Conceptual Model of Customer Utility for Information Databases Used in Iran

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ABSTRACT

The purpose of this article is to address the factors that can increase the utility for customers of information databases in Iran. In order to achieve that, summarizing content analysis techniques was used. The study population consists of customers paying to use information databases in Iran. The bibliographical research has been done on utility related publications published in the 5-year period of 2011-2015, indexed on Science Direct, ProQuest and EBSCO information databases. Samples were randomly chosen from information database customers using paid services from two major information centers in Iran - University of Tehran Central library and Documentation Center and Organization for Industrial Management Library, for interviews. Results showed that the main factors affecting customer utility in using paid information databases are information needs, quality, Incentives, additional information and users’ individual and social characteristics, respectively.

KEYWORDS
Customer Utility, Information Commodity, Information Databases, Information Economics

INTRODUCTION

Information databases are one of the most important channels for scientific and research information retrieval, particularly in recent years, and the majority of students and researchers use information databases to fulfill their information needs. On the other hand, most credible information databases are not free and access to their services requires certain costs for the consumers. Although typically universities undertake these payments to provide access for their faculty and students, a large number of researchers and even students and professors, do not have access to these facilities,
and therefore require using databases provided by other universities and organizations, which will cost them individually. In this paper, we tried to investigate major factors affecting utility among this group using the Utility Theory.

The Utility Theory is mainly used to describe the customers (users) behavior. Based on decision making theory, the priorities of a rational person can be explained by his/her Utility function, the function is calculated for each choice option, and the result is a number that shows the utility of a specific commodity for the customer. Naturally, the commodity or service with the higher utility number will be chosen (Lorkowski & Kreinovich, 2015). So, the utility can be defined as the general satisfaction of customer from a commodity or service (Zeng, 2015).

The Utility Theory provides a methodological framework from people, companies and organizations’ choosing options, which may be used to make decisions on selecting one of the option. Therefore, Utility Theory is based on the assumption that “A person chooses a commodity or service, when the utility of the option is maximized”, in other words, the consumers choose the commodity or service that provides the best utility.

Each consumer decides whether to buy a commodity or service or not, according to the price, the consumer’s income, cost of the similar commodities or services, the consumers taste or preferences. The Consumer behavior theory explains how this factors can be measured in order to determine how changes in one of the factors can affect the quantity demanded (Kingma, 1996).

The major basis of Consumer behavior theory is the concept of utility or customer’s cost-benefits. Originally, the utility theory was introduced by German economist, Gossen, in 1854, and was later developed by Menger and Walras (1874) and Jones (1871). It should be noted that the concept of Utility theory in its common sense was proposed by an English Philosopher, Jeremy Bentham (1748-1831) but its implementation on economics began with Gossen.

There are two major concepts in Gossen’s utility theory: Final utility and Total utility. Total Utility is defined as the utility that a consumer gains by having or using commodities or services. The Final or Marginal Utility proposed in this theory refers to the amount of utility which the consumer gains by consuming any additional unit of commodity or service.

The concept of consumer equilibrium is also especially important in this theory, that is: “In order to maximize overall utility, the consumer will distribute his/her expenses in different commodities or services. In this state, the consumer is considered in equilibrium.

Thus, total utility would be maximized when earned utility does not decrease in repeated purchases. The Ratio of final utility gained to the final cost, represents the amount of utility that the consumer gains from the last cent of the money paid (Mohtasham, 2011, p. 26).
The consumer and seller’s satisfaction is important in every deal and the sellers are always in attempt to satisfy their consumers, so the utility concept and its components can help them present their commodities or services better and subsequently improve consumer’s satisfaction. When discussing information resources that can be accessed through scientific databases, it is better to use the term “users” and “providers” instead of “consumers” and “sellers”, therefore these terms will be used in this article.

The main purpose of this document is to identify the factors effective in increasing users’ utility for scientific databases. Since the “utility” term belongs to information economy area, in this article “utility” is considered as an equivalent term for economic term “user satisfaction”.

In fact, this research is trying to answer this question: “Which factors can maximize the users’ utility for paying users in accessing scientific databases?”

LITERATURE REVIEW

Several studies have been conducted on consumer utility from different disciplines and on different commodities and services, but searching with “consumer utility” or “user utility” and “databases” or “information resources” or “scientific” keywords, authors have not retrieved any similar research in English or in Persian. Albeit, there are many reports and studies in different disciplines and areas of specialties about “user satisfaction” or “consumer satisfaction” or “user – friendly interfaces” with “databases” or “websites” or “scientific” but we did not find any article with similar point of view in investigating the economic utility factors among scientific databases users. Here you can find some related retrieved researches in the field of “Utility”, sorted according to publication year.

