Market and Strategic Analysis of Opinion Aggregators

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Submitted to the System Design and Management Program
in Partial Fulfillment of the Requirements for the Degree of

Master of Science in Engineering and Management

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ABSTRACT

This thesis studies an emerging web phenomenon - online opinion aggregator. The thesis first defines what an opinion aggregator is and then applies a holistic framework to analyze the opinion aggregator to understand its key characteristics. The research then zooms in on one of the most popular opinion aggregators, the product review aggregator, to understand its market opportunities, enabling technologies, and business models. The author samples nine product review aggregators based on the content type, the aggregation method, and the relationship with customers. An experiment of comparing product review ratings is also conducted to reveal issues and challenges faced by the product review aggregators.

The conclusion of this research is that most review aggregators are still in their start-up stage in which they are accumulating product review content and building a bigger user base. Many key enabling technologies such as natural language parsing and web text mining are still in the early stage of the technology evolution. Most of product review aggregators rely on advertising to sustain their businesses. Although aggregating product reviews is a good starting point, an aggregator needs to move towards a more comprehensive product research platform in order to grow its business.

This research can be used by product review aggregators that want to gain a holistic understanding of the opinion aggregation eco-system and want to formalize their business strategies. The research also offers insights into the critical success factors of product review aggregators and can be helpful for anyone who wants to start a review aggregation-based business. The market researchers can benefit from this research with a better understanding of opinion aggregators and opportunities presented to the aggregators.

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1 Introduction

1.1 Background and Motivation

This thesis looks to study an emerging web aggregation entity - the opinion aggregator. The author first defines what an opinion aggregator is and then analyzes in depth a specific type of opinion aggregator – product review aggregator. The thesis seeks to understand whether there are market needs and demands for such opinion aggregators. If so, the author tries to identify who primarily benefit from opinion aggregators' services. In addition, the thesis will explore what technologies an opinion aggregator employs and the current stage of those technologies. Lastly, the business models of opinion aggregators are discussed in depth in order to understand how an opinion aggregator sustains and grows its business.

The author predicts that the opinion aggregation is not hype and will sustain in some form in the future. An opinion aggregator, especially product review aggregator, may start with gathering and analyzing just opinions about products. As it expands the scope of its services, the opinion aggregator would include other information such as price and product feature info as well and therefore move towards a more comprehensive information aggregator. Opinion aggregators mimic the offline mode of people seeking advices from each other. When the underlying technologies become more mature and the critical mass of aggregated opinions is reached, an opinion aggregator will become a powerful online form of "wisdom of crowd" for people to go for guidance.

With the wide spread of broadband connections and the fast growth of Web 2.0 sites such as Blog and Wiki, more and more people voice their opinions about certain products, services, or social topics over the web. Shoppers, besides consulting their friends or relatives for buying advice, often conduct their product research online, reading reviews written by people who have bought the product. According to a recent Forrester report, "71% of online shoppers read reviews; making it the most widely read consumer-generated content". A Deloitte study also shows that online reviews have become an important source influencing online shoppers' purchasing decisions. In their study, 82% of the respondents who read reviews said that they have been influenced by those reviews. As the word-of-mouth content is proliferating on the web, sifting through the sea of messages to get some meaningful insights without getting lost in the details is a daunting task for a normal user.

A new breed of web aggregators, opinion aggregator, is emerging to answer this challenge. Opinion aggregators gather reviews on the web on specific products and present to users an overall view of all opinions gathered. Opinion aggregators reduce users' time in finding the products that best fit their needs. Instead of going to a number of web sites to read reviews, users can just go to one opinion aggregator to search a product, and the site returns an overall opinion rating and the summary of reviews. If users want to explore further on a specific review, they can click on the hyper-link

embedded in the review summary to view the original comments. Opinion aggregators are different from the traditional web aggregators. The latter pulls together objective information (such as price and product specs) of a product from many web sources and gives users a comparison view of gathered information. Opinion aggregators, on the other hand, focus on the subjective aspect of a product (such as reviews or comments on products or service qualities) and present users a summarized view of opinions about the product.

Opinion aggregators differentiate from each other mainly by the post-aggregation information processing method they use and the sources and types of opinions they aggregate. Some opinion aggregators such as Wize.com use the statistical method to calculate a numerical product rating. Other opinion aggregators (for example, ViewScore.com) perform sentiment analysis on reviews to understand whether the overall feelings towards a product are negative or positive. While most opinion aggregators center on product reviews, there also exist aggregators that target much broader topics. OpinMind (www.opinmind.com) lets users search in the Blog space for opinions on almost any topic such as "boyfriend" or a politician's name (OpinMind, 2007). It then groups related opinions into two categories - one who is in favor of such topic and one who dislikes the topic.

The motivation of this thesis is to understand the current situation of opinion aggregators and identify what business opportunities and technological challenges those opinion aggregators are facing . The thesis aims to answer the following questions:

- What are different types of opinion aggregators? What criteria one can use to analyze different types of opinion aggregators such as product review aggregators?

- What are the market opportunities for them? What specific value-add services are provided by opinion aggregators? Who are the main players in aggregators' business eco-system? How should opinion aggregators position themselves within the eco-system?

- What are the underlying technologies used by opinion aggregators to implement value-add services? Are these technologies mature enough for opinion aggregators to provide useful services to their users? What are the technical challenges or issues faced by the opinion aggregators?

- Finally, how do opinion aggregators capture those values they created? What will be the winning business models and what are the critical success factors for each of the business models?

1.2 Research Objective

The primary objective of this research is to analyze the market opportunities for opinion aggregators. The author also explores the enabling technologies and technical

architectures used by opinion aggregators and study what business models opinion aggregators typically adopt to succeed in the market place.

1.3 Research Scope

This thesis analyzes the opinion aggregators in general using the holistic analysis framework. The in-depth analysis and case studies are around a special type of opinion aggregators – product review aggregators.

Because this thesis focuses on aggregators that gather reviews from other sources, the review hosting or destination sites such as Amazon.com or BestBuy.com are in the targets of this research.

Other types of opinion aggregators such as general topic opinion aggregators (e.g. OpinMind.com), opinion trend monitoring aggregators (e.g. BlogPulse.com), Blogs aggregators and news aggregators are also outside the scope of this thesis.

However, the research findings on enabling technologies and business models will benefit and offer insights for further studies of review hosting sites and other types of opinion aggregators.

1.4 Adjacent Research Fields

The adjacent fields of this research are the recommendation system and the information filtering system. Both systems aim to provide relevant information that are likely of interests to users based on either the content users read or the users' social contexts (Ansari et al, 2000). A typical example of the recommendation system is Amazon's book recommendation service, which suggests to buyers what books they might be of interests in buying based on their past buying behaviors or other buyers who bought similar books.

Although most review aggregators focus on aggregating and summarizing product reviews, some aggregators such as Buzzillions.com leverage users' profiles to find relevant reviews from other users with similar interests. As review aggregators start to enhance their service offerings to provide more targeted and relevant review aggregation services, it is very likely that those aggregators will incorporate the recommendation service in the post-aggregation process. Further research on how the recommendation system can be integrated into the post-aggregation process would be beneficial to product review aggregators.

Other fields relevant to this research are manufacturers' product support sites. It is typical for product manufacturers to set up an online support site where customers, when they have questions about products, can go and search for answers. The product support site is organized mostly in the format of questions and answers. Users can post their own questions or answer questions raised by other customers. The product support site

primarily satisfies the needs of getting help on how to use or trouble-shoot a product after customers purchase the product. Product review aggregators, on the other side, facilitate customers' decision-making process prior to their purchases. It is unclear whether product review aggregators will also integrate product support content so that they can offer customers an end-to-end platform for both product research and product support. Further research in this area will provide insights into how product review aggregators can expand their service boundaries.

1.5 Research Frameworks

The technology strategy framework (Davies, 2007) will be used in the research. As shown in figure 1-1, the framework explores a technology-based business strategy from three perspectives:

- Market: it is mainly to understand the demand opportunities, the evolution of such demand, the value-creation process, and major players in the business eco-system.

- Technology: from this perspective, the thesis studies the evolution of enabling technologies, performance of those technologies, system architecture, critical performance parameters and what trade-offs a company should make to achieve its primary goals

- Business Strategy: it primarily answers what the key elements of a business model are, what business models are commonly adopted by opinion aggregators, and what are key success factors in each business model.

