Analysis of Business Customers' Value Network Using Data Mining Techniques

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Abstract

In today's competitive environment, customers are the most important asset to any company. Therefore companies should understand what the retention and value drivers are for each customer. An approach that can help consider customers' different value dimensions is the value network. This paper aims to introduce a new approach using data mining techniques for mapping and analyzing customers' value network. Besides, this approach is applied in a real case study. This research contributes to develop and implement a methodology to identify and define network entities of a value network in the context of B2B relationships. To conduct this work, we use a combination of methods and techniques designed to analyze customer data-sets (e.g. RFM and customer migration) and to analyze value network. As a result, this paper develops a new strategic network view of customers and discusses how a company can add value to its customers. The proposed approach provides an opportunity for marketing managers to gain a deep understanding of their business customers, the characteristics and structure of their customers' value network. This paper is the first contribution of its kind to focus exclusively on large data-set analytics to analyze value network. This new approach indicates that future research of value network can further gain the data mining tools. In this case study, we identify the value entities of the network and its value flows in the telecommunication organization using the available data in order to show that it can improve the value in the network by continuous monitoring.

Keywords: Business-to-business Marketing; Business Customers' Value Network; Market Segmentation; Data Mining; Telecommunication Industry; Value Network Analysis.

1. Introduction

As organizations move towards customer relationship management, the marketing function is the most impacted due to these changes. Under these conditions, data mining tools uncovering previously unknown patterns from large customer databases could help effective customer relationship management, because that can be done only based on understanding needs and preferences of the customers. However, discovered knowledge has to be managed in a systematic manner for true marketing [1].

Companies have different sources of value. Customers and their relationships with a company comprise an important part of organizational value [2]. So to survive in industry it looks building strong lasting relationships with customer who is possible through the value creation has become the most important marketing activity. Therefore, organizations must understand what creates customer value [3].

Value is the fundamental basis for all marketing activities [4]. From a company's viewpoint, all customers do not have the same value, and marketers evaluate customers to recognize key accounts for building a relationship with them [5]. In order to recognize key accounts many researches apply market segmentation using data mining techniques [6,7,8,9,10,11,12,13]. A concept guiding today's business in developing proper relation is the value of a customer defined as the profit resulting from customer's contribution. The common model for measuring customers' value is the RFM model, which made up of three major factors: recency, frequency, and monetary [14]. The model analyzing customer behavior [14, 15, 16] has been widely applied in many practical areas in a long history and has been the most frequently adopted in segmentation technique [16]. Recency represents the time of the last transaction, while frequency denotes the number of transaction in a certain period of time and monetary means the amount of money spent in this specified time period [14, 15, 16].

Nonetheless, large amounts of the value over time lost because many customers change their spending behavior more than defect so an important form of customer segmentation which to do is customer migration. It focuses on smaller changes in customer spending and considers customer value at different points in time to help companies not only stem the downward course, but also influence upward migration earlier [17,18]. Coyles and Gokey [17] found "that improving the management of migration as a whole by focusing not only on defections, but also on smaller changes in customer

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spending can have as much as ten times more value than preventing defections alone."

Marketing can be seen as network relationship interactions [19, 20] and network analysis can be used to describe the value creation [21]. In network perspective the key to value creation lies in understanding how value is created in relationships and it is the network of relationships that provides understanding the competitive environment. Therefore, we must extend any analysis away from viewing value creation. Dynamic nature is one of the most important aspects of network, because one relationship affects positively or negatively in others, an action by one participant in the network can influence other network members or an action by one participant may require further actions by other participants to be effectiveness [22]. In this regard, in order to help marketers recent studies introduced "customers value network", a new form of value networks an extension of Allee's [23] contribution, that focuses on relationships between a company and its business customers.

Customers' Value network is a mostly qualitative approach to distinguish business customers' different value dimensions and gain a better understanding of their customers. On the other hand, many organizations have enormous amounts of customer data in large databases. Marketers have realized that the knowledge in these huge databases is a key to supporting marketing decisions so use data mining tools to discover hidden knowledge about customers from those. However, data mining techniques haven't been used within the value network field, so we introduced a new multi-method for mapping customers' value network to gain the benefit from data available.

In this research following introducing research Methodology, we implement the approach in the case of a telecommunication for understanding the potential benefits. Finally, implications for marketers and related research are presented.

