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Rose Wine industry of Supply Chain Management for Storage using Genetic Algorithm

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Abstract:
Managing the supply chain of the rose wine sector for environmental cooperation and sustainability through Genetic algorithm is an integral part of the management of stocks in the rose wine sector. The new competent approach requires Genetic algorithm to optimize stocks in the rose wine industry for supply chain management for environmental collaboration. We also focus on the complexity of predicting optimal stocks and congestion levels to optimize stocks in the rose wine sector, from supply chain management to environmental cooperation to keep the total cost of managing the supply chain inventory for the rose wine industry. We use our methods in the rose wine industry in supply chain management for an optimization model studied in environmental cooperation. The proposed method was implemented and its performance was evaluated by MATLAB.

***Keywords:** - Supply Chain, Packaging Points, Storage and Genetic algorithm.*

1. Introduction

The supply chain in the wine sector includes all parties directly or indirectly involved in meeting a customer's request. The wine sector's supply chain includes not only producers and suppliers, but also transport companies, packing points, retailers and customers. Within each organization, such as the producer, the wine supply chain includes all the functions needed to receive and respond to a customer's request. A multilevel supply chain in the wine sector consists of several stages and possibly many actors at each stage. The lack of coordination of parcel size decisions throughout the wine supply chain leads to high costs and more cycle inventory than necessary. The purpose of the rigging system is to reduce total costs by coordinating orders in the wine supply chain. The wine sector's entire supply chain can be reduced if the producer synchronizes the product so that it is ready for shipment to the retailer in a timely manner. In such cases, the manufacturer maintains less inventory and does not have to deal with bottlenecks. Thus, both benefit from a common decision-making policy. The value of

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the supply chain in the wine sector is the difference between the value of the final product to the customer and the costs incurred in the wine supply chain to meet customer requirements. The purpose of each supply chain in the wine sector is to create maximum value. For the majority of the commercial wine sector, the value of the supply chain will be closely linked to the profitability of the wine chain, the difference between customer revenues and total costs. throughout the wine supply chain. The wine industry offers an unrivaled opportunity to explore these issues. There are major differences in the structure of the wine sector around the world. For example, there are 464,900 wine producers in France and the top ten markets control only 5% of the market. By contrast, four companies control 65% of the Australian wine market. Overall, there are obvious differences in the structure of the industry when comparing "New World" manufacturers with "Old World" companies. These structural differences are the result of institutional heterogeneity and controversial patterns of historical development. However, they are also determined by the competitive strategies of some companies. This last point is extremely important. Differences in the structure of the industry are almost exogenous; They are also the product of corporate strategies in the industry. Structural differences have widened recently as business consolidation has accelerated in some sectors, especially in New World markets. Why consolidate rapidly in a region that has been fragmented for centuries? There are two types of definitions. The term consists of dollars of reasonable economic consolidation (profit maximization). For example, the market power of the distribution channel is rising dramatically, and manufacturers are increasingly accessing training, size, and savings. The second set of factors can lead to consolidation, alt-hough it is not always profit-maximizing behavior. Companies in other sectors of the alcohol industry (i.e., beer and drink companies) purchase wineries and consolidate the maturing of the same market. They see entry into the wine industry as a way to stimulate sales growth. Zhou and Yang (2005) propose a model inventory with two warehouses and a demand-dependent inventory index. No bottles were allowed in the model, and transportation costs for moving items from RW to OW were considered to depend on the quantity transported. Lee (2006) developed two investment models with LIFO and FIFO shipping guidelines. Hsieh et al. (2008) proposed a definitive investment model for reducing items of two stocks while reducing the present value of total costs. Yadav and Swami, (2018). we developed an inventory index size model with time and fall adjustment costs for the weibull and an integrated supply chain model to reduce inventory-dependent items with linear demand in an undervalued and inflationary environment. Yadav and Swami, (2019). we have developed a flexible flexible model with two warehouses with variable price demand and inflation and an inventory model to instantly reduce items with variable maintenance costs below two warehouses. Yadav, et.al. (2019). a proposed supply chain accounting model for the decline of products with inflationary warehouses and turnovers. Yadav, et.al. (2019). created a chemical industry supply chain for storage with circulating centers using an artificial bee colonization algorithm. Yadav, et.al. (2017). we have proposed an Atmospheric Accounting Model for item decay within two storage systems. Yadav, et.al. (2016). Multi-objective optimization created for a model of electronic storage and rejection of two-storey objects using a genetic algorithm. Yadav, et.al. (2017). proposed an inventory model for two warehouses based on fuzzy products for rapidly declining products with allowable delays in modeling the supply chain and supply chain for two

