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Akbulut M. [1], Okuyan M.C. [2]

DYNAMIC DECREASING PRICING METHOD WITH SOCIAL MEDIA EFFECTIVENESS

[1] «Bandirma Onyedi Eylul University», Balikesir, Turkey
[2] «Balikesir University», Balikesir, Turkey

Online trading firms have to get involved in some kinds of marketing and promotion activities in the new World that appears with Electronic trade. Increasing and decreasing pricing is a new kind of dynamic pricing method. In this study it is explained that Dynamic Decreasing Pricing with Social Media Effectiveness (DDP-SM) benefits both psychologically and strategically as a method of pricing. With this method, buying decreases the prices, even the customers are forced to buy or advice the product. It is going to be formulated mathematically, designed with storedprocedure and it is going to be practicable in database.

Keywords: e-commerce, social media marketing, dynamic pricing, social media effectiveness.

Introduction

Nowadays the firms trading on the internet have to get involved in different marketing and promoting activities .The firms that aim to profit and sell more products use different pricing methods. Dynamic pricing is one of these methods; Dynamic pricing refers to the process of controlling product prices over the sales season to maximize expected revenue (Lydeka & Indrл, 2013).

There isn't only one description of Dynamic pricing. Because as Lydeka and others refer, there are different academic branches and so different definitions. But in this article dynamic pricing is discussed in terms of its advantages as it makes the customers buy and the customers make the other customers buy as well as, Dynamic Decreasing Pricing with Social Media Effectiveness (DDP-SM) is developed in order to promote the customers that show social media effectiveness and to ensure the customer loyalty, by means of developing social media tools.

Both psychological and strategically pricing methods force the customers to buy, even to advice are used when the prices decrease. The psychological effect of the price is an important factor on the decision to buy or the sense of quality. The decision to buy an unnecessary product can motivate a customer to buy it by means of the price experience of another customer. The price is an important factor when the product feature is satisfactory; price comparison is fast and easy on the internet.

The shopping robots which can be used by means of technological developments on the internet can be discussed as an element that strengthens the customer's price decision and enables the customer's price comparison.

In terms of application, the dynamic pricing issues turn out satisfactory in industries with high initial cost, consuming capacity, short term selling and price sensitive demand.

Table 1

Some internet pricing aspects

Pricing Aspect	Pricing strategy
Consumer Aspect	Price differentiation Dynamic pricing
Seller Aspect	Individual pricing Adaptation pricing Package pricing
Competitive Aspect	Price differentiation depending on brand Optional pricing
Relational (Value focused) Aspect	Lifelong pricing Alternative channel pricing

Gurgen expresses the classifying quantitative models in literature as in the below:

1. Deterministic demand model in terms of discussing the demand.
2. Fixed or uncertain price in terms of discussing the price distribution of customer's paying desired.
3. Pricing in terms of considering or disregarding the sales returns.
4. Pricing in terms of discussing the price set. (Biliюik and Gьrgen, 2012).

Companies would be wise to listen to their customers, and even competitors, and to begin exploring what a social media presence can and will mean to their industry. It is about engagement. It is about building the brand. And it is about embracing a new, more agile way of doing business. It does not have to be disruptive to company culture; it can be implemented and made to be fun or exciting as this new channel evolves. It will most certainly be transformative in the years to come, but the important thing is that the social media story has yet to be written. The future of social media in marketing and sales depends on both the customer and the firm, and where it will take both will evolve with time and additional advances in technology (James and others, 2012)

Related literature

Hong Yuan and Song Han discuss that for general demand functions in price and quality, two effects work in different directions. The sales effect is negative, that is, if the price increases, the sales decrease. The markup effect is positive, that is, if the price increases, the markup increases. Hence, the impact of quality on pricing is ambiguous. For separable additive demand functions, the sales effect vanishes and the markup effect holds. Any improvement in quality increases the product price. Finally, both process investment and product investment determine the dynamic pricing policy (Yuan & Song, 2011).