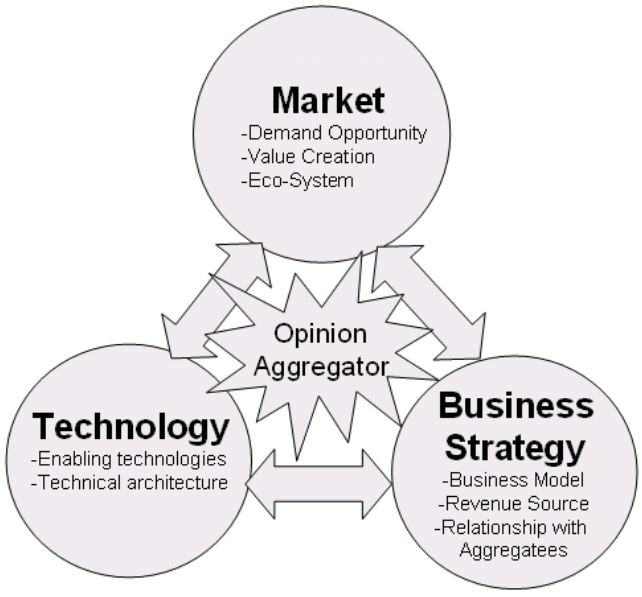

Figure 1-1: Overall Research Framework

Besides the overall framework, the following frameworks or models are also applied in the in-depth analysis:

- Holistic Analysis framework: Professor Ed. Crawley suggests a holistic framework for analyzing any product or system . The author applied such holistic framework to analyze opinion aggregators in order to gain a deep understanding of the opinion aggregation system.

- Aggregator analysis model: Stuart Madnick and Michael Siegel categorize aggregators into four categories and generalize the relationships between aggregators and aggregatees (Madnick and Siegel, 2002). The same analysis model is used in this research to study opinion aggregators and product review aggregators.

- E-Business model schematics: in their popular book "From Place to Space", Peter Weill and Michael Vitale suggested an e-Business model schematics to analyze and depict e-business value creation and capture process (Weill and Vitale, 2001). A set of atomic e-business models are introduced as building blocks for constructing business models of complex e-business services. The author uses the e-Business model schematics along with atomic models to describe emerging business models of opinion aggregators.

1.6 Research Approach

I followed a multi-step approach to gather data and study materials for the thesis.

First, I conducted extensive literature research to gather data and materials from a variety of sources including market research reports, technical papers, personal Blogs, online journals, and books.

Second, I applied various analysis frameworks in synthesizing collected data to obtain a systematic view of opinion aggregators and their surrounding business environment and market context. With the systematic understanding of the market, technology, and strategy aspects of opinion aggregators, I moved forward to predict what business models would be more suitable for opinion aggregators and what strategies they should adopt to succeed.

Third, I performed case studies on three opinion aggregators. In the study, I used the findings from the previous steps to understand each opinion aggregator's technology strength, market positioning, and business strategy.

Fourth, I interviewed founders of an opinion aggregator company to gain insights from people, who are actually in the field building the business, on their perspectives of the market trend, the technology evolution, business models and strategies.

Finally, I concluded the thesis with the learning from this research.

1.7 Structure of Thesis

The whole thesis contains five major sections.

- Chapter 2 gives an overview of aggregators. It provides definitions of information aggregator, opinion aggregator and product review aggregator. The chapter introduces a holistic framework for analyzing aggregators. Various types of aggregators are studied in depth under the lens of the holistic framework.

- Chapter 3 samples a special type of opinion aggregator, product review aggregator. The author chose nine product review aggregators based on the review source, number of reviews aggregated, post-aggregation methods, and services offered. The characteristics of nine review aggregators are described in details. The author projects nine review aggregators to different analysis frameworks to categorize them. Finally, an experiment is conducted to show that review aggregators may provide different review ratings. The author analyzes what may cause the variance in aggregated review ratings.

- Chapter 4, 5, and 6 analyze opinion aggregators from three perspectives: market, technologies, and business models.

- Chapter 7 goes into the detailed case studies of three opinion aggregators (Buzzillions.com, Wize.com, and alaTest.com) to understand the needs each aggregator satisfies, the enabling technologies employed by each aggregator, and the business models adopted by the aggregators.

- Chapter 8 discusses the learning and findings from the overall research. The chapter, in the end, lists the challenges and issues faced by product review aggregators.

2 Overview of Web Aggregators

This chapter introduces the key concepts of web aggregator, opinion aggregator, and product review aggregator. The author uses a holistic framework to analyze each of them to reveal their key characteristics.

2.1 Web Aggregator

Madnick and Siegel define web aggregator as "an entity that can transparently collect and analyze information from multiple web data sources" (Madnick and Siegel, 2002).

According to this definition, an aggregator is different from other web entities on that it does not focus on hosting content; instead, it gathers content from other web sources. Aggregators save users time of doing their own search for information. They also add values to users by processing information gathered. From this aspect, aggregators are different from search engines and web portals for they simply re-present the content without further processing the information. Some aggregators collect price and vendor information and offer users comparison services. Other aggregators conduct natural language parsing on the content to reveal the overall sentiment of a message. Success of an aggregator largely hinges upon the quantity and quality of information sources, the accuracy and reliability of its post-aggregation process, and the intuitive interface it offers to users.

2.1.1 Examples of Web Aggregators

There are wide varieties of web aggregators. They range from shopping comparison sites, which compare product price and shipping rates, to more comprehensive aggregation sites, which gather relevant information around a specific item such as information of sellers and buyers, community, and customer reviews around a real estate property. Madnick and Siegel categorize web aggregators along the dimensions of inter-organizational vs. intra-organizational and comparison vs. relationship (Madnick and Siegel, 2002).

BestBookBuys (www.bestbookbuys.com) is an example of the inter-organizational comparison aggregator. As an aggregator, BestBookBuys gathers seller information of books from online bookstores and helps users compare book prices and store services. As shown in figure 2-1, after a user submits the search for a specific book, the web site returns a nicely formatted table comparing booksellers on the store rating, availability, price, sales tax, and shipping rate etc. A user can easily compare stores based on those listed criteria. Once the user makes the decision, he or she can click on the "BUY" hyper-link embedded in the page to go to the selected vendor site to purchase the book.

Figure 2-1: Screen shot of a Comparison Aggregator – BestBookBuys

Trulia, on the other hand, is an inter-organizational relationship aggregator. As a relationship aggregator, Trulia (www.trulia.com) aims to provide its users all relevant information about a specific real estate property. The site gathers market trends, map information, expert advice, neighborhood rating, and schools nearby a property.

Figure 2-2 shows the screenshot of Trulia information page of Cambridge, Massachusetts. As shown in the screenshot, a user, without leaving the Trulia site, can easily explore relevant information about properties in Cambridge, Massachusetts such as average sales price in each month, average price per square feet, and number of sales etc. Trulia saves a user's time and efforts in searching for the same information by himself or herself.