2. Methodology

On the one hand, Value network is an approach via which the great amount of qualitative information gathered through interviews link in a map to provide a fast, systematic way to analyze the data [24]. On the other, data mining is one important technique of knowledge discovery in the database which has been applied in many fields, especially in CRM and marketing in recent years. However, it has not been used in the value network field, so we proposed a novel multi-method to model customers' value network. A new model of value network applies data mining to use both qualitative and quantitative data.

2.1 Data Mining

Data mining is a process of extracting the unknown and valuable patterns from the huge amounts of data. The aim of data mining is to find out interesting knowledge from sizeable data set [25]. The identification of patterns in a large data set is the first step and Data mining tools provide marketers with just the customer knowledge but to gain useful marketing insights and making critical marketing decisions the discovered knowledge has to be managed in a systematic manner [1]. The process of data mining breaks into five major phases, namely Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation and Deployment, that the sequence of the phases is not strict and moving back and forth between different phases is always required [26].

2.2 Customers' Value Network

Value is the fundamental basis for all marketing activities [4] which the traditional mechanism creating it is the value chain [22, 23, 27]. In recent years, because this Mechanism is inadequate to understand the complexities of value exchange [22, 23, 27], that shifts to value network.

Value network is defined as" any purposeful group creating social and economic good through complex dynamic exchanges of value." Value network analysis is a business methodology that can help companies to distinguish and model value exchanges between networked parties as well as analyse, evaluate, and improve value conversion [21, 23, 27, 28]. This definition can be used in both internal and external perspective. External value networks include relationships between the organization and its suppliers, its investors, its strategic business partners, and its customers [21, 28].

Value networks involve different roles and organizations with different needs; hence, it is necessary to make specific propositions that create value for all participants in the network [29].

Traditional network research has extensively investigated the organizations that compose the network, while the whole network as a form of governance has not been so frequently studied [30]. Understanding network dynamics would influence managers' decisions regarding entering into new alliances by providing information on constraints from their current ties [31]. Network governance is needed for goal-oriented networks if they are to be effective [32]. Stable networks reinforce relational ties among members and ensure equitable distribution of value [33]. A new governance model is needed to realize a system in which 'sustainability issues are integrated in a way that ensures value creation for the firm and beneficial results for all stakeholders in the long term' [34,45].

The integration of sustainability at network level and the achievement of common and individual goals within the network could be then enhanced by new governance mechanisms. Rethinking the purpose of the firm as part of a value network could enable innovations towards new sustainable business models [38].

Greater stakeholder engagement is among the big changes that firms need to undertake in the pursuit of a long-term aim of sustainability [3637]. Den Ouden [29] suggests that specific arrangements are required for all parties in order to have a sustained portion both at the beginning and in the longer term, so they contribute to the

flourishing of the whole system. The analysis of the value flows within the network shows how different choices affect the mutual satisfaction of stakeholders, and hence the sustainability of the network [39]. Mutual value creation in sustainable business models, therefore, requires systemic consideration of a wide set of stakeholders who have a stake and responsibility in the value creation system [38].

In this regard, the study introduced a new concept of value network that focuses on relationships between a company and its business customers – called the "business customers' value network (BCVN)". Furthermore, they developed a systematic approach for mapping of BCVN that includes: describing the focal company, recognizing business customers, identifying the value exchanges, finalizing the value exchange and concluding the final map. To analyze business customers' value network, the paper used a combination of qualitative research approaches, namely in-depth interviews and consensus expert opinion. This approach helps marketers and managers distinguish business customers' different value dimensions in order to understand customers [40].

2.3 Proposed Method

Customers are the most important asset in each business unit, so organizations should develop long-term relationships with customers to survive in the challenging environment of a global market. To build a relationship with customers, organizations must understand its customers. However, on the one hand, hundreds of thousands of public customers have diverse dimensions of values and behaviors, and One-dimensional analysis isn't useful so it's essential to examine customers from several aspects. On the other hand, it is difficult to integrate and combine various analyses, so there is a need for a technique that summarizes them. An effective way to do this is visualization. Visualization is a technique for graphical representation of large amounts of data that its purpose is improving data representation to obtain maximum results and recognition.

In this section, a new approach for mapping and analyzing customers' value network is developed. Identifying and defining network entities of a value network, and drawing on innovative mapping, this approach presents an in-depth, multi-faceted picture of customers for marketing managers to gain a deeper understanding of their customers, the characteristics and structure of their customers' value networks and helps them better align their marketing strategies with the needs of customers to retain them. To conduct this work, we use a combination of methods and techniques designed to analyze large customer data-sets (e.g. clustering and RFM) and to analyze value network as well as to analyze customer migration. The method breaks into four major phases that are as follows and are shown in figure 1.