Paul B. Ellickson, and the others make three contributions in their Repositioning Dynamics and Pricing Strategy article. First, they draw attention to three salient features of repositioning decisions in marketing: that they involve long-term consequences, require significant sunk investments, and are dynamic in their impact. They illustrate that positioning decisions can be empirically analyzed as dynamic games to measure structural constructs such as firm's repositioning costs. Second, they cast empirical light on an age-old question in the marketing of consumer packaged goods: the costs and benefits of using EDLP versus PROMO. Despite the significant interest in this topic, a full accounting of the long-term costs and benefits of these strategies remains lacking in the literature. Their estimates add to the evaluation of either strategy and also identify the sources of heterogeneity in the relative attractiveness of either across markets. This increases understanding of the economics of the supermarket industry and the determinants of long-term market structure. Third, they illustrate how observed switches combined with auxiliary postgame data (e.g., revenues, prices, sales) are useful in cleanly articulating the costs and benefits of repositioning in an environment with strategic interaction (Ellickson, Misra, & Nair, 2012).

Y. Narahari and others discuss that there are different models that have been used in dynamic pricing.

Dynamic pricing includes two aspects: (1) price dispersion and (2) price discrimination. Price dispersion can be spatial or temporal. In spatial price dispersion, several sellers offer a given item at different prices. In temporal price dispersion, a given store varies its price for a given good over time, based on the time of sale and supply-demand situation.

The other aspect of dynamic pricing is differential pricing or price discrimination, where different prices are charged to different consumers for the same product.

A variety of mathematical models have been used in computing dynamic prices. Most of these models formulate the dynamic pricing problem as an optimization problem. Depending on the specific mathematical tool used and emphasized, we provide a list of five categories of models that are Inventory-based models, Data-driven models, Game theory models, Machine learning models, Simulation models (Narahari, and others, 2005)

Table 2 organizes the various social metrics for social media by classifying them according to social media applications and social media performance objectives. While it is not exhaustive, it should give marketers a useful starting point for measuring the effectiveness of social media efforts because all of the metrics listed are easily measured.

Brand Awareness -Traditionally, brand awareness is measured through tracking studies and surveys. Online, however, marketers have a number of ways to track brand awareness.

Brand Engagement -Brand engagement can be enhanced through social media in various ways, and the results can be strikingly positive.

Word of Mouth-Once consumers are aware and engaged, they are in a position to communicate their opinions to other consumers. Satisfied and loyal consumers communicate their positive attitudes toward the brand itself or toward the social application created by the company (be it a Facebook application or group, a Twitter presence, a blog or a YouTube video) to new, prospective customers both online and offline. In a well-designed social media campaign, consumers are likely to spread viral videos, create additional brand-related content, tweet about the brand and post about their experiences on Facebook. The social metrics that reflect these kinds of social media behaviors are important not only because they let marketers measure the bottom line impact of their social media efforts, but also because they focus marketers' attention on social media strategies that take into account the objectives of both the brand and the online customer. (Hoffman & Fodor, 2010)

Social plugins and interactions tools are available that can be used social media effectiveness. Many social networks provide embeddable buttons

Table 2

Relevant metrics for social media applications organized by key social media objectives

SOCIAL MEDIA APPLICATION	BRAND AWARENESS	BRAND ENGAGEMENT	WORD OF MOUTH
Microblogging (e.g., Twitter)	– number of tweets about the brand – valence of tweets +/? –number of followers	– number of followers – number of @replies	– number of retweets
Social Networks (e.g., Bebo, Facebook, LinkedIn)	– number of members/fans – number of installs of applications – number of impressions – number of bookmarks – number of reviews/ratings and valence +/?	– number of comments – number of active users – number of "likes" on friends' feeds – number of user-generated items (photos, threads, replies) – usage metrics of applications/widgets – impressions-to-interactions ratio – rate of activity (how often members personalize profiles, bios, links, etc.)	– frequency of appearances in timeline of friends – number of posts on wall – number of reposts/shares – number of
Video and Photosharing (e.g., Flickr, YouTube)	– number of views of video/photo – valence of video/photo ratings +/?	– number of replies – number of page views – number of comments – number of subscribers	– number of embeddings – number of incoming links – number of references in mock-ups or derived work – number of times republished in other social media and offline – number of "likes"

Fig. 1. Amazon adds social share options to confirmation emails, albeit much smaller ones.

and widgets that allow users to easily share content from the web or from an app. Examples of these buttons include the Google+ «+1» button, or the Facebook «Like» button. User interactions with these embedded social buttons represent social interactions with your content. These social interactions are valuable signals of user engagement and can be measured using Analytics.