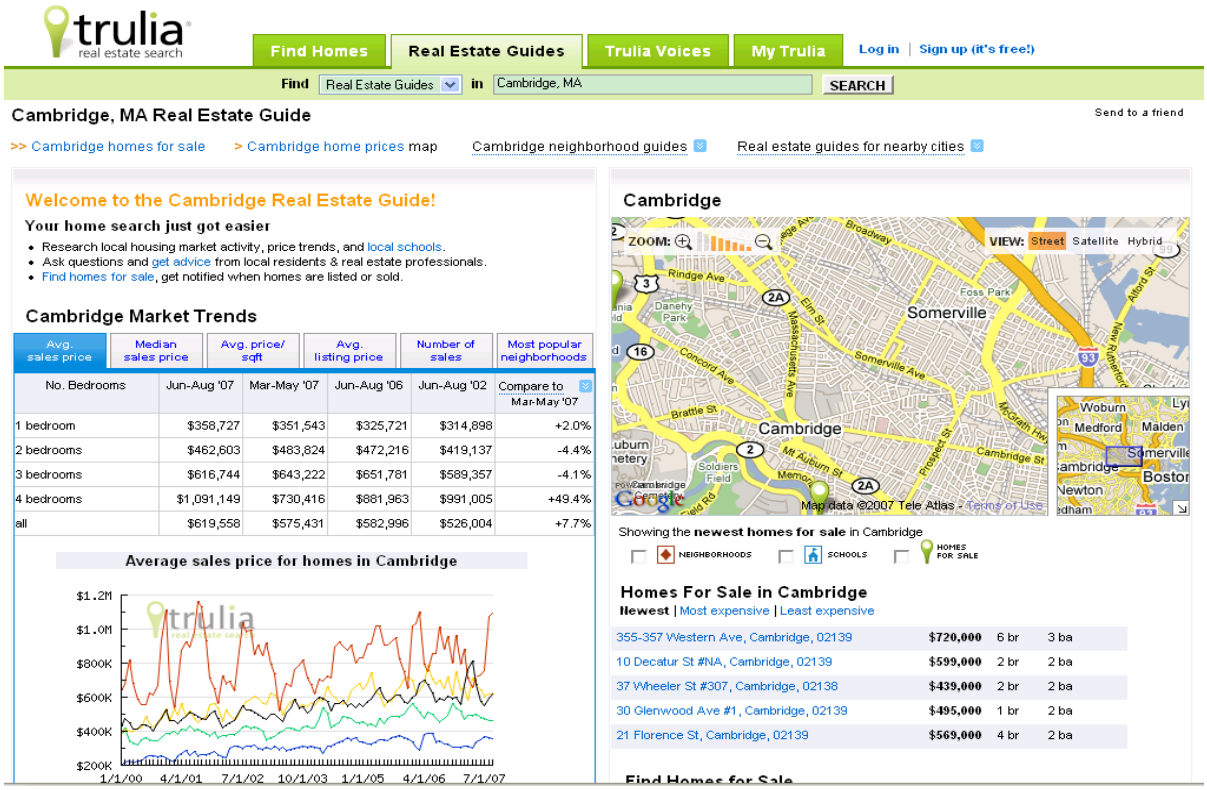

Figure 2-2: Screen shot of a Relationship Aggregator – Trulia

2.1.2 Holistic Framework for Analyzing Aggregators

Professor Ed. Crawley's holistic framework for analyzing products and systems is applied here to gain a systematic view of a web aggregator (Crawley, 2007). The holistic framework addresses questions of why, what, how, who, where, when, and how much. Putting a web aggregator under the lens of the holistic framework (as shown in figure 2-3), one can understand various aspects of the aggregator.

Why – The "Why" question asks about what needs an aggregator satisfies and what values or benefits the aggregator provides to its users. An aggregator should be clear about who are the beneficiaries of its service (this is addressed by the "Who" question) and what are the needs of their beneficiaries.

Different stakeholders have different needs. For web aggregators in general, users need to find information they want with high relevance and in less time. Aggregatees, as the information sources, would need to attract more traffic to their sites so to increase their revenue and brand recognition. Market researchers have the needs of understanding the mark trend and customer segments.

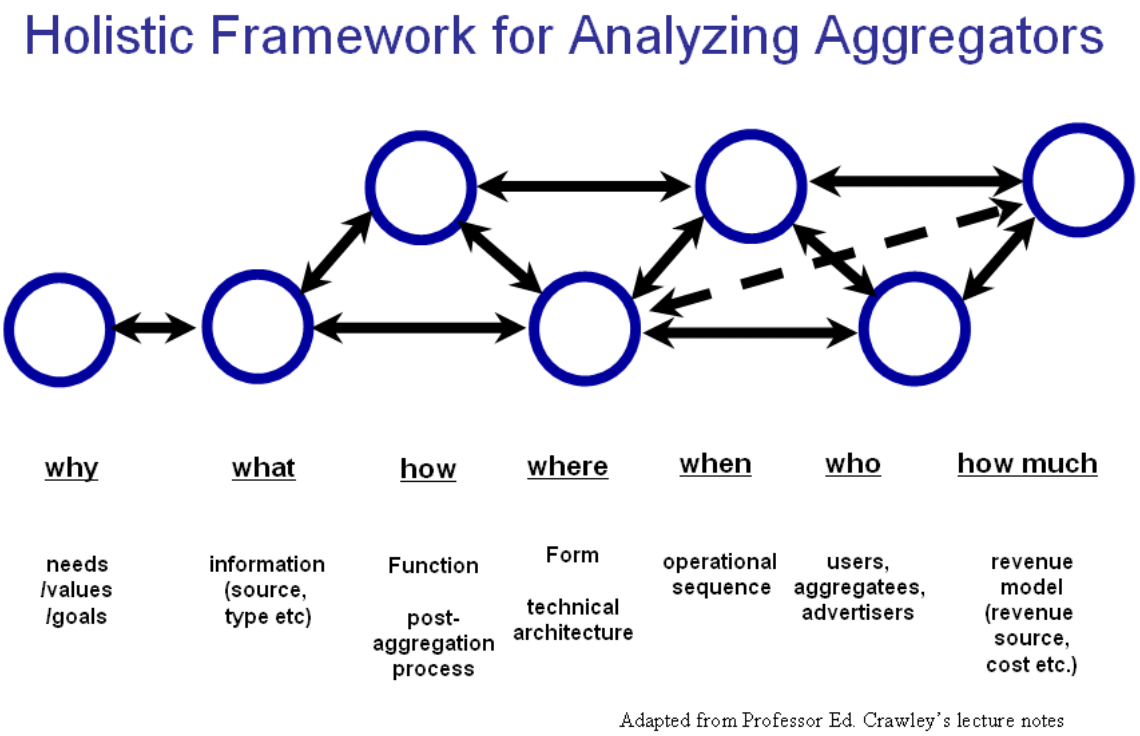

Figure 2-3: Holistic Framework for Analyzing Aggregators
(Adapted from Professor Ed. Crawley's lecture notes)

What – the "What" question is about the information that aggregators gather and analyze. Further questions include:

- What are the sources of the information? What types of content (e.g. subjective or objective) do aggregators gather?
- Which industry (e.g. consumer electronics or entertainment etc.) do aggregators focus on?
- What is the structure of the content?

Aggregators need to understand the information well enough to effectively collect and process them.

Where – the "Where" question mainly addresses the structure or the form of an aggregation system. It specifically refers to the place in which the aggregation service is offered and the technical architecture of an aggregation system. What is the structure of an aggregation system? What are the key components of the system?

When – the "When" question asks about the operational sequence of an aggregation system. It refers to how users use the review aggregation services such as searching and viewing the information. The operational sequence also includes how and when the aggregation system gathers and analyzes information and presents results.

How – the "How" refers to how information are collected and processed. Aggregators do not just collect information and re-present them to users. They conduct certain analysis

and processing on the information gathered and present results to user in an easy-to-navigate way.

Who – aggregators need to be very clear about who are interested in their services and therefore benefit from those services and who will pay for their services. There are people such as users and advertisers who can directly benefit from aggregators' services. There are also in-direct beneficiaries. Aggregatees, for example, can in-directly benefit from aggregators' services because aggregators can guide customers back to aggregatees.

How much – this question targets an aggregator's business model. What are the sources of revenue? What is the cost structure? Is the business profitable? Some aggregators rely on the advertising model to sustain their businesses. Other aggregators follow the revenue sharing business model, in which they build formal relationships with aggregatees so that aggregators can share revenues generated by re-directed sales traffic to aggregatees.

Table 2-1 summarizes the holistic analysis of web aggregators.

Table 2-1: Holistic Analysis of Web Aggregators

Questions	Explanation
Why (Needs)	Needs, Goals, and Benefits
What (Information)	Information (information type, structure, and source etc.)
How (Technology)	Function - post-aggregation Process
Where (Technical Architecture)	Form and structure – key technical architecture (system components etc.)
When (Operational Sequence)	Operational Sequence
Who (Beneficiaries)	Users, Advertisers, Aggregatees, and Market Researchers etc.
How Much (Business Model)	Business models (revenue source and cost structure etc)

2.2 Opinion Aggregator

This section explores several key definitions, followed by a discussion around the online forms of opinions. The section then gives the definition of opinion aggregator and explores various types of opinions aggregators. In the end, the author applies the holistic framework to analyze the opinion aggregator.