In their research titled:” Efficient heuristic algorithms for maximum utility product pricing problems”, Myklebust, Sharpe and Tunçel (2016) had some suggestions for optimizing heuristic algorithms for improved pricing problems, that had been presented by Dobson and Kalish. They implemented certain justifications in Dobson and Kalish algorithms to make them more effective. They analyzed the numeric details of previous algorithms and According to maximized consumer utility, they changed the details and developed some of them to find a new pricing algorithms to achieve the maximum consumer utility.

Luo (2015) in his PhD dissertation in Pennsylvania State University titled” Essay on Network Effects, Consumer Demand, and Firms’ Dynamic Pricing” studied the different factors in Operational System Network that influenced the consumer utility rate and subsequently the consumer’s behaviors. The results showed that the size and the architecture of OSN has effected the consumers’ utility and the pricing. He has also considered the smartphone market as an OSN, and concluded those factors such as improved quality, price and market conditions effects consumer behavior and their demand amount. In another part of his research, Luo investigated the role of national brands on consumer behavior and their utility and he showed that removing brands from the market increases the utility as a result of reducing the prices.
In his PhD dissertation in Berkley University entitled “Rationality and Expected Utility” Gee (2015) studied the expected utility theory and compared it to rational decision making models and showed that consumers tend to pursue their own expected utility instead of acting based on rational decision making factors, since the utility theory addresses different physical and mental aspects to ensure their maximum satisfaction. Therefore, he concludes that the source of rational decision making is actually consumer utility and these two have a direct correlation.

Luo et al. (2012) showed that utility has a direct correlation with rational choice of consumers and encourages them to purchase. So, negative utility has a reverse effect on consumer choice resulting in no purchase. They calculated and presented their results based on utility and rational choice mathematical functions.

In his paper entitled “The arguments of utility: Preference reversals in expected utility of income model”, Lindsay (2013) studied some publications in expected utility and extracted two main approaches. In one approach, some researchers defined utility as the final wealth (profit) produced by a commodity, on the other hand, some researchers believed that the utility is the primary wealth (primary profit) and imperceptible incomes (tacit profits). He agreed with the second approach, which was actually discussed less. He showed that expected utility from income models, can determine the reversion of priorities caused by framing and the desire to pay the value of reversed – priorities. He demonstrated that when income and wealth are considered separately in utility function, the income model can predict the abnormalities occurring against the rational standard model.

As it had mentioned before, the authors could not find any similar matches in approach, methodology, samples or community in English or Persian. On the other hand, there are many documents available about database interfaces and user behaviors without considering relations to economic aspects or utility theory.

**METHODOLOGY**

In order to identify the factors which can potentially increase the scientific databases’ user utility, the qualitative summarizing content analysis method that is one of the three well defined techniques of the qualitative content analysis (Spannagel, Gläser-Zikuda & Schroeder, 2005) was used; qualitative methods were applied to classify concepts in different categories. In the first step, all of the documents from 2011-2016 about “Utility Theory” has been retrieved through Science Direct and Google Scholar during winter and spring 2016. The articles were then reviewed, and utility factors were extracted in a structured checklist. In second step, the researchers performed an exploratory interview with Iranian scientific database users.

The findings from interviews were then reduced in two stages: primary reduction by omitting frequented and similar factors, secondary reduction by concluding and classifying the main categories based on coding them theoretically in three steps: free coding the notes by text segmentation, meaningful coding and code designation to describe and clarify each axial segment (Strauss & Corbin, 1998:102); developing a
significant relationship between different segments in free coding stage (Ibid.:124) and finally, selective coding in which the researchers select the core category (utility is the preferred core category in this article) and identify its relations with other categories to form final categories. (Flick, 2002, p. 183); Then the conceptual model of customer utility was developed based on the frequency of each components in the exploratory interviews.

Utility is an economic term and the object of this study was to user satisfaction and evaluating received services in the paid cost for each information item obtained, hence the research population considered for the interviews is users who paid money for each information services. Random sampling was implemented in a 60-day period and a total number of 150 users who paid for using databases from University of Tehran Central Library and Documentation Center or Industrial Management Organization Library were interviewed. In choosing the samples, there was no consideration in gender specification, education, age or job. Almost after the 50th interview, no more new items were stated by responders.

These two libraries were chosen because of the researchers’ accessibility, having paid information services, collaborative administrators which provided the researchers with appropriate interview rooms and inquiries.

In order to limit the search for articles with the keyword “Utility” in this field, the researchers considered a 5-year period, 2011-2016, in databases Ebsco, ScienceDirect, and ProQuest and 216 main documents in this area were retrieved. Figure 1 shows research model of this article.