In figure 1 interaction applications are shown in product comments and after selling information.

If you have social media buttons on your product pages, you probably added them because you wanted your products to be shared more frequently on networks like Twitter, Facebook, and Pinterest. You know that more shares=more publicity, and more publicity=more new customers making purchases. (Kohler, 2015)

Data collection is a social interaction, like a pageview, screen view, or an event, is a unique hit type that includes a set of unique values to describe the social interaction.

The data model is a social interaction in Analytics is represented by the following fields in Table 3.

A social interaction should be measured when a user completes an interaction with an embedded social button or widget. Examples of social buttons include Facebook "Like" buttons or Google+"+1" buttons.

For example, a developer could measure the interaction of a user with Twitter share button on a web page using the following values:

Table 3

Field	Type	Required	Description
socialNetwork	string	Required	The social network being measured (e.g. Facebook, Twitter, Google+, etc.)
socialAction	string	Required	The social action the user is taking, e.g. "Like", "Share"
socialTarget	string	Optional	The content on which the social action was taken, e.g. the path of an article or video

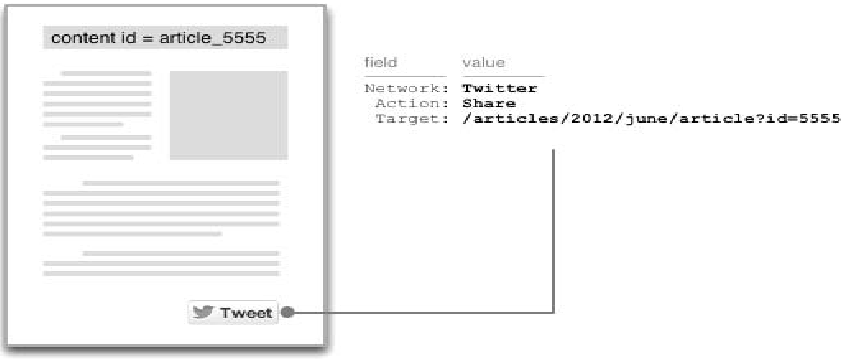


Fig. 2.

Table 4

Social Interaction Dimensions

Web Interface	Core Reporting API	Description
Social Source	ga:socialInteractionNetwork	a value representing the social network being tracked (e.g. Google, Facebook, Twitter, LinkedIn)
Social Action	ga:socialInteractionAction	a value representing the social action being tracked (e.g. +1, like, bookmark)
Social Source and Action	ga:socialInteractionNetworkAction	a value representing the concatenation of the social network and action measured (e.g. Google: +1, Faceboo Like
Social Entity	ga:socialInteractionTarget	a value representing the URL (or resource) which receives the social network action

Table 5

Social Interaction Metrics

Web Interface	Core Reporting API	Description
Social Actions	ga:socialInteractions	The total number of social interactions.
Unique Social Interactions	ga:uniqueSocialInteractions	Number of sessions during which the specified social action(s) occurred at least once. Based on unique combination of network, action, and target.
Actions per Social Session	ga:socialInteractionsPerSession	The number of social interactions per session.

Measuring a social interaction: An article with a content ID in figure 2 "id=5555" is shared using an embedded Twitter share button. The share is measured as a social interaction in Analytics. Each button or widget may have its own API with which developers need to integrate with to measure social interactions. Developers should refer to the API documentation provided by each social network for more information on how best to integration.[1]

"Developers can collect social interaction data using the following client libraries or protocols are Web: analytics.js , Android SDK, iOS SDK, Measurement Protocol. For reporting, after processing, social interaction data can be accessed via the Social Plugin report or custom reports in the web interface, or via the Core Reporting API.