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warehouses with soft computer optimization and the impact of infrastructure on two warehouses of inventory models to reduce time-consuming items and disadvantages. Yadav, et.al. (2020). combines the electronic components of electronic storage warehouse development and its environmental impact using a particle optimization algorithm. Sahooa, et.al. (2012) developed a genetic algorithm based on a more objective optimization of reliability in a transitional environment.

2. Prediction analysis using Genetic algorithm

The proposed method employs Genetic algorithm to study the level of stocks that require a six-phase, 18-member rose wine industry that requires management of stock control in supply chains through environmental cooperation. This is the initial idea that any type of 6-phase, 18-member rose wine industry will provide supply chain management with environmental efficiency. For this we use the neural network method. In practice, the supply chain rose wine sector is m, which means that m is the number of participants in the supply chain rose wine sector, such as the farm rose wine industry, the producer rose wine industry, the rose wine industry or packing points. , Rose wine industry in storage, Rose wine industry 1 in storage, Rose wine industry in storage 2 and Rose wine industry in storage 3,. Each rose wine storage industry consists of different agents for the rose wine industry, but as shown in the example, each rose wine storage industry has one agent for the rose wine industry. For example, there are a total of three agents in the rose wine industry, agent 1 for the rose wine industry, store 2 for the rose wine industry, store 3 for the rose wine industry, agent 2 for the rose wine industry, agent 2 for the rose wine industry. 1. store, 2. store rose wine industry 3. warehouse wine industry and 3. agent rose wine industry 1. warehouse rose wine industry, 2. warehouse rose wine industry, 3. warehouse rose wine industry and so on. Each branch of agent storage for rose wine also consists of different branches of rose wine production. For example, here we will use the six links of the supply chain - the 10-member rose wine industry shown in Figure 1. in the picture. In our example - six six steps - the 10-member rose supply chain wine industry consists of a farm rose wine industry, rose wine. Producer industry, Rose wine industry at packing stations, Rose wine industry in storage-1, Rose wine industry in storage-2, Rose wine industry in stores-3, Rose wine industry in stores-3, Rose wine industry in agents-1, Rose wine industry-2, rose wine industry 2, rose wine Agents-3 industry, rose wine industry Product packaging destruction.

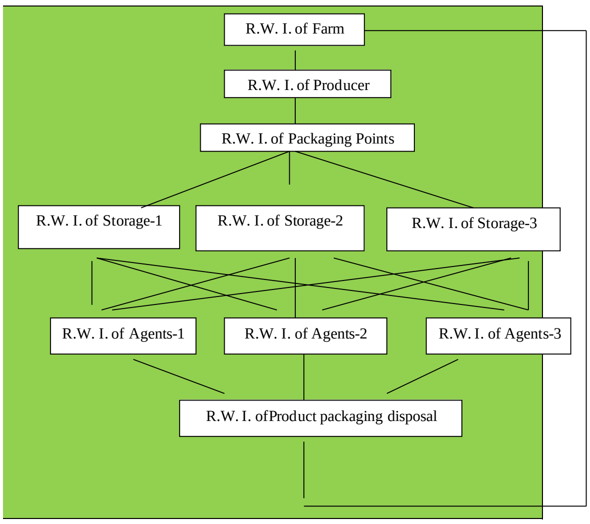

Fig 1. Six Stages - 10 Member Rose wine industry of Supply Chain

In six steps, with 10 members in the management of supply chain supply for the rose wine industry through environmental cooperation, we have been shown that the rose wine raw material industry is a mass-owned zone with holdings in the farm rose wine industry. A producer's rose wine sector is a mass stock area where stocks are produced in accordance with the requirements of the rose wine industry at packing points.