**Figure 1. Research model**
FINDINGS

This research trying to determine which factors maximizes user utility among Iranian information database users who use paid services. As it has mentioned before there was an exploratory review on over 200 information documents including thesis, research reports, articles, etc. And 150 users’ were interviewed, the findings were then reduced in two stage. The results of reduction Stage 1 in Inductive category development (50 interviews) with the frequency of each item in reviewed texts or interviews are shown in Table 1.

There were two major questions in interviews:

1. Could you please explain about the factors that make you satisfied if you pay for retrieved information items from information databases?
2. Which contents, services or facilities by information service providers or information dealers, makes you more interested to use the service again or pay more money for the services?

As shown in Table 1 and mentioned before, Total No. of interviews are considered 50. It is the number of interviews that have all of the items in there and in additional interviews; the researchers could not find any additional items related to increasing the user satisfaction. This situation is a saturation of interviews.

For the related documents in the table, one column is specified to thesis and research reports with total number of 100 records and the other one is for articles with total number of 100 records. The main rule in this selection is also saturation of information.

In the next stage (Reduction Stage 2 from Inductive category development process), the axial category is considered “User utility”, therefore the final items are categorized based on users’ opinions. The final categories are listed in Table 2.

Inductive category development process found four main categories that are mentioned in Table 2. However, reliability and validity of the process of analyzing or the categories are also important in content analysis. Reliability, concerns Inductive category development understandably, therefore the Inductive category development process was repeated and 50 selected interviews were coded and categorized by another trained researcher (outside the research team), and then the Krippendorff’s alpha coefficient was calculated using the formula presented below.

Krippendorff’s alpha coefficient (Krippendorff, 2013, 221) is a statistical measure of the agreement achieved when coding a set of units of analysis in terms of the values of a variable. Since the 1970s, alpha is used in content analysis where textual units are categorized by trained readers. Alpha is given by:

$$\alpha = 1 - \frac{D_0}{D_c}$$

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Table 1. Reduction items and their sources’ statistics: Stage 1

<table>
<thead>
<tr>
<th>Exploratory Items</th>
<th>No. of Interviews (N=50)</th>
<th>No. of Articles (N=100)</th>
<th>No. of Thesis, Research Reports (N=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Needs</td>
<td>50</td>
<td>42</td>
<td>30</td>
</tr>
<tr>
<td>Quality</td>
<td>-</td>
<td>65</td>
<td>60</td>
</tr>
<tr>
<td>Price</td>
<td>50</td>
<td>87</td>
<td>92</td>
</tr>
<tr>
<td>Subsidy</td>
<td>-</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Warranty</td>
<td>-</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Trials/Demo versions</td>
<td>20</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Fast Accessibility</td>
<td>43</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Distance</td>
<td>26</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Demographic Characteristics</td>
<td>2</td>
<td>30</td>
<td>45</td>
</tr>
<tr>
<td>Personal Experiences</td>
<td>43</td>
<td>62</td>
<td>58</td>
</tr>
<tr>
<td>Experts Experiences</td>
<td>32</td>
<td>52</td>
<td>66</td>
</tr>
<tr>
<td>Personal Needs (Entertainment, Pleasure)</td>
<td>-</td>
<td>64</td>
<td>70</td>
</tr>
<tr>
<td>Social Needs (Sympathy, Jealousy, Promotion)</td>
<td>-</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Guarantee</td>
<td>-</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>Psychological Characteristics</td>
<td>-</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>Supply and Distribution</td>
<td>-</td>
<td>92</td>
<td>83</td>
</tr>
<tr>
<td>Advertisement</td>
<td>24</td>
<td>72</td>
<td>54</td>
</tr>
<tr>
<td>Discounts and Awards</td>
<td>43</td>
<td>56</td>
<td>84</td>
</tr>
<tr>
<td>Incomes</td>
<td>-</td>
<td>98</td>
<td>94</td>
</tr>
<tr>
<td>Ethnic and linguistic characteristics</td>
<td>2</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>Market Structure</td>
<td>-</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Full text</td>
<td>50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Language Text</td>
<td>48</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Directories, Helps and Retrieval Method</td>
<td>49</td>
<td>12</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. Final categories based on “User Utility” axial coding: Stage 2