In table 4 and table 5 the social interaction dimensions and metrics available in Analytics:

The following end-to-end example will show how values are collected, processed, and made available via the various social interaction dimensions and metrics.

Collection: In this example, a single user shares two different articles from a website using an embedded Twitter «share» button. At collection time, the developer sends two social interactions to Analytics, once after each «share» is completed, with the following values:

Reporting

After processing, a custom report that uses social entity as the dimension and each of the social action metrics would look like as in table 6 below:

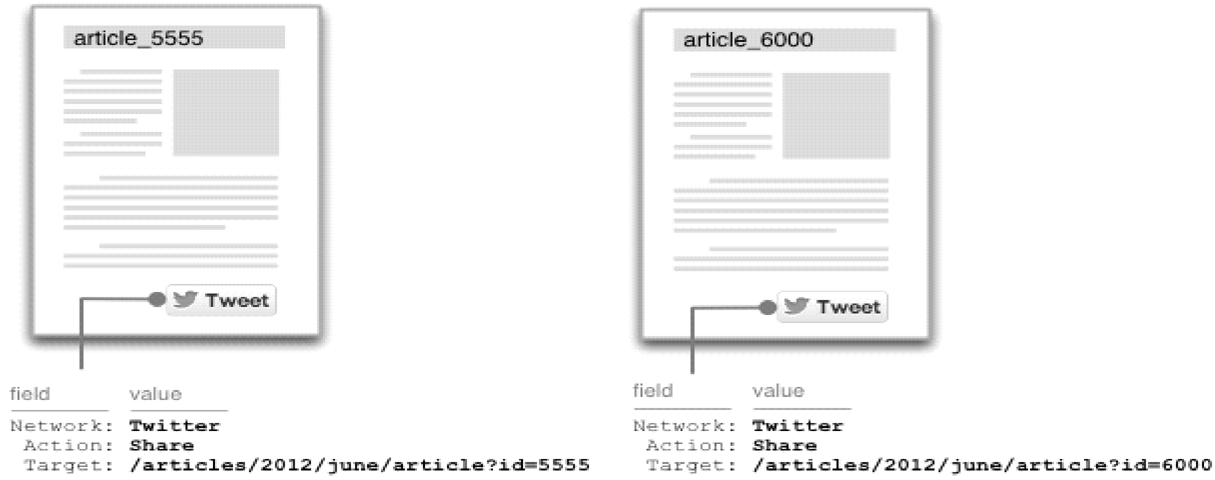


Fig. 3. Example: A user interacts with embedded Twitter share buttons on two separate articles during a single session.

Table 6

Social Entity	Social Actions	Unique Social Actions	Actions per Social Session
/articles/2012/june/article?id=5555	1	1	2
/articles/2012/june/article?id=6000	1	1	2

On the other hand, a custom report that used Social Action as the dimension with the same social action metrics used above would look like as in table 7 below.

Table 7

Social Action	Social Actions	Unique Social Actions	Actions per Social Session
Twitter/Share	2	1	2

In the example above, there is only one unique social action attributed to the network/action combination Twitter/Share. Even though the user interacted with two separate Twitter share buttons, they both had the network/action combination of Twitter/Share, which results in a single unique social action in the reports. Lastly, in the same example above, Actions per Social Session is calculated by dividing the total number of Social Actions, in this case table 7, by the number of unique social actions, in this case table 6. (Google, 2017)

They respond to content posted via likes, comments, shares, clicks to enlarge the images, clicks to play videos, favorites etc. The set of social media objectives to attain may vary across organizations and platforms, however, monitoring these interactions and following up how they evolve over time is key to measure the impact of our activities and to understand how trends are changing on these platforms.