2.2.1 Key Definitions

Opinion

According to the Merriam-Webster online, the definition of opinion is:

Opinion
1: a view, judgment, or appraisal formed in the mind about a particular matter
2: belief stronger than impression and less strong than positive knowledge

This definition points out two interesting characteristics of an opinion.

First, an opinion is subjective as it represents a person's personal views or feelings towards certain things. An opinion can vary from person to person. It is different from fact-based information such as map data or product specifications, which does not change because of the person who accesses the information.

Second, an opinion has not been proven and therefore not necessarily true. People may agree or disagree with a person's opinion. In this sense, opinion is different from knowledge or a dictionary definition that generally holds true and is widely accepted by the public.

Opinions on the Web

Opinions traditionally exist either in the verbal form as in people's conversations or in the written form as in research papers, books, or newspapers. With the availability of the web front, people find new ways to express their opinions and therefore there are new forms of online opinions:

Online Product Reviews – either consumers or experts can write reviews to express their experience or evaluation of a certain product or service. Depending on the product, reviews can be book reviews, music reviews, movie reviews, consumer electronics reviews, and car reviews etc. There are two types of reviews depending on who writes the review:

- Consumer Review refers to a review written by the actual owner of a product or the user of a service. Since the reviewer actually purchased the product or service, he or

she expresses personal feelings or judgment towards the product or service from his or her user experience.

Since a consumer may not likely purchase multiple similar products or services at the same time, the review is limited to the product or service he or she buys. Consumer review can be biased, as the user may simply be in favor of certain brand of products. As such, consumer reviews of one product may not be comparable to user opinions of other similar products.

- Expert Review refers to a review written by a professional evaluator who has tested several comparable products or services and can comment on which product offers the best value for money or has the best set of features.

An expert reviewer typically has deep knowledge and expertise in certain products or services. An expert review is normally in-depth and comprehensive. Readers of the expert review can get general ideas of how one product compares to other products in the same category. However, since the expert reviewer is not the actual user of a product or service, he or she usually does not spend enough time with the product or service like a normal user does. Therefore, expert reviewers may not be able to discover issues associated with long time uses.

Blog – is a person's web log of commentary on a particular subject such as restaurants, movies, products, or local news. The entries in Blog are written in chorological order while displayed in the reverse time sequence. Blog also offers readers ability to leave feedback in an interactive format.

Wiki – is a collaborative site which allows people to access and edit the same set of documents. Unlike Blog which is mainly written by a single person, Wiki involves collaborative efforts and encourages knowledge sharing among a group of people. Wiki typically records knowledge or learning from a group of users. Wikipedia is one example of online collaborative knowledge base.

Forum / Message Board – is a web discussion platform which members of its community post opinions on certain topics. Messages in the forum are grouped by topics discussed. Forum can be further divided into sub-forums based on the categories of discussion topics.

Opinion Aggregator

An opinion aggregator is a special type of web aggregator, which gathers and analyzes opinions (for example reviews, Blogs or Wiki) from a variety of web sources. The opinion aggregator analyzes those opinions collected and presents a summarized view of what people think about certain things. It seeks to uncover an overall sentiment from opinions it gathers. In doing so, the opinion aggregator strives to offer users some meaningful insights about a particular topic and save users time of sifting through a large number of comments.

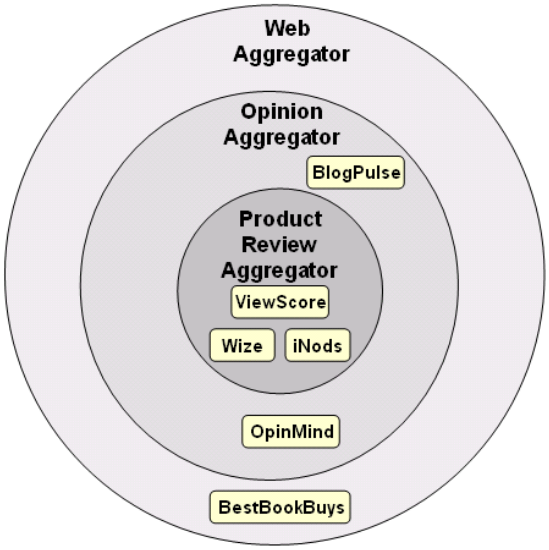

Figure 2-4: Web Aggregator Space

As shown in figure 2-4, opinion aggregators are a sub-set of web aggregators. While web aggregators are interested in a broad range of information, opinion aggregators focus their efforts on subjective content. The example opinion aggregators are BlogPulse.com and OpinMind.com. BlogPulse.com tracks the number of Blog posts on a specific topic over a period of time. OpinMind.com provides sentiment analysis over the opinions aggregated. There are various types of opinion aggregators. Among them, product review aggregator is the most popular one and will be explored in detail in this thesis. Wize.com and ViewScore.com are examples of product review aggregators.

2.2.2 Types of Opinion Aggregators

Opinion aggregators can be categorized into different types based on the type of content they aggregate and the post-aggregation processes.

Content Type – depending on the type of the content, opinion aggregators can be:

- Product Review Aggregators – are aggregators that aggregate reviews on products or services. Product reviews include consumer electronics reviews, movies reviews, and music reviews etc. Viewscore.com (www.viewscore.com) and Wize.com (www.wize.com) are examples of product review aggregators. As a service provider review aggregators, Start12 (www.start12.nl) finds and compares reviews on online service providers.

- Miscellaneous Opinion Aggregators – include Blog aggregators, news aggregators, forum aggregators etc. Blog aggregators track and summarize sentiments or trends on a topic in the Blog space. Blogpulse.com (www.blogpulse.com) monitors Blogs on a topic and plots the trend in terms of number of posts. OpinMind

(www.opinmind.com) searches in the Blog space and calculate an overall sentiment rating on a topic.

Post-aggregation – opinion aggregators can be categorized as comparison aggregators or summarization aggregators based on the post-aggregation process. Madnick and Siegel suggest that general web aggregators can be either comparison aggregators or relationship aggregators and based on the information source, they can be either inter-organizational or intra-organizational (Madnick and Siegel, 2002). According to the research conducted in this thesis, the author found that most opinion aggregators belong to the inter-organizational comparison type (as shown in figure 2-4). Another type of opinion aggregators is summarization aggregator that summarizes opinions on a topic or track on the overall trend of opinions.

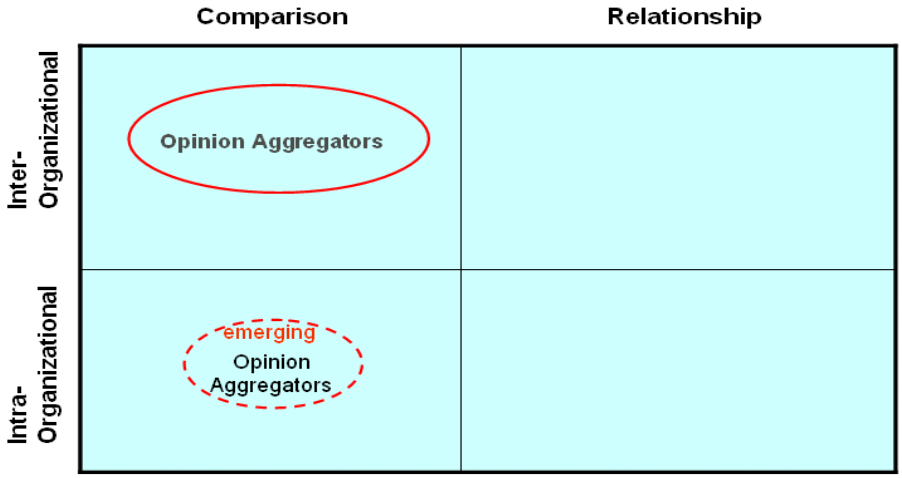

Figure 2-4: Categorization of Opinion Aggregators

- Comparison Aggregator – this type of opinion aggregators fits the general category of comparison aggregator. Comparison opinion aggregators calculate numerical review ratings for products and help users easily compare reviews of different products.

  Most opinion aggregators are inter-organization aggregators. As enterprise 2.0 applications gain popularities, intra-organizational opinion aggregators may emerge to address the needs of analyzing opinions from people inside the company so to provide the management team the insights into employees' morale.