2.3.1 Business Understanding and Defining Network's Purpose

This phase includes the first step the process of data mining and BCVN. First, we begin by defining and describing the focal company. It is necessary to identify fully the aim of the company formation, its goals, its products and/ or services, its customers and its interactions with them. Next, understanding the objectives and requirements from a business perspective, we can define the purposes of network and its mapping (Indeed main aim of customers' value network is deeper understanding from customers).

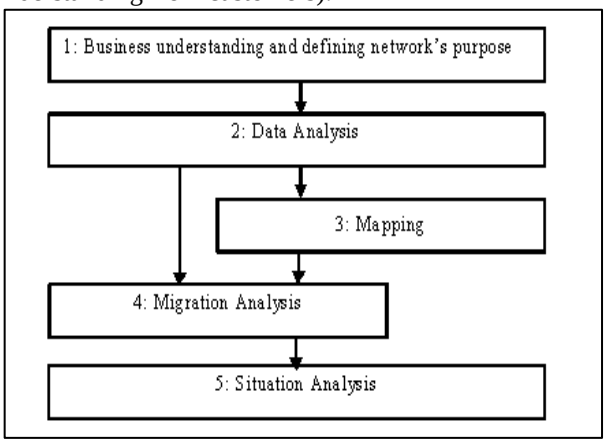

Fig. 1. Phases of proposed model

2.3.2 Data Analysis

In this phase, Data mining-related activities conduct in two steps, namely data preparation, modeling and evaluation. The data preparation phase covers all activities what to do to construct the final data set as data collection, data cleaning and so on. In modeling and evaluation phase, various modeling techniques must are applied and assessed to get objectives. To achieve favorable objectives can step back to the data preparation several times.

In preparation phase, First all customer data bases are identified then useful bases are selected and pre-processed. Second, as data variety is great, it's essential for achieving better analysis to classify data in categories according to similarity of them (as payment behavior, consumption behavior and so on). Third, the categories are prioritized using expert opinions.

In modeling phase, although various data mining techniques can be applied, the most important activity in our research is customer segmentation, because segmentation is a very common interest in marketing as well as we would primarily identify network entities. Therefore, customers with each category of features separately are clustered to determine segments of diverse aspects of customer behavior. Doing this, we understand how behavior of customers according to each category of features is. Results of the highest priority category are main segments, and others are Subsidiary.

2.3.3 Mapping

Mapping is a key phase in our approach. In this research, we only consider the relations between the focal company and its business customers (i.e. the star schema). In fact, for mapping network elements, there is no mandatory rule and it is more important that elements be selected in such a way that those get better understand. In order to be included mass information in a map, we should use from various elements and ways such as shape, shape division, color, page segmentation and so on. It is better that more significant segments are shown by more visible parts. Finally, we try to include important information in the map to draw a more intelligible picture from network. The basic mapping steps are as follows (it is essential to ٩* determine in any steps what element to use):

Step 1, identifying and describing Entities of networks using results of main segmentation

Step 2, identifying and describing subgroups of any Entity of networks using results of Subsidiary segmentation

Step 3, extracting creation patterns of Entity: we can discover the pattern using classification technique to can both analyze current patterns and monitor network changes over time

Step 4, grouping entities according to current value and future value (those can be guessed based on value segmentation.)

Step5, identifying value exchanges existing among nodes

Step 6, mapping

2.3.4 Migration Analysis using Data Mining Technique

Another form of customer analysis less noticed by many marketers is management of small changes in customer behavior while if not pay attention to that, they are losing a great deal of value. However, doing that is vital because continued tendency to downwards drift may causes significantly more value is lost over time than is lost through churn, and worse yet that customers tend not to return to their former group [17, 18]. It considers the customers group at different points in time to find out customers who change their buying patterns to give companies an early chance to correct any downward migration in their spending habits long before it leads them to defect [17]. Coyles and Gokey [17] found "companies not only can reduce downward migration by Systematic communication with target customers and tailoring tactics appropriately, but also helps them influence upward migration."

In this section, we apply data mining technique to analysis customer migration for gaining more insight of value network. The basic steps of migration segmentation are as follows:

Step1, identify value criteria of customer in order to do segmentation

Step2, Selecting a proper time interval for dividing the data set into two sections (to create data set1 and data set2).

