Use of Association Rule Mining within the Framework of a Customer-Oriented Approach

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Abstract

In this study, it was aimed to investigate whether an association rule exists between the products sold, using the sales data of a supermarket with the data mining method within the framework of a customer-oriented approach. For this purpose, the Association Rule Mining Method was used, and analyses were carried out on existing data with the Apriori Algorithm that is widely used in this method. Various association rules were determined between the products sold as a result of these analyses. It was assessed that Association Rule Mining is an alternative technique to proactive customer orientation by revealing the latent purchasing behaviour patterns of the customers.

Introduction

The most important source of sustainable competitive advantage in rapidly changing business environments where uncertainty dominates is to be able to learn faster than competitors (Hosley et al., 1994:5). Organizations that can learn faster will be able to adapt to the changes around them in a short time, whereby to increase their period of survival alongside with being successful in competition.

Organizations may learn primarily in three ways. The first of these is to benefit from the experiences of others. The second way is to buy the knowledge completely. The third and the most efficient way is to learn by investigating and mutual interaction with those around the organization, e.g. customers, suppliers and competitors (Huber, 1996).

The most important information is the one that is obtained in interaction with customers. This information constitutes the basis of a customer-oriented approach that makes up the starting point of strategic

decisions which will affect the future of an enterprise. The customer-oriented approach means designing the functions, processes, structure and presentation environments of the enterprise by putting the customer in the center of all activities by starting from customer expectations.

New technologies and techniques are presented each day in order to obtain the data needed and turn them into the information used in ensuring customer-orientation. These include information technologies and data mining techniques.

While information technologies play an important role in obtaining the data needed, data mining techniques are used in producing information by analysing databases, web logs/records/statistics or standard files that contain potentially hidden patterns and relation sources. It is possible to turn consumers into customers, facilitate the shopping of customers, increase customer satisfaction and ensure customer loyalty by means of the information obtained through data mining.

The use of data mining practices in enterprises has gradually increased especially in recent years. Data mining is used in many areas such as quality control, error analyses, production systems and processes, maintenance, increasing income, product and product group design (Choudhary et al., 2009: 515). These areas may be directly and indirectly effective in developing the customer-oriented approach.

In this study, it was aimed to reveal how to use data mining techniques for the customer-oriented approach by determining product preferences of customers, and preparing and presenting product ranges.

The study consists of five parts. The customer-oriented approach is briefly mentioned in the first part; and descriptive information on the Apriori algorithm used in data mining, association rule mining and analysis are given in the second part. Literature examples of the studies carried out in this area are presented in the third part. Data warehouse was prepared by using the data of a supermarket and association rules were tried to be determined through analyses in the fourth part. The results were interpreted by assessing the findings in the final part.

Customer-Oriented Approach

Creating loyal customer masses is quite an important subject for companies in today's competitive environment. To obtain and sustain competitive advantage requires determining and meeting the customer expectations and needs from the stage of planning to the stage of product development (Rahman: 2004). This is possible with the customer-oriented approach.

Narver and Slater (1990:21) define customer orientation as "the sufficient understanding of one's target buyers to be able to create superior

value for them continuously". In other words, it means that a company focuses on providing products and services that will meet the customer need (Dean and Bowen, 1994). Certain authors that find these definitions restrictive (Schneider and Bowen, 1995: 84) consider customer orientation as a responsibility of the company for the customer in which customers and the company share their values and strategies in the long term and are in mutual solidarity.

While the customer-oriented approach provides a mutual advantage for both customers and companies in the long term (Kelley, 1992), the companies that adopt this approach put forth a better performance in terms of profitability and service quality than the enterprises that adopt other approaches (Hartline et al., 2000).

Although customer orientation is a property that is much longed for by organizations, it is quite hard for organizations to fully determine what the subjects and approaches that must be applied for achieving customer orientation are (Mukerjee, 2013).

That companies achieve customer orientation is possible with bringing their customer-oriented values to the forefront. Companies need to redesign the necessary structure, processes and incentives in order to activate their customer-oriented values (Deshpandé, Farley and Webster, 1993). For this design, companies come into direct contact with the customer, collect information about customer needs; and they use the information obtained from the customers to design and present products and services (Schneider and Bowen, 1995: 84).

While many authors (Kirca, Jayachandran, and Bearden 2005; Narver and Slater, 1990; Slater and Narver, 1994; Jaworski and Kohli, 1993; Pelham and Wilson, 1996; Han et al., 1998) indicate that customer-orientation provides success to companies in terms of profitability, sales, service quality and new products; other authors indicate that customer-orientation may lead to negative consequences by forcing the organization to see the world only through the eyes of customers (Hamel and Prahalad, 1994) and losing the leadership positions in the industry by over listening to customers (Christensen and Bower, 1996: 198).

These contradictory results obtained on customer-orientation made it necessary to address the issue more in-depth. Rather than the approaches that directly associate customer-orientation and performance, studies on the approaches that reveal the relationship between the sub-dimensions of customer-orientation and competitive advantage were deepened.

