ANALELE UNIVERSITĂȚII
"EFTIMIE MURGU" REȘIȚA
ANUL XXIII, NR. 1, 2016, ISSN 1453 - 7397

Study on the Evolution of Weights on the Market of Competitive Products using Markov Chains

Daniel Mihai Amariei, Alexandru Victor Amariei

In this paper aims the application through the Markov Process mode, within the software product WinQSB, Markov chain in the establishment of the development on the market of five brands of athletic shoes.

***Keywords**: Markov chains, condition of balance, market share, probability, weight*

1. Introduction

In scientific management, analysis of Markov is the most widely used in the study and forecasting of the behavior of customers versus a branded product. Markov chains can apply for any competitive products to determine how that is supposed to evolve on the market of a competitive products [4].

The premise of the application of Markov chain to determine the evolution of weights on the market of some products perfectly substitutable leads to navigate the following steps [2]:

- Identification of competitive products;
- Seting the gallup poll of the share on the market of competing products at any time, considered the initial point;
- Seting the market gallup poll of the degree of reliability in relation to each product and the likelihood of movement to other products;
- The use of a informatic product to calculate the successive changes wich apears in the size of the share held by each of the competitive product. In this paper was used the computer program WinQSB, Markov Process module.
- Plotting graphs wich are associated with the evolution of the market share of each product;
- An indication of the product's lifeon the curve situation, at the time and setting the policy for the marketing of the product.

2. Case Study

On sports equipment market compete 5 brands of sport shoes: Adidas, Asics, Puma, Nike, and the last category are entered data with other brands less famous, but who are sold on a specific segment of the market. Market shares are currently held by the five brands are: 22%, 15%, 18%, 15% and 30%.

Based on a gallup poll of marketers made on a representative sample of consumers have determined their preferences in relation to the five brands, those that leave a mark are turning to other brands, in different proportions, presented in table 1.

Table 1.

		REORIENTATION				
		Adidas	Asics	Puma	Nike	Others
DESERTED TRADEMARK	Adidas	-	10%	20%	20%	5%
	Asics	15%	-	5%	15%	10%
	Puma	20%	10%	-	4%	13%
	Nike	18%	8%	20%	-	5%
	Others	6%	19%	9%	10%	-

The marketing gallup poll has determined the following loyalty coefficients from month to month: 45%, 55%, 53%, 49% and 56%.

Having this information, it is desirable to establish the market share of the evolution of each trade mark for a period of 6 months.

Input data of the problem are presented in Fig. 1.

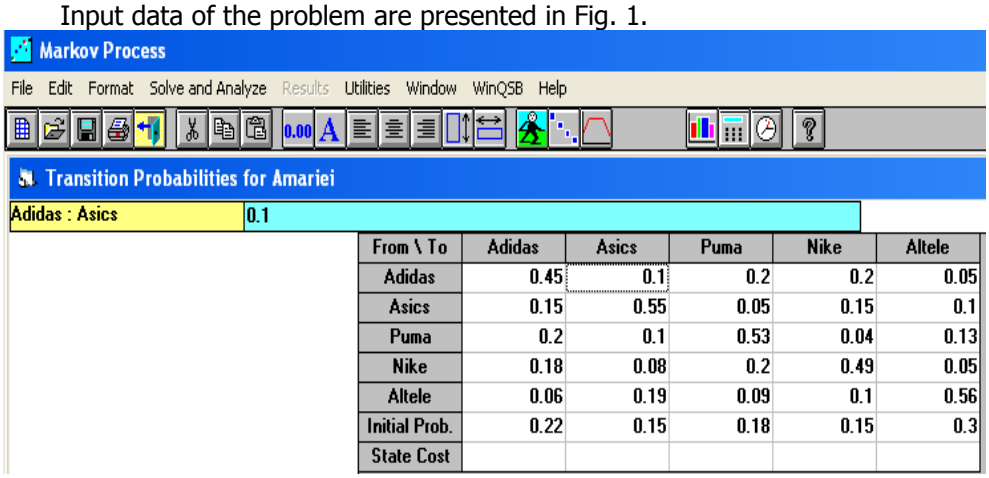

Figure 1. Input data of the problem

3. The problem solution

To obtain the values at which stabilizes the market shares of the products and the time to return to consumers the same trademark call menu Solve and Analyze, select the command Solve Steandy States. The result of the steady state of the five products studied is shown in Fig. 2

02-05-2016	State Name	State Probability	Recurrence Time
1	Adidas	0.2183	4.5808
2	Asics	0.2009	4.9777
3	Puma	0.2273	4.3991
4	Nike	0.1938	5.1592
5	Altele	0.1597	6.2636
	Expected	Cost/Return =	0

Figure 2. The probabilities of balance mood and recurrence period

The probability of choice for brand Adidas is equal to 0.2183, and the client can return to this mark after 4,58 months, to Asics brand after 4,97 months, at Puma after 4.39 months, at Nike after 5.15 months, and at last, the customer returns after 6.26 months. In other words, it is observed that for 1000 clients, 218 prefer Adidas mark, 200- Asics, 227- Puma, Nike shoes are buyed by 193 people, and brands less known sport shoes are preferred by 159.