Step3, implementing a clustering algorithm for data set1 for extract customer segments (the number of segments equal nodes of value network)

Step4, giving any segment a value degree

Step5, implementing classification algorithm based on results of clustering for identifying customer segments in data set2 (because patterns of segment formations within two data sets should be like to be comparable, we carry out this)

Step6, comparing segmentations (in all data, data set1 and data set2)

Step7, Clustering customers into three clusters:

- Positive migration: who have increased value degree
- Negative migration: who have decreased value degree
- Stable: who have held steady in their segment

2.3.5 Situation Analysis

Once the network mapped, we can now describe the situation of the customers' value network as it is. Describing network requires addressing several basic questions. The essential questions are:

- How are the overall patterns of creation entities?
- How are the overall patterns of migration?
- How are the overall patterns of exchanges and value creation?
- Does value management exist within the network?
- Is a group that received value from the organization is less than the value which that creates for the organization and it is necessary to be given it value-added?
- Is a group that be overheads (does not create any value for the organization)?
- What are the most appropriate channels to communicate with each group of customers?
- What are the opportunities of value creation?
- Which groups are appropriate for proposing new service?
- What are the overall patterns within the system? How assess you status of the network as a whole?

3. Case Study (Telecom)

In this section, in order to demonstrate the proposed approach application in the real world and to understand the potential benefits, it is applied to the Fixed-line Telecommunication Company. Step-by-step Implementation of the model is as follows.

Telecommunication operators are organizations that create value by linking customers who are interdependent. Value is about the connectivity to a network, which can be reached, and the conductivity of a network, what can be transacted [30]. This industry produce and storing a massive amount of data (i.e. call detail, network data) all over the world and because manual analysis of the extraordinary size databases is difficult, this industry is an early adopter of Data Mining technology. Telecommunication companies store a huge amount of data from and about its customers as Demographic data, Account Information, Service usage information, Bill information, Calling behavior information, payment behavior, etc. These data sources can be used for Comprehensive analysis of customers (analyzing all

aspects of customers). The application of data mining to customer relationship management can help telecom companies win new customers in the mass market, allow existing customers to be more profitable, retain valuable customers, offer their customers more personalized services, etc. [31].

Step-by-step implementation of proposed model in the fixed-line telecommunication is as follows. In the research, we applied the data set that includes data related to six two-month periods of Subscribers of Telecom Company of Dez (subset of KHZ Telecommunication). The company that has approximately 11000 fixed-line business subscribers provides services of voice call, ADSL, intelligent network (IN), easy internet (EI) and electronic payment system (1818). **"Discovering of creating-value opportunities for customer in order to generating more profits for the business" is defined as purpose of network.**

In second phase, in order to customer clustering, we used bill information that includes customer's monthly consumption and debt (i.e. data analysis is shown in figure 2). The two segmentation schemes considered are customer value segmentation and customer anti-value segmentation. Value segmentation focuses on identifying the contribution that a customer makes to overall organizational revenue based on current relationships with the organization. The other form of segmentation is segmentation according to customer debt. Because revenue is more important than debt from expert's view, main clustering is performed based on revenue information and debt information is used for the second level of clustering. Considering RFM model, we made of three major factors for value clustering: R, the time of the last revenue period, F, the number of revenue period, M, average of the amount of money spent in any period. As well as for anti-value clustering, three factors are made of: R, the time of the latest debt period, F, the number of debt period, M, average of the amount owed in any debt period. Using Two-steps algorithm, customers divide into five value segment and three anti-value segments that each reflects the different pattern of subscribers' behavior. Then according to segmentation results, other characteristics within each group as ARPU (Average revenue per user) and behavior service is gotten. Segmentation results are demonstrated in table1. Data mining is carried out using the default option of the spss Clementine 12 on a machine with RAM 8.00 GB and x64-based processor.

In the third phase, i.e. mapping, focal company is indicated by Oval and circles denote value segmentations discovered in the previous phase that the more customers in any group, the bigger its circle. Circle's labels indicate size and ARPU of any customer group. Any circle based on anti-value segmentation divided into sectors that show subgroups of that group, the arc length of each sector is proportional to the subgroup size. Color of any sector indicates its subgroup, and the darker be color, more degrees of anti-value (the same sector colour in different groups is alike). Value exchanges are indicated by arrows that can be bi-direction or one-direction (that bi-direction show Reciprocity). Furthermore, labels on arrows provide the description of value exchanges such as service name, Percentage of customers who use the services within the group and Percentage of the amount that the group has given for the service during the year. Finally, color of a circle header determines that group degree of value. Value segmentations based on current consumption behavior and future that guessed break up into four parts, namely platinum-colored, golden, silver-colored, bronze-colored. Figure 3 presents the mapped customers' value network.