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Thereafter, the packing point rose wine industry will take care of supplies for the rose wine storage industry. Starting from the storage rose wine sector, the shares will be shifted to the corresponding agent rose wine sector and finally to the processed rose wine sector where the products are marketed, the shares will be shifted to the corresponding rose wine sector. As discussed earlier, our approach has the responsibility of predicting the optimum file level from previous records, so that the predicted file level does not use excessive amounts and each resource has less resources. From this it can be concluded that our approach ultimately results in a stock level to be maintained in six steps - 10 MemberRose wine sector stock control management with environmental cooperation, farm rose wine industry, producer rose wine industry, rose Packing point wine industry, rose wine storage sector 1, rose wine storage sector 2, rose wine shop 3, rose wine industry-1, rose wine industry-2 and rose wine industry-3. Each warehouse is additionally made up of different representatives of the red wine industry, but as shown in the example, there is one agent in each wine storage sector - rose wine. In total there are three rose wine industry, 1. agent rose wine industry 1. storage rose wine industry, 2. warehouse rose wine industry, 3. warehouse rose wine industry, 3. warehouse rose wine industry, 2. agent rose wine industry industry. ofStorage 1, Rose 2 Wine Industry 2 in Warehouse 3, Rose Wine Industry 3 and Rose Wine Industry 1 for Rose Wine Industry, 2 Rose Wine Shop, 3 Rose Wine Industry. the agent additionally includes a number of rose wine product packages, but as shown in the example, each rose wine agent has one rose wine product product pack. In the proposed methodology, we are Genetic algorithm to find the optimal value.

What are the steps in the optimization analysis? Initially, the levels of stock levels that are too high and stock levels that are insufficient in the various rose wine sectors operating under supply chain management with the help of environmental collaborators shall be designated as zero or zero. values. Zero indicates that the participant does not need inventory control, while non-zero data requires inventory control. Zero zero data determines both the amount of excess stock and the amount of deficit. The excess amount is reported as a positive value and the deficit amount is called a negative value. The first process to do is clustering, which combines levels of classification files that have a surplus or a deficit, and file levels that are not yet too much still a deficit. This is done by simply grouping the values of zero and zero. We use efficient Genetic algorithm for this purpose. After completing the neural network process, work begins its procedures on the Genetic algorithm that are at the heart of our work.

Genetic algorithm

$$[1]:\rightarrow \left\{\begin{array}{l} \text{Set population size } (p\_size), \text{ probability of crossover } (p\_cross), \\ \text{probability of mutation } (p\_mute), \text{ maximum generation } (m\_gen) \\ \text{and bounds of the variables.} \end{array}\right\}$$

$$[2]: \rightarrow \{[t = 0[t \text{ represents the number of current generation}].\}$$

$$[3]: \rightarrow \left\{\begin{array}{l} \text{Initialize the chromosomes of the population} \\ P(t)[\ P(t) \text{ represents the population at tth generation}]. \end{array}\right\}$$

$$[4]:\rightarrow \left\{\begin{array}{l} \text{Evaluate the fitness function of each chromosome of} \\ P(t) \text{ considering the objective function as the fitness function.} \end{array}\right\}$$

$$[5]: \rightarrow \{\text{Find the best chromosome from the population } P(t).\}$$

$$[6]: \rightarrow \{t \text{ Is increased by unity.}\}$$

$$[7]: \rightarrow \left\{\begin{array}{l} \text{If the termination criterion is satisfied go to Step} -14, \\ \text{otherwise, go to next step.} \end{array}\right\}$$

$$[8]: \rightarrow \left\{\begin{array}{l} \text{Select the population } P(t) \text{ from the population} \\ P(t-1) \text{ of earlier generation by tournament selection process.} \end{array}\right\}$$

$$[9]: \rightarrow \left\{\begin{array}{l} \text{Alter the population } P\ (t) \text{ by crossover,} \\ \text{mutation and elitism operators.} \end{array}\right\}$$

$$[10]: \rightarrow \left\{\begin{array}{l} \text{Evaluate the fitness function value of} \\ \text{each chromosome of } P(t). \end{array}\right\}$$