Customer-orientation has two dimensions as responsive customer-orientation and proactive customer orientation, which are not opposite but which complete each other (Atuahene-Gima et al., 2005).

Responsive customer-orientation is related to the customer needs that are defined as their current expectations that they consciously and actively demand from the company. These needs are called expressed needs. Responsive customer-orientation is the effort to understand the needs expressed by the customers and fulfil them (Narver, Slater & MacLachlan, 2004). Companies with this focus are companies that are skilful in meeting expressed needs, but are not good at estimating future needs and defining hidden needs (Slater and Narver, 1998).

Proactive customer-orientation is defined as a skill in determining the latent customer needs and revealing their future needs (Blocker et al., 2010: 2). Latent needs and solutions are needs and solutions that the customers are not aware of. Latent needs are at least as realistic as expressed needs, but the customer is not aware of them yet. Fulfilling these hidden needs is possible by directing the customers, and this means being proactive (Narver, Slater & MacLachlan, 2004). The companies with this focus investigate hidden needs by looking at the future and making innovations, rather than focusing on existing customer needs (Christensen and Bower, 1996).

The relationship between responsive and proactive customer-orientation and competitive advantage may be explained by the resource-based approach. There are basically two models that try to explain how to ensure competitive advantage and sustainable competitive advantage. The first of these is the Positioning School View, also known as the "Outside to inside" approach, and the other one is the Resource-based view, also known as "Inside to outside" approach (Erol and Ince, 2012).

According to the resource-based view, resources are "all assets, firm attributes, capabilities, knowledge, organizational processes, information, etc. controlled by a firm to conceive of and implement strategies that improve its effectiveness and efficiency" (Barney, 1991:101) and is a critical factor in gaining competitive advantage (Barney 1991; Wernerfelt 1984, 1995). In addition to the resources being valuable for the implementation of the company's strategy, strategically valuable resources must also be rare. For, a very small number of companies have valuable resources, and competitive advantage may only be obtained with these resources. If the company has valuable and rare resources, it can gain a competitive advantage by means of these resources. If the company has both valuable and rare resources and also if these resources cannot be easily substituted and imitated by the competitors, these resources may ensure the sustainability of the company's competitive advantage (Barney 1991; Eisenhardt and Martin, 2000).

According to Barney (1991: 112-113), resources are heterogeneously distributed among the companies. As a result, companies that have valuable and rare resources may obtain a competitive advantage by means of the

strategies that they develop and implement. If the resources are immobile in addition to being heterogeneous, it will not be easy to imitate and substitute valuable and rare resources. Thus, companies may gain a sustainable competitive advantage through the strategies they develop and implement.

Valuable

Rare

| Resources | → | Competitive Advantage | → | Sustainable Competitive Advantage |

Non-substitutable

Non-imitable
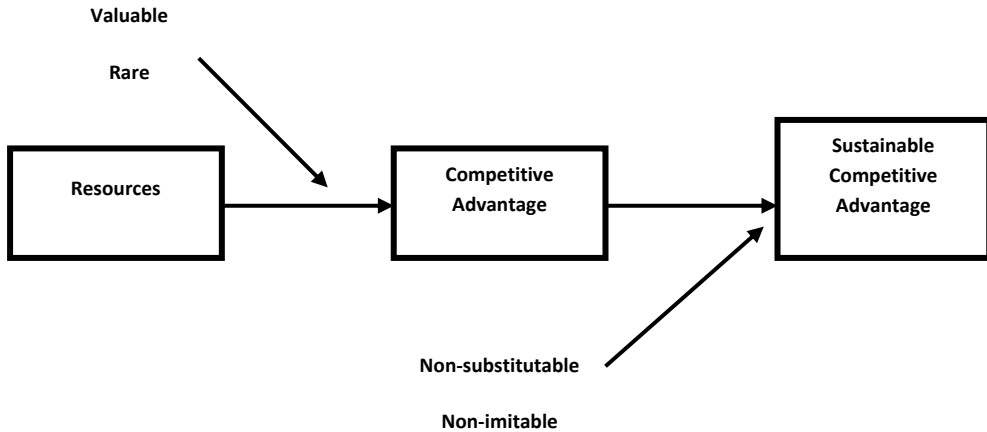
Responsive customer-orientation has a critical role in creating customer value (White, Varadarajan, and Dacin 2003; Jayachandran, Hewett, and Kaufman 2004;). Customer value is an important resource that cannot be easily created. The enterprise may ensure competitive advantage by means of this valuable and rare resource. However, this resource is insufficient for ensuring sustainable competitive advantage.

| Responsive Customer Orientation | → | Customer Value | → | Competitive Advantage |