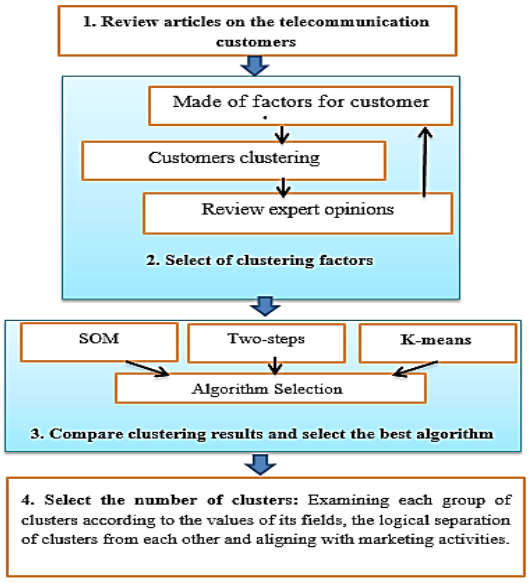

Fig. 2. Phases of data analysis

In fourth phase, i.e. migration analysis is performed using value segmentation. With the aim, data set is divided into two six-month part. So using two steps algorithm first-data set segment into five parts then implementing the classification algorithm second-data set segments are extracted. Next, segments are ranked from one to five. Finally, with calculating below formula, we identify migration segments: if the migration degree is more than 1, it's positive migration. If Migration degree is less than -1, it's negative migration. Else it's stable.

V: value degree of primary value segment, V_1: value degree of first-data set value segment, V_2: value degree of second-data set value segment, Migration degree: $(V_2 - V) + (V_2 - V_1)$.

Figure 4 presents statistics related to migration. Additional insights come from comparing the ratios of migration in any group. Subscribers become more stable by moving from left to right in figure 4 (Therefore, the more the debt is, the less stable it becomes). A substantial percentage of negative migration occurred in high and medium debt clusters; thus, it can be concluded that the debt of subscribers reduces the value of the network in the long term and makes the valuable clusters become smaller.

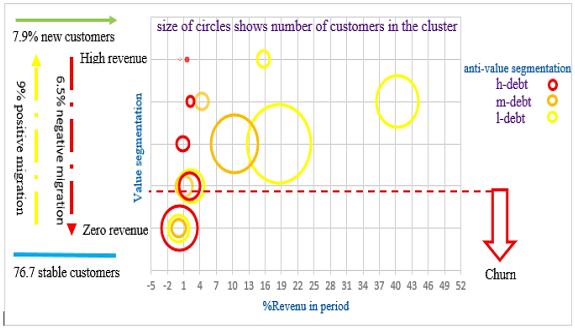

Fig. 3. Migration status

In fifth phase, i.e. situation analysis, we can describe the Situation of the customers' value network: according to the map the number of the most valuable subscribers is much lower than other categories. From high to low value groups, anti-value behavior is increasing. Network status is relatively bad because: The most valuable subscribers are very low, ARPU of middle groups its population is more than other groups is low, Many consumers have almost lost (this segments is shown as "churn customers" in figure 4 and in table 1), A substantial percentage of negative migration occurred that it is not a good sign. In the network value management do not exist because customers do not receive as much value from network that they get value to network. Unfortunately, Subscribers spite of disparate value receives equal services and facilities that the situation should not be continued. Also a group is that not only does not create any value but have cost for organization. As most service users are in the Middle group, they are appropriate for proposing new services and the opportunities of cross selling exist for higher group.

As we used various criteria for customer analysis, now any customer is part of a micro-segment. This allows more precision targeting, with knowledge of what the retention and value drivers are for each customer. Appropriate use of a multi-layer segmentation results in higher retention and growth. In addition, it allows enhanced business planning, where specific growth and retention targets can be assigned to every segment of each layer (namely value segmentation, anti-value segmentation, migration segmentation). Public strategies of any layer are in table 2.