$$[11]: \rightarrow \{\text{Find the best chromosome from } P(t).\}$$

$$[12]: \rightarrow \left\{\begin{array}{l} \text{Compare the best chromosome of } P\ (t) \\ \text{and } P\ (t-1) \text{ store better one.} \end{array}\right\}$$

$$[13]: \rightarrow \{\text{Go to Step} - 6.\}$$

$$[14]: \rightarrow \left\{\begin{array}{l} \text{Print the best chromosome} \\ (\text{which is the solution of the optimization problem}). \end{array}\right\}$$

$$[15]: \rightarrow \{End.\}$$

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3. Implementation Results

For optimal inventory control on the MATLAB platform, we implement neural network-based analyzes. As mentioned above, we have detailed information on the over-supply and shortage of white wine in each supply chain, product delivery times to complement each supply chain member, and raw material delivery times. Table 1 shows examples of data containing this information.

Table 1. Sample data with records of each actor in the white wine supply chain

DI	R.W. I.F	R.W. I.P	R.W. I.P.P	R.W. I.S-9	R.W. I.S-8	R.W. I.S-3	R.W. I.A9	R.W. I.A8	R.W. I.A3	R.W. I.PPD
1	901	801	301	101	101	101	101	101	101	901
2	990	890	390	190	190	190	190	190	190	991
3	991	891	391	191	191	191	191	191	191	811
1	980	880	380	180	180	180	180	180	180	381
5	981	881	381	181	181	181	181	181	181	111
6	930	830	330	130	130	130	130	130	130	931
7	931	831	331	131	131	131	131	131	131	811
8	910	810	310	110	110	110	110	110	110	311
9	911	811	311	111	111	111	111	111	111	101
10	910	810	310	110	110	110	110	110	110	971
11	911	811	311	111	111	111	111	111	111	801
12	960	860	360	160	160	160	160	160	160	301
13	961	861	361	161	161	161	161	161	161	111
11	970	870	370	170	170	170	170	170	170	101
15	971	871	371	171	171	171	171	171	171	611
16	980	880	380	180	180	180	180	180	180	701
17	981	881	381	181	181	181	181	181	181	801

In Table 1, six levels of product identification - 10 members, six levels of transport identification - 10 members, six levels of inventory - 10 members above or above six levels - 10 members missing in each of six levels - 10 members are members of the supply chain. Negative values mean a six-level deficit: 10 members 'stocks and positive values mean a six-level surplus: 10 members' stocks. The Transport ID in the table for six levels: 10 members serves as an index for separating deadlines for six levels: 10 members stocks and six levels: 10 members. Table 2 shows a sample of transport IDs for six levels - 10 members and deadlines for six levels - 10 members for six levels - 10 member populations. 6-member supply chain with six levels: 10 members, six levels can be obtained in 17 delivery times: 10 members.

Table 2. Database data examples with stock delivery times

DI	R.W. I.D-4	R.W. I.D-2	R.W. I.D-3	R.W. I.D-8	R.W. I.D-7	R.W. I.D-6	R.W. I.D-7	R.W. I.D-8	R.W. I.D-9	R.W. I.D-40
1	440	242	343	823	823	823	783	783	783	423
2	424	227	348	828	828	828	788	788	788	428
3	434	228	347	827	827	827	787	787	787	427
4	427	262	346	826	826	826	786	786	786	426
5	487	238	347	827	827	827	787	787	787	427
6	437	236	348	828	828	828	788	788	788	428
7	476	239	349	829	829	829	789	789	789	429
8	486	287	320	830	830	830	780	780	780	220
9	467	280	324	834	834	834	784	784	784	224
10	470	289	322	832	832	832	782	782	782	222
11	487	274	323	833	833	833	783	783	783	223
12	487	272	328	838	838	838	788	788	788	228
13	423	273	327	837	837	837	787	787	787	227
14	426	278	326	836	836	836	786	786	786	226
15	427	277	328	838	838	838	788	788	788	228
16	478	278	329	839	839	839	789	789	789	229
17	487	279	330	830	830	830	780	780	780	320

Table 2 shows sample data with shipping ID and stock delivery times. Seven actors in the rose wine sector can reach six deadlines in the supply chain.