- Summarization Aggregator – another type of aggregators parse opinions into an easy-to-read summary so that users can grasp the overall sentiment of opinions about a subject. As mentioned earlier, OpinMind (www.opinmind.com) analyzes opinions around a target theme and shows at high level the percentage of people in favor or dislike the topic. BlogPulse (www.blogpulse.com), on the other hand, tracks number of posts or conversations on a particular topic and present a trend plot.

2.2.3 Analyzing Opinion Aggregators Using the Holistic Framework

Applying the analysis framework, one can summarize the key characteristics of opinion aggregators in table 2-2.

Why (Needs) - opinion aggregators satisfy users' needs of sharing opinions or experience. The online merchants can use opinion aggregators' services to understand customers' preferences and get feedbacks on their store services. Market researchers can leverage the service to study the market trend.

What (Information) – information targeted by opinion aggregators are opinions that include reviews, comments, Blogs, and messages on Wiki and forums.

How (Technology) – opinion aggregators apply web crawling, data mining, sentiment analysis, and web presentation technologies to analyze opinions and present results.

Where (Technical Architecture) – the technical architecture normally contains the web crawling, the statistical analysis, search, and UI modules.

When (Operational Sequence) – the operational sequence here refers to the sequence of how opinions are gathered and analyzed and how users search and view results.

Who (Beneficiaries) – the beneficiaries of opinion aggregator include Bloggers, consumers, online merchants, product manufacturers, and market researchers.

How Much (Business Models) – common business models for opinion aggregators include advertising, subscription, and revenue sharing.

Table 2-2: Holistic View Analysis of Opinion Aggregator

Questions	Explanation
Why (Needs)	* Share opinions/experience * Listen to customer voice * Understand market trends
What (Information)	Reviews, comments, Blogs, Wiki, forum
How (Technology)	Post-aggregation Process * Summarizing * Statistical processing * Sentiment analysis
Where (Technical Architecture)	Form – web application architecture which includes web crawling, aggregating, search, and presentation modules
When (Operational Sequence)	Operational Sequence – when & how often opinions are aggregated, and the sequence of how users search opinions
Who (Beneficiaries)	* Consumers * Online merchants * Product manufacturers * Market researchers
How Much (Business Model)	* Advertising * Subscription * Revenue-sharing

2.3 Product Review Aggregator

As product reviews proliferate on the web, more and more opinion aggregators gather and analyze those reviews. The majority of opinion aggregators found during this research focus on aggregating product reviews. Therefore, this thesis will focus on the product review aggregators.

Other types of opinion aggregators are beyond the scope of this study. Those opinion aggregators include the general opinion aggregators (i.e. OpinMind.com), Blog aggregators and news aggregators etc. Although those opinion aggregators are not the focus of the study, the author believes that the holistic analysis, some of the enabling technologies (such as web crawling, data mining and natural language parsing technologies) and business models for product review aggregators are still applicable to them. .

2.3.1 Analyzing Product Review Aggregators Using the Holistic Framework

Again, applying the holistic analysis framework, one can identify the key characteristics of review aggregators as shown in table 2-2. The detailed discussions on "Why" (market analysis), "How" (technology), and "How much" (business model) are in subsequent chapters.

Table 2-3: Holistic Analysis of Product Review Aggregator

Questions	Explanation
Why (Needs)	* Find best products (users) * Generate more revenue (retailers) * Listen to customer voice (product company) * Improve product quality (product company)
What (Information)	Product reviews (Expert reviews, consumer reviews etc.)
How (Technology)	Post-aggregation Process - Statistical processing - Sentiment analysis - Natural language parsing
Where (Technical Architecture)	Form – web application architecture which includes web crawling, aggregating, search, and presentation modules
When (Operational Sequence)	Operational Sequence – when & how often reviews are aggregated, and the sequence of how users search reviews
Who (Beneficiaries)	* Shoppers * Online merchants * Product companies * Market researchers
How Much (Business Model)	* Advertising * Subscription * Revenue-sharing

3 Sampling Product Review Aggregators

To get a general sense of what a product review aggregator looks like and what services it offers, this chapter samples 9 product review aggregators. After the detailed descriptions of those aggregators, the author analyzes them using two matrices. Finally, the author uses an experiment to show some issues and challenges faced by product review aggregators.

3.1 Sampling Method

In order to ensure that the sampled review aggregators are representative, the author uses the following criteria when selecting product review aggregators:

- Types of Reviews – reviews can be consumer reviews or professional reviews. Some review aggregators (e.g. ProductCritic.com) collect only expert reviews while others (e.g. Buzzillions.com) focus only on consumer reviews. There are also aggregators (e.g. Wize.com) that target both consumer reviews and expert reviews. The author picked review aggregators from each of the three groups.

- Product Categories – some review aggregators such as Retrevo narrowly target a vertical such as consumer electronics. Other review aggregators such as Buzzillions.com aggregate reviews on a wide range of products. The author selected review aggregators from each of the categories.

- Post-aggregation Processing Method – the post-aggregation processing method ranges from the simple re-grouping and re-formatting of the information to the advanced statistical processing or natural language parsing. The author makes sure that most post-aggregation processing methods are represented in the sample pool.

- Business Models – most review aggregators (such as Wize.com) depend on advertising as their revenue source. Some review aggregators (e.g. Buzzillions.com) use the software-as-a-service model. They provide review solutions to online retail stores and charge subscription fees from them. The author ensures that typical business models of product review aggregators are in the sample pool.

3.2 Example Product Review Aggregators

3.2.1 iNods – aggregating reviews with a social review community

iNods (www.inods.com) gathers reviews from individual users as well as from expert reviewers. The web sources which iNods aggregates include personal web sites, Blogs, E-Commerce sites (such as Amazon.com and shopping.com), and review hosting sites (such as CNET.com and Epinion.com) (iNods, 2007). Reviews collected by iNods fall into a wide variety of product categories ranging from consumer electronics (e.g. Digital

camera and Flat panel TV) and media goods (such as books, movies, and music) to home, garden, and family products.

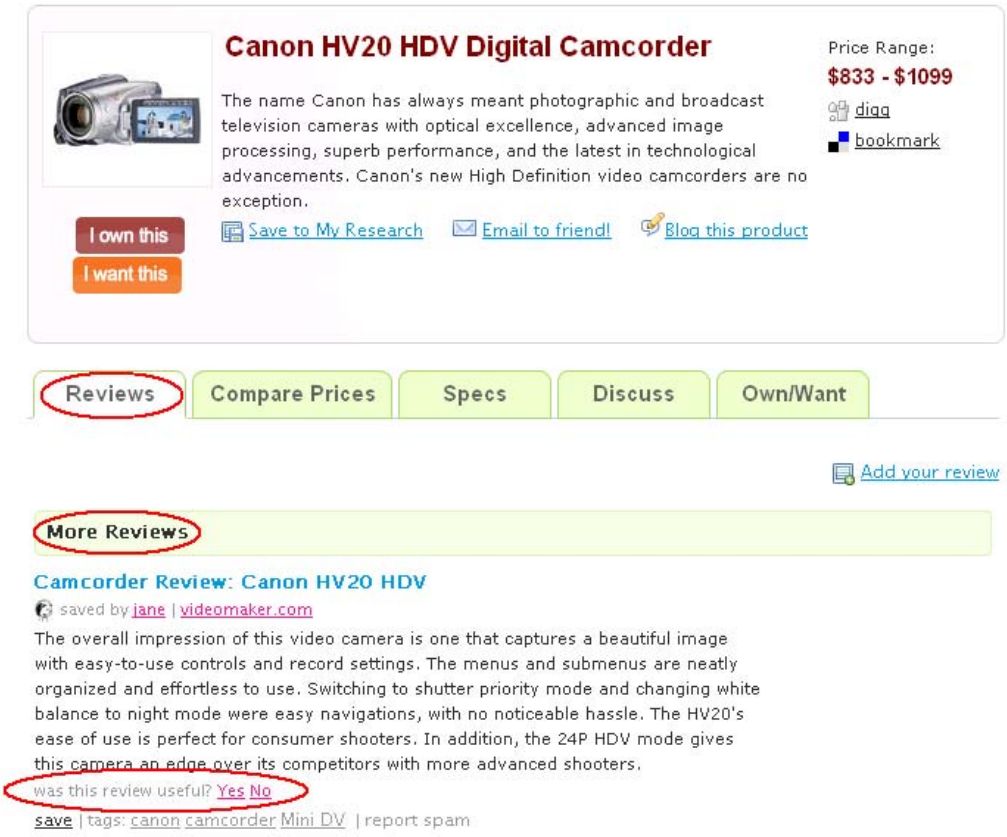

Figure 3-1: Screen shot of iNods Review Summary of Canon HV20 Camcorder

As shown in figure 3-1, users can search a product on iNods and the result page shows reviews, specs, price comparison, discussions, and owner info. iNods combines user reviews and expert reviews into one "Reviews" section without clearly distinguishing them. Some reviews are grouped under the "User Reviews" heading, while the rest are under the "More Reviews" title. The "Reviews" section contains summaries of collected reviews with references to the corresponding sources. iNods does not calculate an overall review rating; neither does it display ratings from original sites.

iNods lets users rate each review for whether it is useful or not. Registered users can save reviews they feel helpful, record products they own or want, find other users who have bought the same products to ask questions, or write their own reviews. By connecting users with each other, iNods builds a social review community in which users can share their experience or opinions about products.