Our approach uses both qualitative (namely in-depth interviews and consensus expert opinion) and quantitative data .Therefore, the accuracy of the results is taken from two dimensions .The algorithms and the method for examining the results of the quantitative are shown in Fig 2 and Qualitative results were also approved at meetings held with the organization's experts.

Table 1. Public strategies

Measures	Level		Public strategy
Main layer (value segmentation)	Platinum-colored Golden Silver-colored Bronze-colored	(high revenue) h-medium revenue medium and low revenue zero revenue	Retain retain and extend extend reduce cost
Second layer (anti-value segmentation):	Low-debt Medium-debt High-debt		encourage Should be encouraged provided that they pay its bill timely. Instalment payment
Migration layer:	Positive-migration Negative-migration Stable		to Strengthen and encourage upselling plan to prevent negative migration upselling plan

Table 2. Results of clustering

Low-debt				medium-debt				h-debt				
Count: 184,1.729 ARPU(rank): 6997636.125 (1)				Count: 4, 0.038% ARPU(rank): 6165947.5 (2)			Unstable in migration	Count: 18, 0.169% ARPU(rank): 5562774.889(3)			Unstable in migration	high-revenue
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
5.989	5.707	1211248		6.000	6.000	1027657		5.111	3.944	1324021		
4	1	750343		6	6	810947		2	1	737422		
6	6	6428363		6	6	1213734		6	6	3958889		
6	6	975183		6	6	1042975		6	3.500	909176		
R	F	M(debt)		R	F	M(debt)		R	F	M(debt)		
0.016	0.016	1722		3.250	1.250	229610		4.444	2.889	2748812		
0	0	0		2	1	79985		2	1	206766		
1	1	129452		4	2	498984		6	6	7853816		
0	0	0		3.500	1	169735		4	3	1725077		
Count: 1493,14.025 ARPU(rank):2255771.215(4)				Count: 187, 1.757% ARPU(rank): 1871379.316(6)				Count: 82, 0.77% ARPU(rank): 1925229.976(5)			Unstable in migration	medium- high -revenue
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
5.991	5.886	383636		5.957	5.701	330413		5.622	4.866	391538		
3	2	213245		4	2	213226		3	2	220854		
6	6	777914		6	6	759105		6	6	773020		
6	6	344216		6	6	283620		6	5	358016		
R	F	M(debt)		R	F	M(debt)		R	F	M(debt)		
0.042	0.042	3800		3.556	1.283	230869		4.573	2.683	836465		
0	0	0		1	1	52844		1	1	79543		
1	1	240595		6	3	584922		6	6	2436306		
0	0	0		3	1	196143		5	3	737211		

Low-debt				medium-debt				h-debt				
Count: 3382,31.771% ARPU(rank): 460002.847 (7)				Count: 1928,18.112% ARPU(rank): 446093.771 (8)				Count: 176, 1.653% ARPU(rank): 335949.028 (9)				
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
5.978	5.834	77806		5.959	5.780	76404		5.813	5.182	64457		
5	4	2982		5	4	11378		5	4	11378		
6	6	213118		6	6	213954		6	6	213641		
6	6	61086		6	6	67687		6	5	42983		
R	F	M(debt)		R	F	M(debt)		R	F	M(debt)		
0.055	0.055	5108		4.358	1.670	95571		5.352	4.017	300172		
0	0	0		1	1	50050		1	1	64444		
1	1	296306		6	3	565464		6	6	2777520		
0	0	0		5	2	77776		6	4	107955		
Count: 636, 5.975% ARPU(rank):133669.786(12)				Count: 292, 2.743% ARPU(rank): 178789.959(11)				Count: 443, 4.162% ARPU(rank): 204855.707(10)				
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
5.035	2.003	51671		4.589	2.349	50479		4.242	1.946	66775		
2	1	948		2	1	9525		2	1	10999		
6	4	463360		6	4	335884		6	4	589249		
6	2	16757		5	2	22579		4	2	21878		
R	F	M(debt)		R	F	M(debt)		R	F	M(debt)		
0.035	0.035	4673		4.682	2.024	108442		5.381	4.792	458573		
0	0	0		2	1	50695		1	1	62260		
1	1	271904		6	3	611278		6	6	7018612		
0	0	0		6	2	71088		6	5	267194		
Count: 446, 4.19% ARPU(rank): 64912.211(15)				Count: 213, 2% ARPU(rank): 71247.624 (14)				Count: 1161, 10.9% ARPU(rank): 71454.511 (13)				
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
0.029	0.029	1815		0.202	0.202	4752		0.028	0.028	2662		
0	0	0		0	0	0		0	0	0		
1	1	81046		1	1	213831		1	1	469961		
0	0	0		0	0	0		0	0	0		
R	F	M(revenue)		R	F	M(revenue)		R	F	M(revenue)		
0.087	0.081	1746		5.488	2.023	127302		5.993	5.885	391886		
0	0	0		1	1	60028		4	1	69582		
2	1	137582		6	3	796239		6	6	3954290		
0	0	0		6	2	110940		6	6	290714		
			churn				churn				churn	medium--revenue
												Low-medium-revenue
												Low -revenue