Proactive customer-orientation provides customer value (Blocker et al. 2010) and new opportunities that will direct to customer value (Slater and Narver 1998, 1999; Jaworski, Kohli, and Sahay 2000) at the point of meeting hidden and future customer needs. The customer value created by customer-orientation is a valuable, rare and non-substitutable strategic resource that is not easily imitable (Hunt and Lambe, 2000). Then, this resource can be used in obtaining competitive advantage and making this sustainable, and thus, it can ensure superior performance.

| Proactive Customer Orientation | → | Customer Value | → | Sustainable Competitive ... |
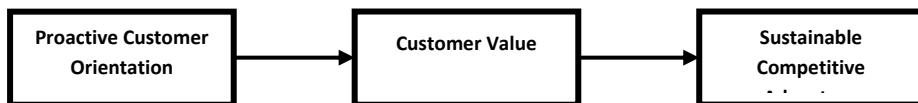
However, it is not easy to ensure proactive customer orientation. Since "customer may not know what they want, or may not be able to imagine what they may want in the future" (Zeithaml et al., 2006: 177);

furthermore, while it is possible to make certain theoretical inferences on hidden and future needs of the customers, it is hard to make practical analyses (Narver, Slater & MacLachlan, 2004: 335).

At this point, it becomes important to recommend ways and methods that may reveal hidden and future customer needs or help companies in this respect.

Information technologies and data mining techniques may provide new opportunities for proactive customer orientation in revealing latent customer needs, if not their future needs. Association rule mining may reveal the purchasing behaviours of the customers that they use unconsciously. It may help reveal the hidden needs and expectations shown by the customer unconsciously. Companies exhibit a proactive approach by focusing on these needs and expectations.

Data Mining, Association Rules and Apriori Algorithm

Data mining is an interdisciplinary area and the combination of the disciplinary cluster that includes database systems, statistics, machine learning, visualization and information science (Han and Kamber, 2006: 29). Data mining is used for providing the pre-information necessary for decision support systems for the field that is studied by exploring the information in databases (Fayyad et al., 1996: 38). By means of data mining, it is possible to reveal the tendencies and behaviour patterns needed for decision support systems for enterprises to make more effective decisions (Inan, 2003). Data mining, where it is possible to explore information based on analysing data from different points-of-view, can be implemented in various fields, including advertising, bioinformatics, database marketing, fraud detection, e-trade, health, security, web, financial estimation, etc. (Jain et al., 2011). In addition to these, data mining is the part of a general process for exploring information in databases as data exploration science and technology for exploring previously unknown patterns. In today's computer focused world, large information in databases also include the patterns to be explored. The accessibility and abundance of this information make data mining very important and necessary (Maimon and Rokach, 2008:1).

There are many techniques in data mining, namely, Association Rules, Clustering, Decision Trees, Discriminant Analysis, Artificial Neural Networks, Genetic Algorithms, etc. These techniques are used for the purpose of processing information taken from various fields in order to explore the information that can guide the decisions of a manager and provide information (Wu and Li, 2003).

The Association Rules technique was developed in the field of computer sciences but implemented in areas such as market basket analysis (that measures the relationship between the products purchased by a

particular customer) and web clicking analysis (that reveals the relationship between the pages that are frequently clicked by a visitor for a website). In general, the aim is to emphasise the groups of parts that majorly co-occur in a group of processes (Giudici and Figini, 2009: 90–91). In other words, Association Rules mean the determination of the relationship and association between the special values of the variables in large data clusters. This technique ensures that analysers and researchers reveal hidden patterns in large data sets (Nisbet et al., 2009:126). The strengths of the technique are its practicality, ease of understanding and that it reveals all possible patterns. However, that it reveals all possible possibilities is also its weakness. For, decision-makers have to cope with a large amount of information where they will assess all of these possibilities, and this is a hard and time-consuming situation (Kantardzic, 2003: 169).

Using the Association Rules technique, also called Market Basket Analysis, assessments are made especially on the consumption habits of consumers, and it allows for the definition of the products or product groups with a co-existence tendency in purchasing processes (Giudici and Figini, 2009: 175).

One of the most widely used algorithms in association rules is the Apriori algorithm. The algorithms that reveal wide object clusters revise all existing data more than once. In the first revision, the support level of each object is calculated and compared with the minimum support value entered at the beginning by the user, and whether each object is widespread is examined. Each following revision starts with the objects that are determined as widespread in the previous revision, and widespread object clusters are formed. These widespread object clusters are called candidate object clusters. At the end of the revision, which candidate object cluster is actually widespread is checked. As indicated before, in order for an object cluster to be named as widespread, it must have a support level above the minimum support level given by the user. The next revision is also started with the product clusters that are chosen as widespread in the previous revision, and the support levels of these object clusters are calculated by the end of the database. This process is maintained until no new widespread product clusters can be found (Silahtaroğlu, 2008:86). The general structure of the Apriori algorithm is as follows:

The Apriori Algorithm for Generating Frequent Item Sets

1. $L_1 = \{\text{frequent one-item-item sets}\}$
2.   **for** $k = 2$; $L_{k-1} \neq \emptyset$; $k{+}{+}$ **do begin**
3. $C_k = \{\{x_1, x_2, \ldots, x_{k-2}, x_{k-1}, x_k\} \mid \{x_1, x_2, \ldots, x_{k-2}, x_{k-1}\} \in L_{k-1} \wedge$
    $\{x_1, x_2, \ldots, x_{k-2}, x_k\} \in L_{k-1}\}$
4.   **for all** transactions $t \in D$ **do begin**
5.   **for all** candidates $c \in C_k \wedge c \subseteq t$ **do**
6. $c.\text{count}{+}{+}$;
7.   **end**
8. $Lk = \{c \in C_k \mid c.\text{count} \geq \text{minsup}\}$
9.   **end**
10.   return $\bigcup_k L_k$;

Literature Review

Many studies have been carried out in the literature using the association rule mining technique. Kumar and Rukmani (2010) created association rules using the Apriori and FP-Growth algorithms from web log files. Alan (2014) determined that there are association rules between both the lessons in which students are successful and those in which students fail by using student data. Babu and Bhuvaneswari (2012) applied Association Rule Mining to Customer Relations Management using the data of the company's customers. Umarani and Punithavalli (2011) conducted analyses using different association rule mining on real-life data such as retail sales data and market basket data. Erpolat (2012) investigated the association rules between the service equipment purchased by the customers in a car service. Wang et al. (2010) applied the Fuzzy FP-Growth and standard Apriori algorithms to two different data sets and found that fuzzy association rules demonstrate better performance in both cases. Ivancy (2005) compared the advantages and disadvantages of the Apriori and FP-Growth algorithms among the popular algorithms in association rule mining on the data sets produced from the website of IBM and found that the cubic algorithm demonstrates better performance in both of them.

Data Preparation

In this study, sales obtained from a supermarket in the city centre of Sivas were used as data. The data were taken in Excel format, and the data warehouse was prepared using Excel macros.

A data warehouse is a structure which is used in order to help managers make decisions; it changes in time, is integrated, subject-oriented, and consists of the sum of the data that cannot be updated. According to Anahory and Murray, a data warehouse is meta, real, dimensional and clustered data, and is a process manager that supplies appropriate

information that helps people make conscious decisions (which loads data and questions). Before using a data warehouse, companies used to store data for different functions in separate databases (Bose 2009:190).

A data warehouse is a database system used for the purpose of storing data in various functional databases for decision support purposes. For a retailer, a data warehouse may contain information from a market basket database, a supplier database or customer databases. The data in a payroll may not be included in a data warehouse if it is considered that they are not of vital importance. A data warehouse cannot be formed by the minimization of various data in different databases only on a single disc. It must fulfil various integrated tasks such as solving possible conflicts between variable names and their uses and revealing the meaning of properties and values. Creating data warehouses is an expensive process as functional databases require a careful approach and manual intervention most of the time (Hand et al., 2001:419).

The structure of a data warehouse requires data cleaning, data integration and data arrangement most of the time. The use of the data warehouse generally requires a compilation of decision support technologies (Han and Kamber, 2006:107).

Two criteria as "support" and "trust" are used in order to reveal the relations between the products sold in association rules. A value called "number of support" is used in the calculation of these criteria. "The support criterion" determines the rate in which a relationship is repeated in all transactions. "The trust criterion" reveals the possibility that the customer purchasing A product group will also buy B product group (Özkan 2008:157).

While preparing the data warehouse in this study, the necessary transformations were made on the data and written on the text file named "veriset.txt". During this stage of transformation, noisy data were sorted out, and their writing on the text file was prevented. Value "1" was appointed in case the product is purchased while the data warehouse is being prepared, and "0" was appointed in case it is not.

Version 1.4.50 of Tanagra program was used in the study carried out. Tanagra Software is an open-source code software. This software supports the algorithm of many classifications, clustering and association rules.

Association rule mining was performed between the product sales made to 2205 customers considering the data of the customers buying at least 5 products at once among the existing 203.000 lines of data. As a result of the analysis, 156 rules presented in the table below were produced with the Apriori algorithm.