Ideally, we would like to calculate the percentage of people who read our message and interacted with it. The diagram below represents the key metrics to measure the actual interaction: community (number of followers), the reach (people who have seen the content) and interactions. The size of the circles will vary depending on the community size, type of reach (organic, viral, paid) and finally, degree of interaction with the content posted.

The interaction or engagement rate, as referred to in some social media analytics tools, can be calculated in different ways. (1) Formula is to divide the number of interactions by the number of reached users. (Villaespesa, 2015)

$$\text{Interaction rate} = \frac{\text{Interaction}}{\text{Reached Users}}. \qquad (1)$$

Kumar (2012) discuss the seven-step approach described here, along with the CIE and CIV metrics, solves an important problem for social media marketers: identifying influencers. Despite the vast amount of individual and relationship data available through these media, most organizations have been unable to directly and efficiently measure the effectiveness of their Social media strategy. The lack of robust methodologies to measure the impact of social media efforts is addressed in this study. It provides tangible metrics and a robust methodology to measure the effectiveness of social media marketing spending and to maximize the ROI of social media campaigns. (Kumar & Mirchandani, 2012)

Model description and formulation

The formulas needed to price a product sold online in Dynamic Decreasing Method with Social Effectiveness are given below.

Table 8

Social Interaction Metrics Parameters

Social Actions	Unique Social Actions	Actions per Social Session	SMEffect

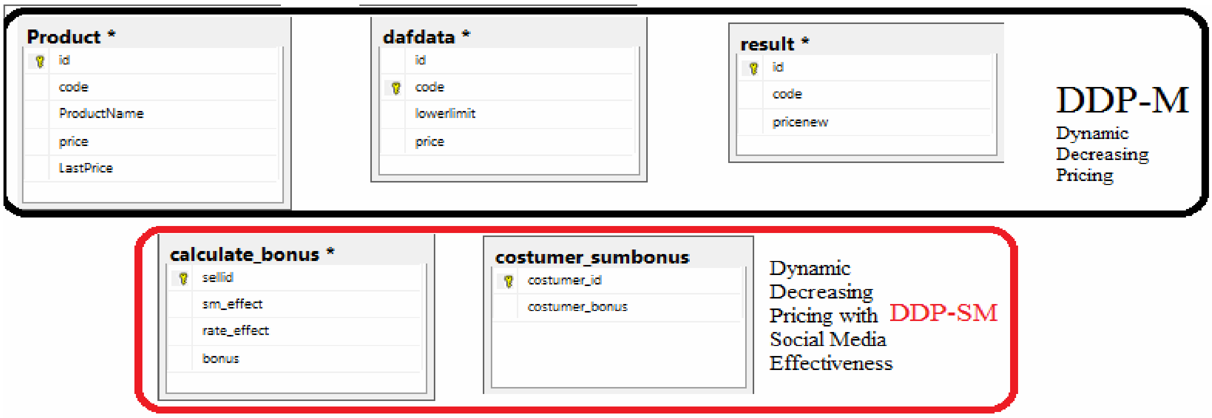


Fig. 4. Calculate DDP and DDP-SM

Table 9

Cost	800	lowerbound	900	Sellprice	1000	number of stock	10

Table 10

rate	100	rate_n	10	SMEffect	8	rate_effect(1/ SMEffect)	0.13	bonus	18.125

rate=sellprice-lowerbound (1)

rate_n=rate/number of stock (2)

$sellprice_n = sellprice_{n-1}$-rate_n (3)

Sell price is the price that the product is sold first. Lowerbound is the last limit price in decreasing pricing. The price difference of sell price and lower limit gives the rate.

Rate is divided into total number of stocks to be sold, in order to get $rate_n$. The difference between sell $price_{n-1}$ and $rate_n$ gives sell $price_n$ of n price.

In our sample scenario a 10-item product in stock and 1000 planned unit to be sold is re-priced viaF-M pricing. After each selling the price is calculated by sellpricen=sellpricen_1-rate_n.