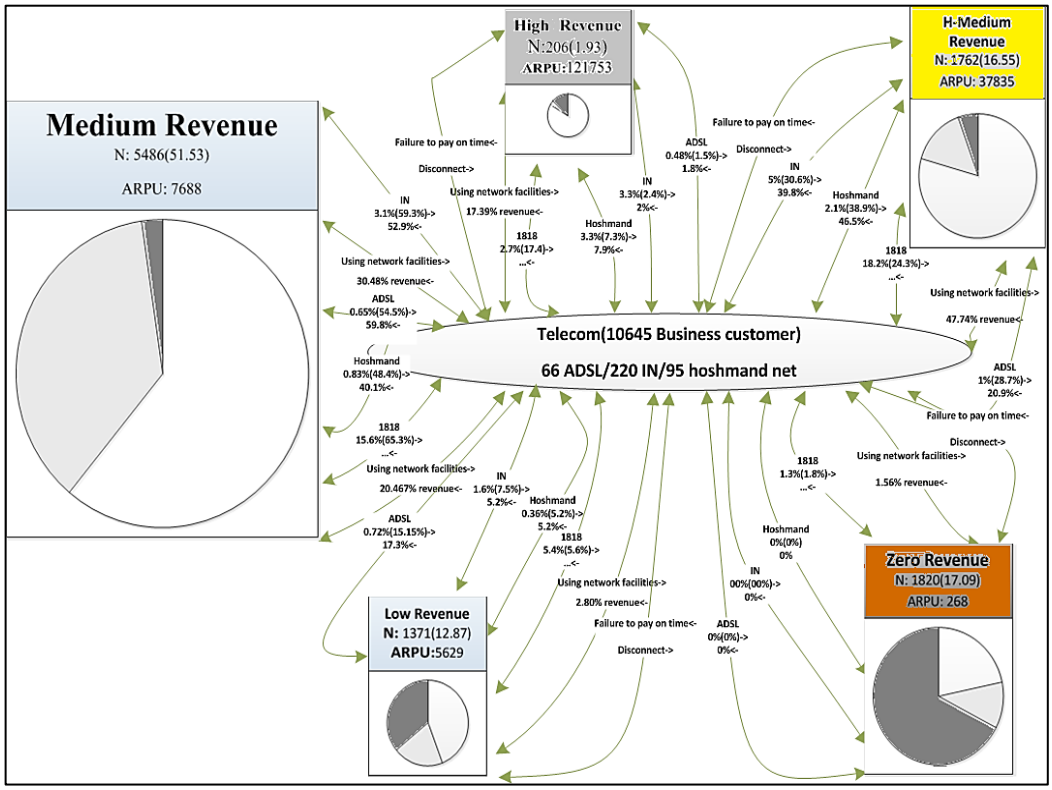

Fig. 3. customers' value network of Dez Telecom

4. Managerial Implications and Applications

Customers are the most important asset in each business unit but because of the intense competition and increased choices available for customers, organizations should manage customers in a long-term relationship. That requires that they interact with their customers based on actual customer preferences. As businesses owing to information technology increasingly have the capability to accumulate huge amounts of customer data in large databases, by using this databases data mining tools can help uncover the hidden knowledge and understand customer better. However, customers have diverse dimensions of values and behaviors and marketer for true understanding need to use multi-dimensional analysis (which each customer can be part of a micro-segment) to gain greater knowledge about customers. Since it's difficult to integrate and combine various analyses, there is a need for a technique that summarizes them. An effective way to do this is visualization. Data visualization allows marketers to view complex patterns in their customer data as visual objects complete in three dimensions and colors. Hence we proposed the approach that presents an in-depth, multi-faceted picture of customers for marketing managers to gain a multi-dimensional understanding of their customers so helps them better align their marketing strategies with the needs of customers to retain them. Additionally, because it requires no special technical knowledge for interpreting, it can be used as a managerial tool.