In addition to online search service, iNods develops review service programs to help online merchants, content publishers and domain owners easily incorporate rich review

content into their web pages. iNods also participates in the Google AdSense program and displays ads relevant to searched products.

iNods is currently running as a standalone entity, not affiliated with other companies.

3.2.2 Retrevo – vertical review search engine

Retrevo (www.retrevo.com) was founded in 2005 in Sunnyvale, California. The company develops a vertical search platform on consumer electronics (Retrevo, 2007). Retrevo secured $700,000 in the seed round funding from Alloy Ventures in February 2006. Ten months later, the company received another $3.2 million in Series A funding led by Alloy Ventures and Norwest Venture Partners (CrunchBase, 2007a).

Retrevo's homepage resembles Google's simple search interface. As shown in figure 3-2, Retrevo organizes product information into following pages (Retrevo, 2007):

- Overview – shows where the product is positioned in the price and feature matrix. The page also displays overall user rating and expert rating along with Retrevo's analysis of the product.

- Expert Reviews and User Reviews – display the abbreviated version of original reviews. Users can click on each review summary to go to the original site to read the details.

- Manufacturer info – lists links to product manufacturer sites.

- Deals & Prices – shows online stores that sell specific products. The page does not provide price comparison information though.

- Manuals – Retrevo provides the link to the online user manual. Users can download and read the instructions manual from the product manufacturer's site.

Retrevo puts together relevant information about specific products and gives users a central platform to conduct their product research. Users do no need to leave Retrevo to get all the information needed including reviews, online stores, manufacturers, and user manuals.

In addition to overall user rating and expert rating, Retrevo designs a nice "Feature vs. Price" matrix to visualize where the product is positioned. For example, figure 3-2 shows that the Canon HV20 Camcorder is featured as a mid-price-range camcorder with average feature set. By looking at the matrix, users can quickly get the idea for whether the product fits in the range of what they are looking for.

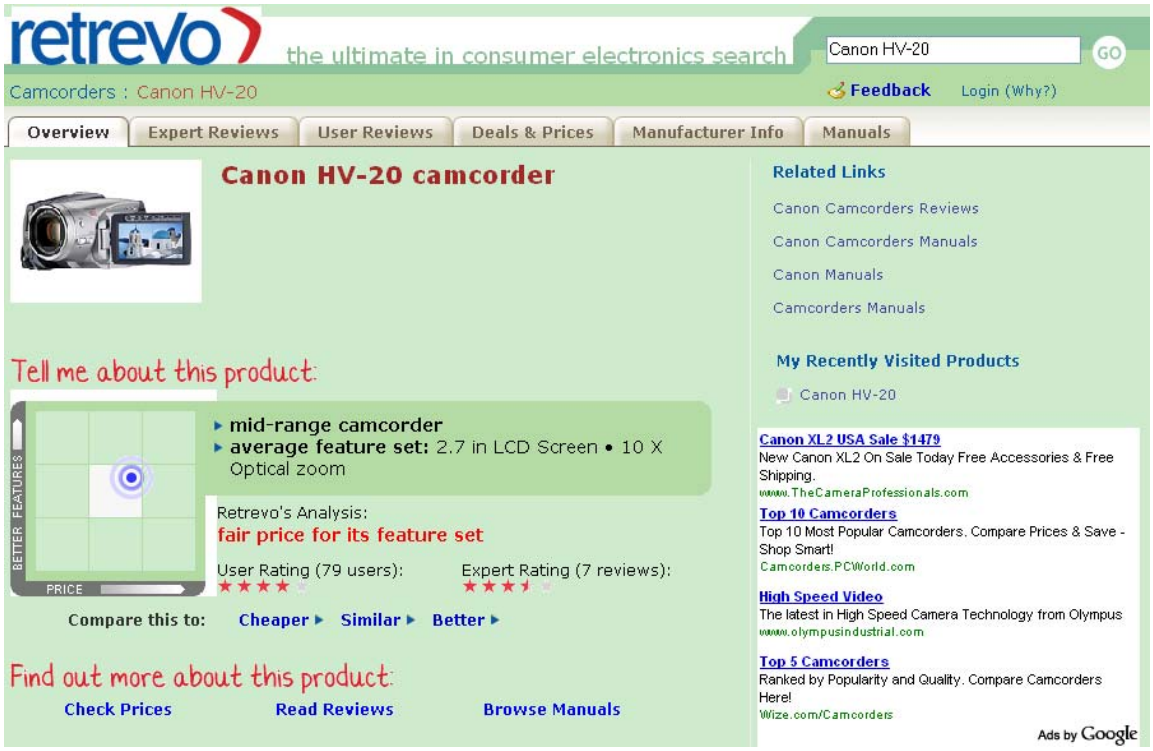

Figure 3-2: Screen shot of Retrevo Review Summary of Canon HV20 Camcorder

What is unique about the Retrevo's service is that it provides links to manufacturer sites and user manuals. Most review aggregators focus on reviews and price comparisons but do not offer such links to manufacturers. These additional features provided by Retrevo will likely attract more users to its site.

It is also worth pointing out that Retrevo has revamped its web site during the time this research was conducted. The old version simply re-grouped and re-formatted the information collected, but did not provide a review summary. The new site added overall user & expert ratings and the price-feature matrix. .

Retrevo site participates in the Google AdSense program and therefore part of its revenue comes from the Google Ads program. It is unclear from Retrevo site whether it built partnerships with aggregatees.

3.2.3 ViewScore – Applying natural language processing technology

ViewScore (wwww.viewscore.com) is about digesting reviews from thousands of web sources to provide users an easy-to-follow shopping guide (ViewScore, 2007). The site offers a comprehensive product research platform for users to compare product reviews, specs, and prices. ViewScore also includes merchants' links in its web site to facilitate users' purchasing process after their product research.

ViewScore focuses on reviews around consumer electronics products. It searches a wide variety of web sources including CNET, DCResource, TrustedReviews, PC World, and PC magazine etc for both expert reviews and user reviews.

Upon the return of a product search, the site displays an overall product score along with an average expert rating and an average user rating. Product reviews are listed under two separate tabs: the expert reviews and the user reviews. Users can drill down on each review to read the original content. Users can also do price comparison, check product specification, and compare with other similar products.

Figure 3-3 shows the screen shot of the review summary page of Canon HV20 camcorder.