D1 is the deadline for product movements of the Rose wine industry of product from R.W. I.F to R.W. I.P
D2 is the deadline for product movements R.W. I.P to R.W. I.P.P;
D3 is the deadline for product movements R.W. I.P.P to R.W. I.S-1;
D4 is the deadline for product movements R.W. I.P.P. to R.W. I.S-2;
D5 is the deadline for product movements R.W. I.P.P to R.W. I.S-3;
D6 is the deadline for product movements R.W. I.S-1 to R.W. I.A1;
D7is the deadline for product movements R.W. I.S-1 to R.W. I.A2;
D8is the deadline for product movements R.W. I.S-1 to R.W. I.A3;
D9 is the deadline for product movements R.W. I.S-2 to R.W. I.A1;
D10 is the deadline for product movements R.W. I.S-2 to R.W. I.A2;
D11 is the deadline for product movements R.W. I.S-2 to R.W. I.A3;
D12 is the deadline for product movements R.W. I.S-3 to R.W. I.A1;
D13 is the deadline for product movements R.W. I.S-3 to R.W. I.A2;
D14 is the deadline for product movements R.W. I.S-3 to R.W. I.A3;

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D15 is the deadline for product movements R.W. I.A1 to R.W. I.PPD;
D16 is the deadline for product movements R.W. I.A2 to R.W. I.PPD;
D17 is the deadline for product movements R.W. I.A3 to R.W. I.PPD;

As an initialization step in the neural network process, random individuals and their corresponding velocities are generated.

Table 3: Initially random people

DI	R.W. I.F	R.W. I.P	R.W. I.P.P	R.W. I.S-1	R.W. I.S-2	R.W. I.S-3	R.W. I.A1	R.W. I.A2	R.W. I.A3	R.W. I.PPD
1	725	-247	354	125	125	125	354	354	354	-101
2	754	215	351	-234	-234	-234	265	265	265	901

For analysis based on Genetic algorithm, participants in the supply chain must be composed of random people with 17 particles representing product identification and seven red wine industries. Table 3 describes two people in the sample. Table 4 also shows the random velocities corresponding to each particle.

Table 4: Random initial velocities corresponding to each particle

DI	R.W. I.F	R.W. I.P	R.W. I.P.P	R.W. I.S-1	R.W. I.S-2	R.W. I.S-3	R.W. I.A1	R.W. I.A2	R.W. I.A3	R.W. I.PPD
1	10.725	10.154	10.124	10.145	10.145	10.145	10.158	10.158	10.158	10.169
2	10.274	10.245	10.254	10.231	10.231	10.231	10.287	10.287	10.287	10.201

The final individual obtained after meeting the above convergence criteria is shown in Table 5.

Table 5: Formatting the last person's database

DI	R.W. I.F	R.W. I.P	R.W. I.P.P	R.W. I.S-1	R.W. I.S-2	R.W. I.S-3	R.W. I.A1	R.W. I.A2	R.W. I.A3	R.W. I.PPD
1	1120	-1180	-1230	1235	1235	1235	-1301	-1301	-1301	-1501

The last person thus received represents the product identifier and stock level for each of the seven players important to the rose wine industry in order to optimize the supply chain supply.

4. Conclusion

Nowadays, the rose wine stock management industry is considered to be an important area in the supermarket management rose wine industry. Once effective and efficient management of the rose wine industry in the supply chain will finally improve customer service. In order to ensure minimum costs for the rose wine sector in the supply chain, it is inevitable that the rose wine sector accounts to be kept at different levels in the rose wine sector in the supply chain. Reducing the overall costs of the supply chain in the rose wine sector refers to reducing the cost of ownership and the short supply chain in the high rose sector. Effective Inventory Management The rose wine industry is a complex process that manages inventory throughout the rose wine supply chain and identifies the end solution as the optimal solution. In other words, in the wine supply chain management process, the inventory of each member of the red wine supply industry must correspond to the minimum total cost of supplying the red wine in the wine sector. The dynamics of abundance and scarcity at all times are a serious problem when considering implementation. In addition, multiple product tracking leads to a very complex inventory management process. The complexity of the problem is exacerbated by the split between the warehouse rose wine sector and the red wine sector.

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