As regards the academic level, from the aspect of value network, we show future research of value network can further gain data mining tools. Our approach applies capabilities of data mining techniques in context of value network analysis. A summary of the differences between methodologies are in table2. In addition, from view of knowledge discovery, based on our results can understand that not only data mining tools help value network analysis but also value network map is very helpful for management of discovered knowledge using data mining. Indeed, value network can be considered as a visual framework for knowledge management that may be integrated into data mining.

In this case study, we distinguish parties (where any party is a group of business customers) and model value exchanges between networked parties using the available data in the telecommunication organization (focusing on the relationships between a company and its business customers). Then, diverse dimensions of values and behaviors parties are visualized in the value network to describe how the value is created in relationships. Analyzing value flows not only can prevent the decline of value in the network, but also it can identify ways to promote the value in the network.

In order to maintain the value of the network and increase it, managing the customer behavior changes in the network is a necessary task for a business and customer behavior changes in the network should be monitored continuously. Consequently, each category of migrations should be treated in such a way as to induce positive migrations behavior.

We also propose that it's better for organizations to investigate their value network in three levels: internal, customers and collaboration because a part of value lies in each of them. Figure5 shows different levels value network. And as Customers and their relationships with a company comprise an important part of organizational value [2], customers' value network is a very influential level.

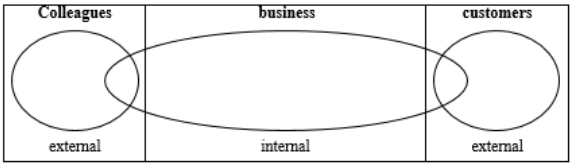

Fig. 4. Three level of value network

5. Conclusion and Limitation

Understanding the real value of customers is essential to retaining them. An approach that helps gain a deep understanding of customer is the value network by considering different value dimensions of customers. Despite enormous sources of data available in any organization, current approach of value network has not used them. This study, therefore, aims to justify the capabilities of data mining techniques in context of value network analysis. This study proposed a new approach to identify and define network entities in multi-layer in order to gain Deep insight about customer behaviors. Meanwhile, by understanding customers' value dimension, it allows precise targeting, where specific growth and retention targets can be assigned to every segment of each layer. Appropriate use of richly value network results in higher retention and growth. We applied this approach to the Telecommunications Company to show its applicability in the real world.

We in this research only analyze relations between the focal company and its customers and do not consider value relations existing among customers- call detail data can are used for this work. Moreover, we use a part of customer data, and a more detailed map can is created by using all of them. In future researches, we discuss how to use insights gained from this approach for decision making and policy management.

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Table 3. Comparison of methods

Term	Value network (23) & BCVN [29]	Proposed approach
Method	This approach is a qualitative method that uses data gathered through interviews.	This approach is a multi-method analysis, because it applies data mining to use both qualitative and quantitative data. Hence its result surely will be more detailed. Quantitative means data that already have been in a company database.
Result	It is a one-level analysis that gives descriptive picture from nodes and its relation.	It is a multilevel analysis because both that gives descriptive picture with statistics and that uses diverse dimensions of values and behaviors. Therefore, the multi-faceted picture gets a deeper understanding of the network.
Mapping element	It uses specific elements for mapping, i.e. ovals, arrows, labels, solid and dashed lines.	It hasn't mandatory elements and can use various elements, such as shape, shape division, shape size, colour, and page segmentation etc.
Nodes	Roles (role-based network) or participants (participant-based network) in Allee's value network Business customers in BCVN	Business Customer groups
Node Attributes	Nodes can have attributes such as name and type.	As nodes identify using data, More detailed information is available. Nodes can have many identifiers such as name, size, ARPU and so on. Furthermore, color, division, position, etc. related to any node describes other characteristics of them.
Links	Link show value exchanges between two nodes and there can be multiple links between nodes.	Link show value exchanges between two nodes and there can be multiple links between nodes.
Direction	Every link indicates a single direction and bi-directional arrows are not permitted (in Allee's value network). The arrows should be one-direction, bi-directional arrows only are used to depict loyalty and sense of community (in BCVN).	Arrows can be bi-direction or one-direction that bi-direction show Reciprocity.
Link Attributes	Every link has unique attributes such as its deliverable and its nature (tangible or intangible).	Every link has unique attributes such as its deliverable and its related statistics that can be used as Evaluation indicator of that link.

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