Table 1. Rules Produced with the Apriori Algorithm

N	Antecedent	Consequent	Support (%)	Confidence (%)
1	"Chips=true" - "Cleaning_products=true"	"Chewing_gum=true" - "Hot_drinks=true"	0,114	100,000
2	"Chips=true" - "Cleaning_products=true"	"Beverage=true" - "Hot_drinks=true"	0,114	100,000
3	"Cleaning_products=true" - "Hot_drinks=true"	"Chips=true" - "Chewing_gum=true"	0,114	100,000
4	"Water=true" - "Hot_drinks=true"	"Chips=true" - "Chewing_gum=true"	0,114	100,000
5	"Cleaning_products=true" - "Hot_drinks=true"	"Beverage=true" - "Chewing_gum=true"	0,114	100,000
6	"Chips=true" - "Cleaning_products=true"	"Beverage=true" - "Chewing_gum=true"	0,114	100,000
7	"Basic_food=true" - "Hot_drinks=true"	"Beverage=true" - "Waterturunleri=true"	0,171	75,000
8	"Chips=true" - "Chewing_gum=true" - "Cleaning_products=true"	"Hot_drinks=true"	0,114	100,000
9	"Beverage=true" - "Chips=true" - "Cleaning_products=true"	"Hot_drinks=true"	0,114	100,000
10	"Chips=true" - "Cleaning_products=true"	"Hot_drinks=true"	0,114	100,000
11	"Cigarette=true" - "Dairy_products=true" - "Cleaning_products=true"	"Greengrocer=true"	0,171	100,000
12	"Cleaning_products=true" - "Hot_drinks=true"	"Beverage=true" - "Chips=true"	0,114	100,000
13	"Biscuit=true" - "Hot_drinks=true"	"Beverage=true" - "Chips=true"	0,171	100,000
14	"Beverage=true" - "Chewing_gum=true" - "Hot_drinks=true"	"Cleaning_products=true"	0,114	100,000
15	"Dairy_products=true" - "Chewing_gum=true" - "Basic_food=true"	"Cleaning_products=true"	0,114	100,000
16	"Water=true" - "Dairy_products=true" - "Basic_food=true"	"Cleaning_products=true"	0,114	100,000
17	"Dairy_products=true" - "Cookies=true"	"Cleaning_products=true"	0,114	100,000
18	"Beverage=true" - "Newspaper=true"	"Cigarette=true" - "Biscuit=true"	0,114	100,000
19	"Cigarette=true" - "Newspaper=true"	"Beverage=true" - "Biscuit=true"	0,114	100,000
20	"Cikolata=true" - "Beverage=true" - "Greengrocer=true"	"Basic_food=true"	0,114	100,000
21	"Dairy_products=true" - "Chewing_gum=true" - "Cleaning_products=true"	"Basic_food=true"	0,114	100,000
22	"Water=true" - "Dairy_products=true" - "Cleaning_products=true"	"Basic_food=true"	0,114	100,000
23	"Chips=true" - "Dairy_products=true" - "Hot_drinks=true"	"Basic_food=true"	0,114	100,000
24	"Beverage=true" - "Dairy_products=true" - "Hot_drinks=true"	"Basic_food=true"	0,171	100,000
25	"Cigarette=true" - "Chocolate=true" - "Greengrocer=true"	"Basic_food=true"	0,114	100,000
26	"Chips=true" - "Greengrocer=true"	"Cigarette=true" - "Beverage=true"	0,114	100,000
27	"Water=true" - "Jellybeans=true"	"Chocolate=true" - "Beverage=true"	0,114	100,000
28	"Water=true" - "Jellybeans=true"	"Cigarette=true" - "Beverage=true"	0,114	100,000
29	"Biscuit=true" - "Newspaper=true"	"Cigarette=true" - "Beverage=true"	0,114	100,000

30	"Water=true" - "Jellybeans=true"	"Cigarette=true" - "Chocolate=true"	0,114	100,000
31	"Chips=true" - "Cleaning_products=true"	"Chewing_gum=true"	0,114	100,000
32	"Cleaning_products=true" - "Hot_drinks=true"	"Chewing_gum=true"	0,114	100,000
33	"Chips=true" - "Water=true" - "Hot_drinks=true"	"Chewing_gum=true"	0,114	100,000
34	"Water=true" - "Hot_drinks=true"	"Chewing_gum=true"	0,114	100,000
35	"Chips=true" - "Cleaning_products=true" - "Hot_drinks=true"	"Chewing_gum=true"	0,114	100,000
36	"Beverage=true" - "Cleaning_products=true" - "Hot_drinks=true"	"Chewing_gum=true"	0,114	100,000
37	"Beverage=true" - "Chips=true" - "Cleaning_products=true"	"Chewing_gum=true"	0,114	100,000
38	"Beverage=true" - "Basic_food=true" - "Hot_drinks=true"	"Dairy_products=true"	0,171	100,000
39	"Basic_food=true" - "Cleaning_products=true" - "Greengrocer=true"	"Dairy_products=true"	0,114	100,000
40	"Beverage=true" - "Basic_food=true" - "Cleaning_products=true"	"Dairy_products=true"	0,114	100,000
41	"Basic_food=true" - "Hot_drinks=true"	"Dairy_products=true"	0,228	100,000
42	"Chips=true" - "Basic_food=true" - "Hot_drinks=true"	"Dairy_products=true"	0,114	100,000
43	"Chewing_gum=true" - "Basic_food=true" - "Cleaning_products=true"	"Dairy_products=true"	0,114	100,000
44	"Water=true" - "Basic_food=true" - "Cleaning_products=true"	"Dairy_products=true"	0,114	100,000
45	"Dairy_products=true" - "Hot_drinks=true"	"Basic_food=true"	0,228	80,000
46	"Ice_cream=true" - "Jellybeans=true"	"Chocolate=true" - "Biscuit=true"	0,114	100,000
47	"Chocolate=true" - "Beverage=true" - "Jellybeans=true"	"Water=true"	0,114	100,000
48	"Beverage=true" - "Basic_food=true" - "Cleaning_products=true"	"Water=true"	0,114	100,000
49	"Basic_food=true" - "Ice_cream=true"	"Water=true"	0,114	100,000
50	"Cigarette=true" - "Cleaning_products=true" - "Greengrocer=true"	"Dairy_products=true"	0,171	75,000
51	"Basic_food=true" - "Greengrocer=true"	"Dairy_products=true"	0,171	75,000
52	"Beverage=true" - "Chewing_gum=true" - "Hot_drinks=true"	"Chips=true"	0,114	100,000
53	"Biscuit=true" - "Water=true" - "Ice_cream=true"	"Chips=true"	0,114	100,000
54	"Water=true" - "Chewing_gum=true" - "Hot_drinks=true"	"Chips=true"	0,114	100,000
55	"Biscuit=true" - "Hot_drinks=true"	"Chips=true"	0,171	100,000
56	"Cleaning_products=true" - "Hot_drinks=true"	"Chips=true"	0,114	100,000
57	"Chewing_gum=true" - "Hot_drinks=true"	"Chips=true"	0,171	100,000
58	"Water=true" - "Hot_drinks=true"	"Chips=true"	0,114	100,000
59	"Chewing_gum=true" -	"Chips=true"	0,114	100,000