Eventually while first price is sold on 1000 unit, the last price is sold on 900 unit. If each product was sold on 1000 unit, 2000 unit profit would be earned. In this method the profit is 1450 unit. The loss is 550 unit (Akbulut & Okuyan, 2014).

Increase of sell proves that loss of Profit can be ignored. Social effectiveness is developed in Order that the effect could go on and to increase customer loyalty. This effect is calculated by dividing rate_effect rate into one parameter Social media effect. The rate_effect rate and DDF-M profit is loaded as gift bonus that won't exceed 10 percent to customers that make effect. It never exceeds 10 percent of profit. It is calculated by formulas below in Order (4), (5).

rate_effect=1/SMEffect (4)

bonus=0,10*rate_effect (5)

In figure 4 DDP-M model of Akbulut and Okuyan 2014 and DDP-SM model which is developed lately are shown.

With interaction tools such as socialNetwork, socialAction, socialTarget in figure 4 the related product is saved after customer affection. The bonus which is gained with formula such as socialNetwork, socialAction, socialTarget is written into bonus accounts of the customers that make the effectiveness (5). After that they are enabled to use their bonus.

In table 11 product sells are carried out of 10 items. After each sell interactive customers are saved . rate_effect of the customers saved with SMeffect are calculated and their bonus is calculated too.

Table 11

	Sum Sell	8550	Discount	SMEffect
1	Price	990	10	1
2	Price	980	10	1
3	Price	970	10	1
4	Price	960	10	1
5	Price	950	10	1
6	Price	940	10	0
7	Price	930	10	1
8	Price	920	10	0
9	Price	910	10	1
10	Price	900	10	1
			Summary	8

When the example is discussed in terms of the firm and customer, there are three results.

Table 12

Ddp-M profit	1450	Standard profit	2000	Ignored loss	550

1. The decreasing price has a positive effect on the customer by advising to buy the product with the positive effect of this method.
2. The firm can sell product rapidly till its limits, loss of profit can be ignored as the selling in target time interval is high.
3. By creating bonus application after sell a sustainable communication will be carried out.

The database design is shown in Figures 5,6,7,8 below.

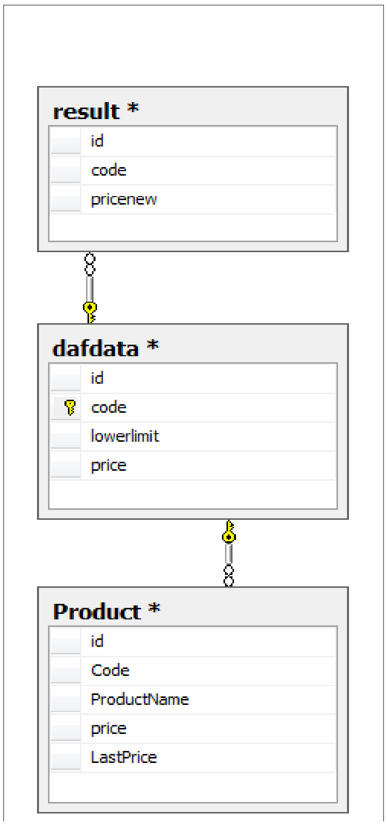
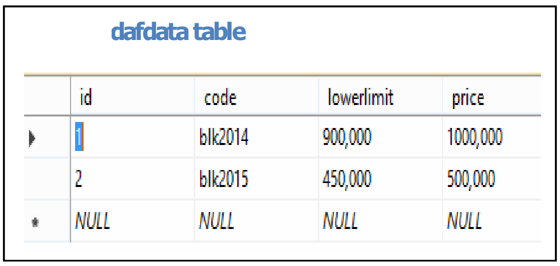


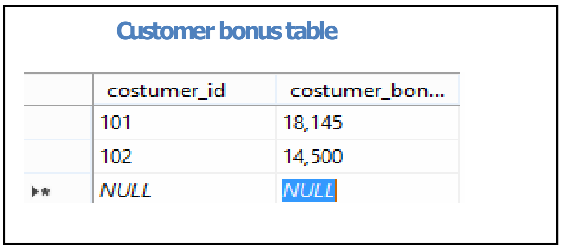
Fig. 5



dafdata table

	id	code	lowerlimit	price
▶	1	blk2014	900,000	1000,000
	2	blk2015	450,000	500,000
*	NULL	NULL	NULL	NULL