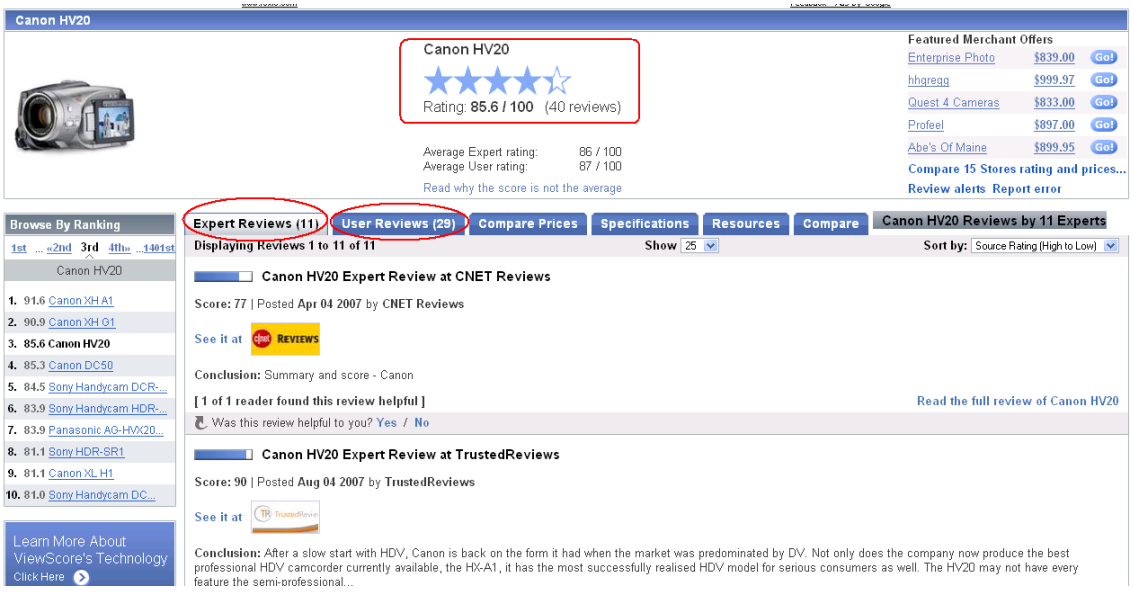

Figure 3-3: Screen shot of ViewScore Review Summary of Canon HV20 Camcorder

The unique strength of ViewScore's review search engine lies in its NLP (natural language processing) powered TextScore system (ViewScore, 2007). The TextScore system parses each review comment and computes an individual review rating. Individual scores are then aggregated into an overall product review rating (on a scale of 0 to 100). Based on review scores, the site recommends to users a list of top ranked products.

3.2.4 Wize – "Millions of Opinions, One Score"

Wize (www.wize.com) aims to build a comprehensive product research platform for online shoppers to read reviews and make buy decisions. The site targets broad categories of product reviews, ranging from consumer electronics to home and garden products. According to its web site, Wize crawls more than 7,000 websites, gathers more than a million user and expert reviews, and ranks over 75,000 products (Wize, 2007a).

The site summarizes all the reviews it gathers on a product into a single WizeRank score, showing people's overall sentiment towards the product. To do so, Wize uses a complex statistical process to normalize reviews and remove calculation errors (Wize, 2007b). For example, reviews come in with various rating scales. Some reviews use the 5-star rating approach. Others rate products from one to 100. Wize first converts all raw ratings into numbers of one to 100 and then applies statistical methods to take in consideration of a few factors such as the number of reviews and the weight of expert reviews vs. user reviews etc.

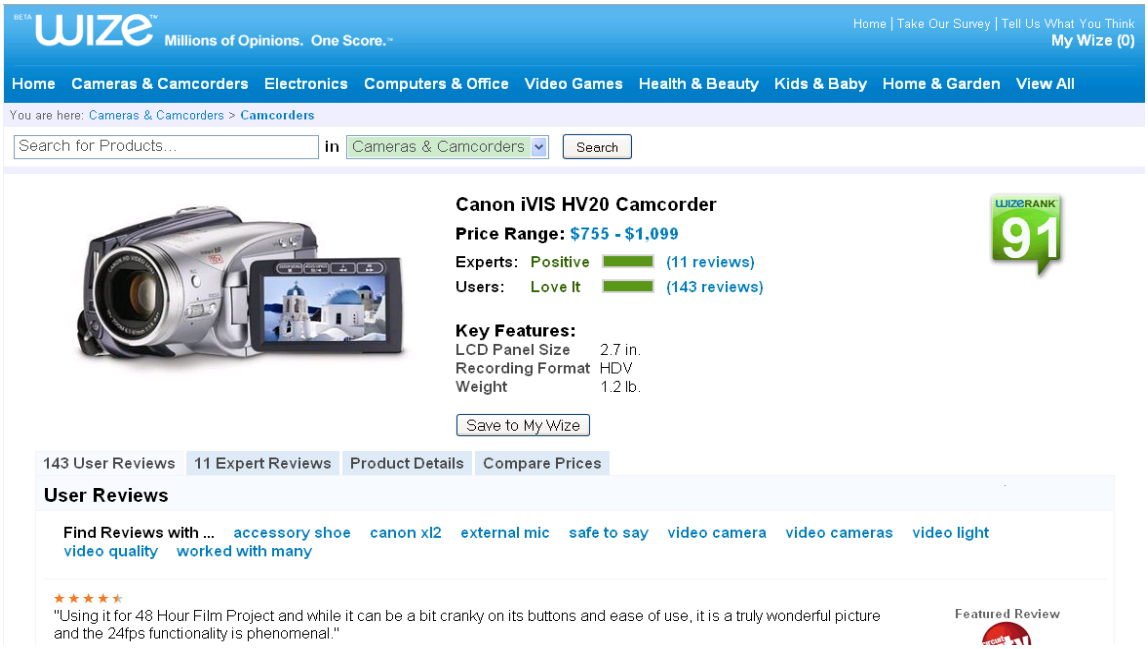

Figure 3-4: Screen shot of Wize Review Summary of Canon HV20 Camcorder

On the product review page as shown in figure 3-4, Wize shows reviews under two groups: user reviews and expert reviews. It is worth mentioning that Wize does not display separate ratings from each group. The site also displays product specs as well as price and store comparisons.

Wize allows users to create their private space on the site and save products that are of interests to them. Users can add and edit notes to the products saved. In terms of virtual communities, Wize provides a way for users to post questions about a specific product and get help from other users.

For the business model, Wize.com relies on advertising as the main source of its revenue. In order to ensure the objectiveness of its review ratings and maintain its independent status, Wize does not build formal relationships with merchants and manufacturers.

3.2.5 Buzzillions – collects reviews from actual buyers

Buzzillions (www.buzzillions.com) aggregates reviews written by actual buyers who shop at online retail stores. The site does not contain expert opinions. A quick search on a couple of products reveals that reviews are from online retail stores (such as ABT Electronics or OverStocks.com) other than Amazon.com.

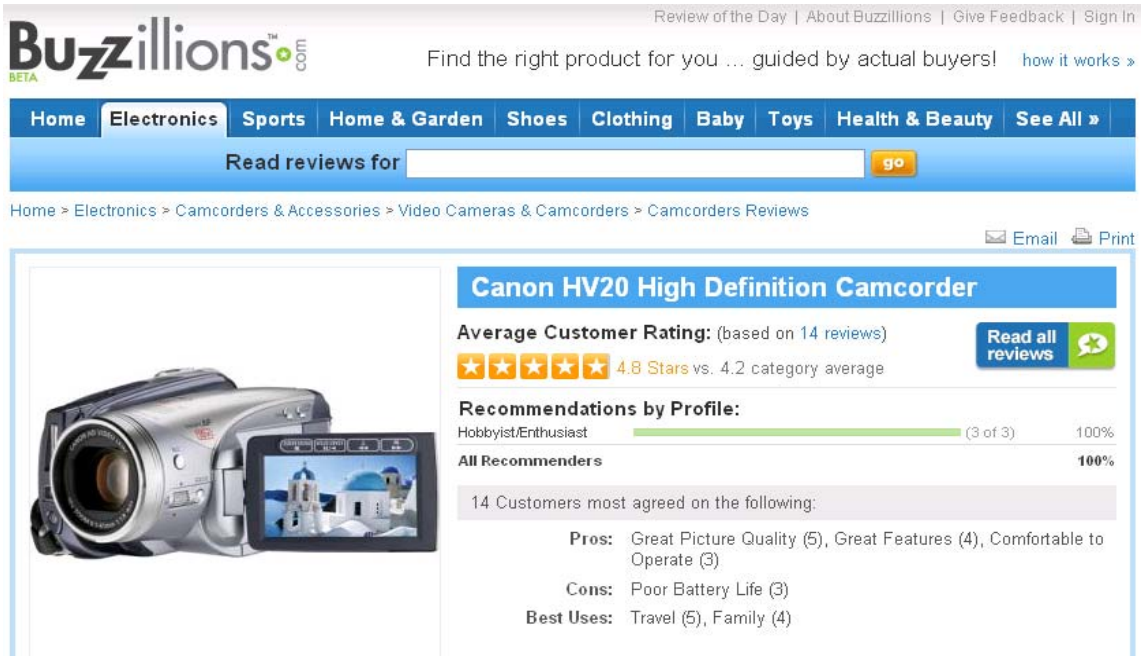

Figure 3-5: Screen shot of Buzzillions Review Summary of Canon HV20 Camcorder

On the product review page as shown in figure 3-5, Buzzillions has a nicely designed section summarizing Pros, Cons and Best uses for the product. The site not only displays the average customer rating for the product, but also shows the comparison of the product rating to the average rating within the product category. The "Where to Buy" section includes prices offered by online vendors, availabilities of the product and the "shop" button linking to vendors' sites.