	"Cleaning_products=true" - "Hot_drinks=true"			
60	"Beverage=true" - "Biscuit=true" - "Hot_drinks=true"	"Chips=true"	0,171	100,000
61	"Beverage=true" - "Cleaning_products=true" - "Hot_drinks=true"	"Chips=true"	0,114	100,000
62	"Beverage=true" - "Hot_drinks=true"	"Chips=true"	0,284	83,333
63	"Beverage=true" - "Water=true" - "Cookies=true"	"Biscuit=true"	0,114	100,000
64	"Beverage=true" - "Chips=true" - "Cookies=true"	"Biscuit=true"	0,114	100,000
65	"Chocolate=true" - "Ice_cream=true" - "Jellybeans=true"	"Biscuit=true"	0,114	100,000
66	"Ice_cream=true" - "Jellybeans=true"	"Biscuit=true"	0,114	100,000
67	"Cigarette=true" - "Water=true" - "Chewing_gum=true"	"Biscuit=true"	0,114	100,000
68	"Cigarette=true" - "Newspaper=true"	"Biscuit=true"	0,114	100,000
69	"Cigarette=true" - "Beverage=true" - "Newspaper=true"	"Biscuit=true"	0,114	100,000
70	"Beverage=true" - "Newspaper=true"	"Biscuit=true"	0,114	100,000
71	"Cigarette=true" - "Water=true" - "Cookies=true"	"Biscuit=true"	0,114	100,000
72	"Chocolate=true" - "Basic_food=true" - "Cookies=true"	"Biscuit=true"	0,171	100,000
73	"Chips=true" - "Water=true" - "Ice_cream=true"	"Biscuit=true"	0,114	100,000
74	"Chocolate=true" - "Dairy_products=true" - "Chewing_gum=true"	"Biscuit=true"	0,114	100,000
75	"Cigarette=true" - "Chewing_gum=true" - "Cookies=true"	"Biscuit=true"	0,114	100,000
76	"Water=true" - "Cleaning_products=true"	"Beverage=true"	0,171	100,000
77	"Water=true" - "Jellybeans=true"	"Beverage=true"	0,114	100,000
78	"Water=true" - "Basic_food=true" - "Cleaning_products=true"	"Beverage=true"	0,114	100,000
79	"Cleaning_products=true" - "Hot_drinks=true"	"Beverage=true"	0,114	100,000
80	"Chips=true" - "Greengrocer=true"	"Beverage=true"	0,114	100,000
81	"Cigarette=true" - "Newspaper=true"	"Beverage=true"	0,114	100,000
82	"Chewing_gum=true" - "Cleaning_products=true" - "Hot_drinks=true"	"Beverage=true"	0,114	100,000
83	"Biscuit=true" - "Newspaper=true"	"Beverage=true"	0,114	100,000
84	"Chips=true" - "Cleaning_products=true"	"Beverage=true"	0,114	100,000
85	"Biscuit=true" - "Hot_drinks=true"	"Beverage=true"	0,171	100,000
86	"Chocolate=true" - "Water=true" - "Jellybeans=true"	"Beverage=true"	0,114	100,000
87	"Cigarette=true" - "Biscuit=true" - "Basic_food=true"	"Beverage=true"	0,114	100,000
88	"Chocolate=true" - "Basic_food=true" - "Greengrocer=true"	"Beverage=true"	0,114	100,000
89	"Cigarette=true" - "Chips=true" - "Water=true"	"Beverage=true"	0,171	100,000
90	"Cigarette=true" - "Biscuit=true" -	"Beverage=true"	0,114	100,000