<table>
<thead>
<tr>
<th>Related Item Sets</th>
<th>Final Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Experiences, Expert Experiments, Advertisements</td>
<td>Quality</td>
</tr>
<tr>
<td>Discounts and Awards, Subsidy, Price, Trials/Demo Versions</td>
<td>Background information</td>
</tr>
<tr>
<td>Psychological and demographical Characteristics</td>
<td>Incentives</td>
</tr>
<tr>
<td></td>
<td>Individual and Social Characteristics</td>
</tr>
</tbody>
</table>
where:

\[ D_{\text{o}} \]

is the disagreement and:

\[ D_{\text{e}} \]

is the disagreement expected. An \( a = 1 \) indicates perfect reliability and an:

\[ a = 0 \alpha = 0 \]

indicates the absence of reliability.

\[
D_{\text{o}} = 1 \sum_{c \in R} \sum_{k \in R} \delta(c,k) \sum_{u \in U} m_{u} n_{c} k_{u} P(m_{u},2) = \frac{1}{n} \sum_{c \in R} \sum_{k \in R} \delta(c,k) \sum_{u \in U} m_{u} \{ \frac{1}{n} (n_{c} k_{u}) P(m_{u},2) \}
\]

The minimum acceptable \( \alpha \) coefficient should be chosen according to the importance of the conclusions to be drawn from imperfect data. In the absence of knowledge of the risks of drawing false conclusions from unreliable data, social scientists commonly rely on data with reliabilities \( \alpha \geq .750 \).

Krippendorff’s \( \alpha \) is more general than any of other special purpose coefficients. It adjusts to varying sample sizes and affords comparisons across a wide variety of reliability data, mostly ignored by the familiar measures. The \( \alpha \) calculated for 50 interviews in this study, was about 0.774 and seems to be suitable for summarizing content analysis.

The average frequency of each category, obtained by total presence number of related item sets is presented in Table 3.

The desirable average for the data presented in Table 3 is 50, so if an average frequency is closer to 50, it is more relevant to customer utility in information databases. Figure 2 shows these relationships.

**CONCLUSION**

As it was mentioned before, information databases’ users’ priorities for increasing utility for their payment value, in order of the frequency of categories reflected on their responses are as follows:

- Information Needs
- Quality
- Incentives
- Background information
- And finally, Individual and Social Characteristics
Most of interviewees mentioned their needs to information resources as the first item, and all of them noted that the information needs without any notice to discounts or subsidy is their major reason to pay money and therefore it is the basis of their utility. The second stated priority among them was Quality (full text, text language and etc.). Some of the interviewees mentioned the Incentives as their third priority, and whether their affiliated organization or the service provider could pay a part or all

<table>
<thead>
<tr>
<th>Average of Frequency</th>
<th>Related Item Sets</th>
<th>Final Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Information Needs</td>
<td>Information Needs</td>
</tr>
<tr>
<td>36.33</td>
<td>Quality, Ethnic and Linguistic Characteristics, Full Text, Text Language, Directories, Helps and Retrieval Method, Fast Accessibility, Distance</td>
<td>Quality</td>
</tr>
<tr>
<td>33</td>
<td>Personal Experiences, Expert Experiments, Advertisements</td>
<td>Background information</td>
</tr>
<tr>
<td>28.5</td>
<td>Discounts and Awards, Subsidy, Price, Trials/Demo Versions</td>
<td>Incentives</td>
</tr>
<tr>
<td>2</td>
<td>Psychological and demographical Characteristics</td>
<td>Individual and Social Characteristics</td>
</tr>
</tbody>
</table>
of their information expenses as a subsidy or discount or another encouraging method had a great impact on increasing users’ utility.

Background information also contributed to increased user utility to a large degree, however individual and social characteristics had no significant influence on user utility and a very few number of people pointed it out on their interviews.

Results of this study are not exactly comparable to the results of previous works, since the majority of previous data, as mentioned before, aims to study consumer utility in commercial product market and therefore information goods such as information databases are not included. This study can hence be considered as one of the initial attempts to focus on economic utility in the field of information merchandises.

Database marketers and vendors can use this model to improve their sales; they can set introduction meetings based on the degree of importance of this model’s components, for example, they must speak and explain about the strengths of their database and bold them in “Quality”, “Incentives” and “Information Needs” components, that develop more utility in customers, and so, it can tend customers to buying information databases. Furthermore, Information database marketers can use the “Background information” and “And finally Individual and Social Characteristics” components to their market analysis activities.

The database producers also can benefit from this model, thus, they must improve some components such as quality in their information database so that have better position than other competitors. So, marketers and producers can take advantage of this model.

This article is a part of a large research project in the field of customer utility and efficient markets in information databases, some other sectors include:

1. Quantitative validation of the conceptual model of customer utility in information databases;
2. Factors involved in efficient markets in information databases;
3. Conceptual model of efficient markets in information databases;
4. The relevancy model of customer utility and efficient markets in information databases; and etc...
REFERENCES


