 3	Strongly Agree

Table(3) presents all the results and comparisons required to answer the axes of the questionnaire that was applied and relying on the Likart scale, provides results essential to make judgments.

Note that the result of first axis 2.51 was strictly agree and was the result of second axis 2.53 that mean agree. Therefore, we can say that the results of the study indicate that the models are important and have advantages in the application and high quality in improving the results and that the models are comprehensive solutions to trade problems, specifically financial.

9. Conclusion

This study revealed that there is a difference between the actual values and expected values when we applied the mathematical models. The result of models was better than the actual values, also we note that the traders' satisfaction was significant.

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