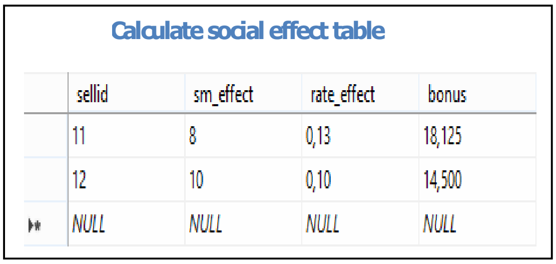
Fig. 6



Customer bonus table

	costumer_id	costumer_bon...
	101	18,145
	102	14,500
▶*	NULL	NULL

Fig. 7



Calculate social effect table

	sellid	sm_effect	rate_effect	bonus
	11	8	0,13	18,125
	12	10	0,10	14,500
▶*	NULL	NULL	NULL	NULL

Fig. 8

The stored procedure is in the database design DDP-SM.

Conclusion

it is discussed that dynamic decreasing pricing (DDP-SM) can be used as a method on internet trading. Formulas are defined and applied. It is proved that DDP-SM can raise the selling rates. Both psychological and strategically pricing methods that force the customers to buy, even to advice are used when the prices decrease. The psychological effect of the price is an important factor on the decision to buy or the sense of quality. The decision to buy an unnecessary product can motivate a customer to buy it by means of the price experience of another customer.

Today it is determined that DDP-SM model that uses only dynamic price parameter is insufficient alone to create customer loyalty. DDP-SM is developed with the development and widespread of social media and the critical are tried to be improved. Consequently a sustainable communication will be carried out by creating customer loyalty.

Dynamic price tools which can adapt into social media, virtual reality and innovations that may appear should be revised and discussed.

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ДИНАМІЧНИЙ МЕТОД ЗНИЖЕННЯ ЦІНИ З ВИКОРИСТАННЯМ ЕФЕКТИВНОСТІ СОЦІАЛЬНИХ МЕДІА

Акбулут М., Окуян Дж.

Компанії онлайн-трейдингу повинні брати участь в деяких видах маркетингової і рекламної діяльності в новому вигляді, який з'являється в електронній торгівлі. Збільшення і зниження цін – це новий метод динамічного ціноутворення. У цьому дослідженні пояснюється, що динамічне зниження цін з ефективністю соціальних медіа (DDP-SM) вигідно і психологічно, і стратегічно, як метод ціноутворення. За допомогою цього методу покупка знижує ціни, тому що клієнти змушені купувати або консультуватись щодо продукту. У статті він сформульований математично, розроблена і описана в базі даних його процедура.

Ключові слова: електронна комерція, маркетинг в соціальних мережах, динамічне ціноутворення, ефективність соціальних мереж.

ДИНАМИЧЕСКИЙ МЕТОД СНИЖЕНИЯ ЦЕНЫ С ИСПОЛЬЗОВАНИЕМ ЭФФЕКТИВНОСТИ СОЦИАЛЬНЫХ МЕДИА

Акбулут М., Окуян Дж.

Компании онлайн-трейдинга должны участвовать в некоторых видах маркетинговой и рекламной деятельности в новом виде, который появляется в электронной торговле. Увеличение и снижение цен – это новый метод динамического ценообразования. В этом исследовании объясняется, что динамическое снижение цен с эффективностью социальных медиа (DDP-SM) выгодно и психологически, и стратегически, как метод ценообразования. С помощью этого метода покупка снижает цены, т.к. клиенты вынуждены покупать или консультироваться относительно продукта. В статье он сформулирован математически, разработана и описана в базе данных его процедура

Ключевые слова: электронная коммерция, маркетинг в социальных сетях, динамическое ценообразование, эффективность социальных сетей.