02-05-2016	From State	To State	First Passage Time
1	Adidas	Adidas	4.5808
2	Adidas	Asics	9.1548
3	Adidas	Puma	6.3402
4	Adidas	Nike	7.2736
5	Adidas	Altele	12.5835
6	Asics	Adidas	6.7637
7	Asics	Asics	4.9777
8	Asics	Puma	8.2363
9	Asics	Nike	7.5259
10	Asics	Altele	11.8488
11	Puma	Adidas	6.2853
12	Puma	Asics	8.8932
13	Puma	Puma	4.3991
14	Puma	Nike	9.1432
15	Puma	Altele	11.0761
16	Nike	Adidas	6.2613
17	Nike	Asics	9.4127
18	Nike	Puma	6.2868
19	Nike	Nike	5.1592
20	Nike	Altele	12.6042
21	Altele	Adidas	7.9021
22	Altele	Asics	7.4794
23	Altele	Puma	8.1227
24	Altele	Nike	8.3846
25	Altele	Altele	6.2636

Figure 3. First Passage Times for Markov

Calling the same option Solve and Analyze-Solve Steandy States, but from the Results by choosing Show First Passage Times it can obtain the average range at which a purchaser switches from one product to another, as shown in Figure 3. The shorter intervals are observed at the transition of clients from Nike and Puma to Adidas after 6,26 months and 6,28 months, as well as from the Nike brand to Puma after 6.28 months.

Table 2. The evolution of market share

Time period	Probability of State Adidas	Probability of State Asics	Probability of State Puma	Probability of State Nike	Probability of State Altele
1	0,2025	0,1915	0,2039	0,1772	0,2249
2	0,2060	0,2029	0,2138	0,1867	0,1906
3	0,2109	0,2047	0,2192	0,1907	0,1744
4	0,2143	0,2040	0,2224	0,1926	0,1667
5	0,2162	0,2030	0,2245	0,1934	0,1630
6	0,2172	0,2021	0,2257	0,1937	0,1613

To obtain the evolution of the market share of each product on the market together with the graphical representation we use the option Time Parametric Analysis.

The market share of the product Adidas in the first month the is 20,25%, and increase gradually, so in the second month it get to 20,6%, in the third month21,09%, in the month fourth 21,43% , in the fifth month 21.62% and in sixth month at 21,72%.

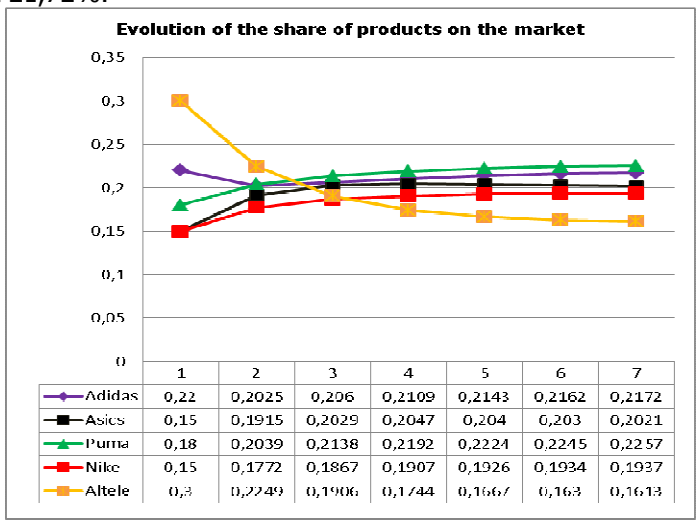

Figure 4. Evolution of the share of products on the market

The market share of the product Asics grows from the first month until the third, from 19,15% to 20,47%, then decreases until the sixth month at 20,21%.

Market shares of products 3 and 4, grows in the first month until the sixth, from 20,39% to 22,57%, in the case of Puma brand, from 17,72% to 19,37% at Nike product.

At last product it can note a drop in market share from 22,49% in the first month, until 16,13% in the last sixth.

The graphics of the development of the share on the market of the products considered to be between 1 and 7, are given in Figure 4. They are "segments" that are part of the curve of life products (launch, growth, maturity and decline).

4. Conclusion

From the analysis of the market share of the five products, it appears that the products from Adidas, Puma and Nike are in the expansion phase. Adidas product grows from 20.25% to 21,72%, Puma from 20.39 to 22,57% and Nike from 17.72 to 19,37%%. These products can be supported by an aggressive marketing, presenting a high attractiveness to consumers and the other two products.

Asics product, after two months of expansion, reaching the mature stage (20.47% -20.4%)-and then in decline, his market share dropping to 20%.

The last type of product called Others, is in the phase of decline, the share of the market being in constant decrease, from 22.49% to 16,13%.

If you are redirecting customers after certain products is due to their quality and there are not opportunities to improve it, it will try to increase sales of the Asics products and Others by lowering the price, by improving certain features or it waiving their undoing.

Asics product, in terms of quality, satisfy and the most snobbish customer, so it can only consider a fall in prices and possibly an aggressive marketing strategy.

References

[1] Amariei O.I., *Aplicaţii ale programului WinQSB în simularea proceselor de producţie*, Editura Eftimie Murgu, Reşiţa, 2009.

[2] Raţiu–Suciu C., *Modelarea & Simularea proceselor economice. Teorie şi practică.* Ediţia a II-a. Editura Economică, Bucureşti, 2002.

[3] Raţiu–Suciu C., Luban F., ş.a., *Modelare economică aplicată. 50 Studii de caz. 525 Teste*, Editura Economică, Bucureşti, 2002.

[4] Raţiu–Suciu C., *Modelarea & simularea proceselor economice. Teorie şi practică*, Ediţia a treia, Editura Economică, Bucureşti, 2003.

[5] Blăjină O.A., *Decizii optime în management cu WinQSB 2.0*, Vol.1, Editura Albastră, Cluj-Napoca, 2011.

Addresses:

- Prof. Drd. Daniel Mihai Amariei, University "Politehnica" Timișoara, Strada Remus, nr.14, 300191, Timișoara, amarieidaniel@yahoo.com
- Eng. Drd. Alexandru Victor Amariei, University "Politehnica" Timișoara, Strada Remus, nr.14, 300191, Timișoara, dj.ruvy@yahoo.com