	"Newspaper=true"			
91	"Cigarette=true" - "Water=true" - "Jellybeans=true"	"Beverage=true"	0,114	100,000
92	"Cigarette=true" - "Water=true" - "Cleaning_products=true"	"Beverage=true"	0,114	100,000
93	"Cigarette=true" - "Chocolate=true" - "Greengrocer=true"	"Beverage=true"	0,114	100,000
94	"Cigarette=true" - "Chips=true" - "Greengrocer=true"	"Beverage=true"	0,114	100,000
95	"Cigarette=true" - "Basic_food=true" - "Greengrocer=true"	"Beverage=true"	0,114	100,000
96	"Chips=true" - "Basic_food=true" - "Hot_drinks=true"	"Beverage=true"	0,114	100,000
97	"Chips=true" - "Chewing_gum=true" - "Cleaning_products=true"	"Beverage=true"	0,114	100,000
98	"Chips=true" - "Dairy_products=true" - "Hot_drinks=true"	"Beverage=true"	0,114	100,000
99	"Cigarette=true" - "Chips=true" - "Basic_food=true"	"Beverage=true"	0,114	100,000
100	"Water=true" - "Dairy_products=true" - "Cleaning_products=true"	"Beverage=true"	0,114	100,000
101	"Water=true" - "Dairy_products=true" - "Basic_food=true"	"Beverage=true"	0,114	100,000
102	"Chips=true" - "Cleaning_products=true" - "Hot_drinks=true"	"Beverage=true"	0,114	100,000
103	"Biscuit=true" - "Chips=true" - "Hot_drinks=true"	"Beverage=true"	0,171	100,000
104	"Biscuit=true" - "Chips=true" - "Cookies=true"	"Beverage=true"	0,114	100,000
105	"Biscuit=true" - "Basic_food=true" - "Cookies=true"	"Chocolate=true"	0,171	100,000
106	"Cigarette=true" - "Chips=true" - "Hot_drinks=true"	"Chocolate=true"	0,114	100,000
107	"Biscuit=true" - "Dairy_products=true" - "Chewing_gum=true"	"Chocolate=true"	0,114	100,000
108	"Cigarette=true" - "Basic_food=true" - "Greengrocer=true"	"Chocolate=true"	0,114	100,000
109	"Cigarette=true" - "Water=true" - "Jellybeans=true"	"Chocolate=true"	0,114	100,000
110	"Biscuit=true" - "Ice_cream=true" - "Jellybeans=true"	"Chocolate=true"	0,114	100,000
111	"Cigarette=true" - "Water=true" - "Chewing_gum=true"	"Chocolate=true"	0,114	100,000
112	"Ice_cream=true" - "Jellybeans=true"	"Chocolate=true"	0,114	100,000
113	"Beverage=true" - "Water=true" - "Jellybeans=true"	"Chocolate=true"	0,114	100,000
114	"Beverage=true" - "Basic_food=true" - "Greengrocer=true"	"Chocolate=true"	0,114	100,000
115	"Cigarette=true" - "Beverage=true" - "Chewing_gum=true"	"Chocolate=true"	0,171	100,000
116	"Water=true" - "Jellybeans=true"	"Chocolate=true"	0,114	100,000
117	"Biscuit=true" - "Water=true" - "Chewing_gum=true"	"Chocolate=true"	0,171	100,000
118	"Cigarette=true" - "Biscuit=true" - "Chips=true"	"Beverage=true"	0,284	83,333
119	"Cigarette=true" - "Chocolate=true" - "Chewing_gum=true"	"Biscuit=true"	0,228	80,000

120	"Chocolate=true" - "Chips=true" - "Water=true"	"Biscuit=true"	0,228	80,000
121	"Chocolate=true" - "Beverage=true" - "Cookies=true"	"Biscuit=true"	0,171	75,000
122	"Chocolate=true" - "Chips=true" - "Dairy_products=true"	"Biscuit=true"	0,171	75,000
123	"Cigarette=true" - "Chips=true" - "Dairy_products=true"	"Biscuit=true"	0,171	75,000
124	"Beverage=true" - "Chips=true" - "Dairy_products=true"	"Biscuit=true"	0,171	75,000
125	"Chocolate=true" - "Water=true" - "Chewing_gum=true"	"Biscuit=true"	0,171	75,000
126	"Biscuit=true" - "Jellybeans=true"	"Chocolate=true"	0,284	83,333
127	"Chocolate=true" - "Beverage=true" - "Jellybeans=true"	"Cigarette=true"	0,114	100,000
128	"Chocolate=true" - "Water=true" - "Dairy_products=true"	"Cigarette=true"	0,114	100,000
129	"Chocolate=true" - "Water=true" - "Jellybeans=true"	"Cigarette=true"	0,114	100,000
130	"Chocolate=true" - "Basic_food=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
131	"Beverage=true" - "Biscuit=true" - "Newspaper=true"	"Cigarette=true"	0,114	100,000
132	"Beverage=true" - "Biscuit=true" - "Ice_cream=true"	"Cigarette=true"	0,114	100,000
133	"Chocolate=true" - "Chips=true" - "Hot_drinks=true"	"Cigarette=true"	0,114	100,000
134	"Chocolate=true" - "Hot_drinks=true"	"Cigarette=true"	0,171	100,000
135	"Beverage=true" - "Newspaper=true"	"Cigarette=true"	0,114	100,000
136	"Chocolate=true" - "Beverage=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
137	"Beverage=true" - "Water=true" - "Jellybeans=true"	"Cigarette=true"	0,114	100,000
138	"Biscuit=true" - "Chewing_gum=true" - "Cookies=true"	"Cigarette=true"	0,114	100,000
139	"Beverage=true" - "Basic_food=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
140	"Beverage=true" - "Dairy_products=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
141	"Water=true" - "Jellybeans=true"	"Cigarette=true"	0,114	100,000
142	"Cookies=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
143	"Ice_cream=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
144	"Beverage=true" - "Chips=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
145	"Biscuit=true" - "Newspaper=true"	"Cigarette=true"	0,114	100,000
146	"Chips=true" - "Greengrocer=true"	"Cigarette=true"	0,114	100,000
147	"Dairy_products=true" - "Basic_food=true" - "Hot_drinks=true"	"Beverage=true"	0,171	75,000
148	"Chocolate=true" - "Cleaning_products=true"	"Beverage=true"	0,171	75,000
149	"Basic_food=true" - "Hot_drinks=true"	"Beverage=true"	0,171	75,000
150	"Cigarette=true" - "Chocolate=true" - "Basic_food=true"	"Beverage=true"	0,171	75,000
151	"Cigarette=true" - "Jellybeans=true"	"Chocolate=true"	0,228	80,000
152	"Cigarette=true" - "Biscuit=true" - "Ice_cream=true"	"Chocolate=true"	0,171	75,000

153	"Chocolate=true" - "Cleaning_products=true"	"Cigarette=true"	0,171	75,000
154	"Dairy_products=true" - "Cleaning_products=true" - "Greengrocer=true"	"Cigarette=true"	0,171	75,000
155	"Biscuit=true" - "Cleaning_products=true"	"Cigarette=true"	0,171	75,000
156	"Beverage=true" - "Jellybeans=true"	"Cigarette=true"	0,171	75,000

Result and Assessment

That enterprises obtain and maintain competitive advantage is possible by determining and fulfilling the expectations and needs of the customers. This requires the enterprises to adopt the customer-oriented approach. Competitive advantage can be ensured in responsive customer-orientation only by means of creating valuable and rare customer value. However, this is not sufficient at the point of maintaining a competitive advantage. Non-substitutable and non-imitable customer value can be created by means of proactive customer orientation. It may be possible to ensure a sustainable competitive advantage in this way.

Proactive customer-orientation can be ensured by means of association rule mining, one of the data mining techniques, by fulfilling customers' hidden expectations by determining the hidden patterns between purchasing behaviours. In this way, the enterprises both adopt a customer-oriented approach and facilitate the work of the customer and save time.

In this study carried out for the purpose of showing that association rule mining is one of the techniques that can be used within the framework of the customer-oriented approach, analyses were carried out on the sales data of a supermarket in the city centre of Sivas, and rules and patterns were determined between different product groups. Thus, enterprises can do proactive customer-oriented practices that will optimize the sales and customer satisfaction in shop design, and achieve sustainable competitive advantage.

Version 1.4.50 of Tanagra software was used in the study carried out. Association rule mining was performed between the product sales made to 2205 customers considering the data of the customers buying at least 5 products at once among the existing 203.000 lines of data. As a result of the analysis, 156 rules presented in the table below were produced with the Apriori algorithm. In the first rule produced, it is understood that customers buying "Chips" and "Cleaning Products" also buy "Chewing Gum" and "Hot Drinks". According to the second rule, it is understood that customers buying "Chips" and "Cleaning Products" also buy "Beverage" and "Hot Drinks". And according to the third rule, it is understood that customers buying "Cleaning Products" and "Hot Drinks" also buy "Chips" and "Chewing Gum". Similar assessments can also be made for other rules.

According to these hidden patterns, it is understood that the internal design of a shop in such a way that the possible products that may be purchased by the customers are reminded while arranging a sales shop will benefit both the enterprise and customer, and can fulfil proactive customer orientation to some extent.

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