The site also runs an affinity recommendation program to assist users in finding products that others with similar interests and preference recommend.

Buzzillions is owned by PowerReviews (www.powerreviews.com), the company which develops the distributed online shopping research engine (Buzzillions, 2007). PowerReviews runs an interesting model to tie together its online review aggregator site (Buzzillions), customers, and online retailers. Online retail sites use PowerReviews' shopping research service to capture and display customer reviews. Buzzillions pulls together reviews from those retail sites to provide users an overall picture of a product so that users can decide what product to buy. After users read reviews and make the buy decisions, the site re-directs traffic back to online retailers.

3.2.6 alaTest – international product review aggregator

alaTest (www.alatest.com) is an international product test and review information aggregator, which is based in Sweden. alaTest aggregates product test and quality information from international sources both online and offline. Its web site supports 12 languages (alaTest, 2007).

Like other review aggregators, the alaTest groups reviews into "Expert Reviews" and "User Reviews". alaTest computes average ratings by experts as well as by users. It compares the average product ratings with review ratings of similar products to determine a relative product quality rating, alaScore. alaScore is a relative rating system. For example, as shown in figure 3-6, a search on "Canon HV20 Camcorder" returns expert rating of 83/100 and user rating of 87/100. After comparing with reviews of other camcorder products, alaTest concludes that "Canon HV20" is the best in the category and the overall alaScore is 100/100.

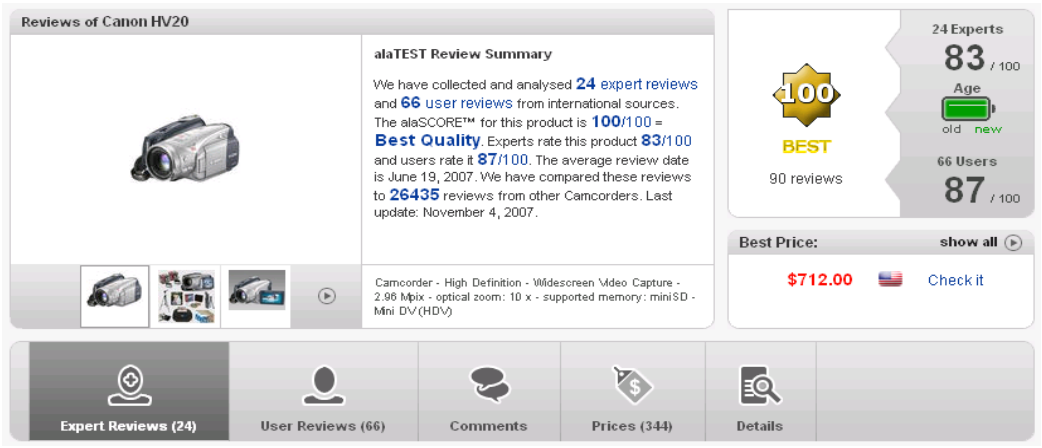

Figure 3-6: Screen shot of alaTest Review Summary of Canon HV20 Camcorder

alaTest shows reviews in their original languages. For reviews not in English, the site provides a translation button along the side for users to translate them into English. Users can also leave comments about a product on the site. alaTest does not let users provide feedback on individual reviews; neither does the site build a virtual community for users to share product recommendations.

The site is owned by International Consumer Services Sweden AB. alaTest runs extensive partnerships with comparison shopping sites from many countries including US, Germany, Italy, France, UK, and China.

3.2.7 ProductCritic – professional reviews on consumer electronics

ProductCritic (www.productcritic.com) is all about expert opinions. It aims to offer users one place to go for professional reviews on a particular product. The site favors

professional reviews as those reviews are typically more comprehensive and with a higher quality than reviews from normal consumers.

The site summarizes all professional reviews it can find about a product into a product score so that users can easily compare it to the ratings of similar products. To arrive at this single score, ProductCritic searches for professional reviews of a product, extracts the scores provided by reviewers, and consolidates them into a rating scaled from 0 to 100. If a reviewer rates 2 stars (out of 5 stars), this rating will be translated into a score of 60. For if a review does not have a rating, ProductCritic will assign a score manually based on its own staff's impression from reading the reviews (ProductCritic, 2007).

Figure 3-7 shows the product review summary page of Canon HV20 camcorder.

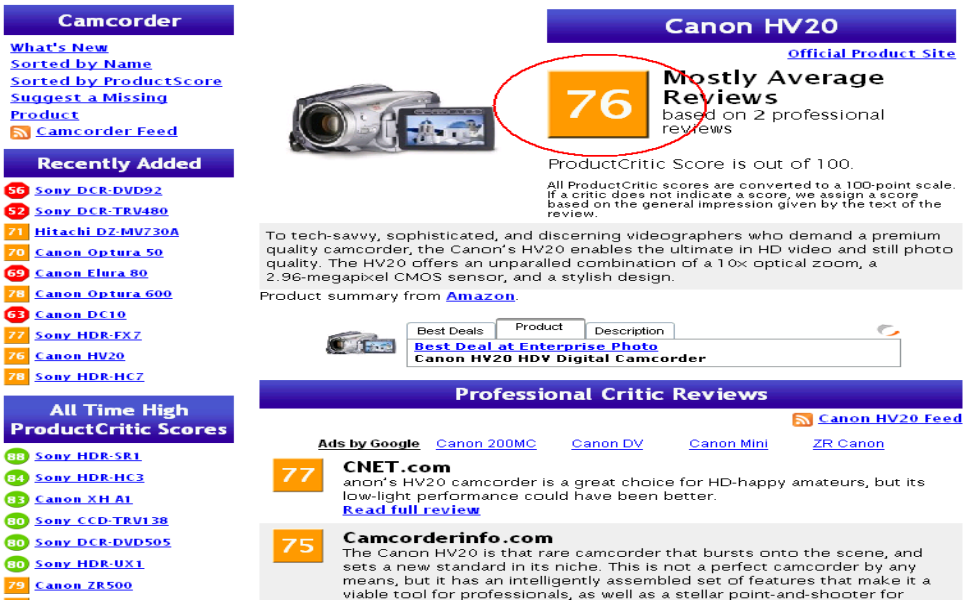

Figure 3-7: Screen shot of ProductCritic Review Summary of Canon HV20 Camcorder

ProductCritic targets only Digital Cameras, Camcorders, and Cell Phones. Review sources are also very limited. A search on Canon HV20 shows only two professional reviews: one from CNET.com and the other from CamcorderInfo.com.

Since the site does not focus on consumer reviews, it does not allow users provide feedbacks on the reviews. The site does not provide price and feature comparison services either.

3.2.8 FindProductReview – international expert review aggregator

Similar to ProductCritic, FindProductReview.com (www.productcritic.com) also features professional reviews. Instead of searching reviews only from US review sites such as

CNET.com, FindProductReview.com collects reviews from international web sources including PCPro and Les Numeriques (FindProductReview, 2007). The site targets a wider range of product categories. The products covered by the site include consumer electronics, food and beverages, entertainment, and home products.

Figure 3-8: Screen shot of FindProductReview Review Summary of Canon HV20 Camcorder

As shown in figure 3-8, a numerical average expert rating is calculated for each product. Individual reviewer ratings are displayed along with original reviews. FindProductReview allows users to leave reviews on its web site. However, the site does not offer other comparison services on price and sellers.

3.2.9 Summize – summarizing reviews

Summize (www.summize.com) scours the internet for reviews and presents users a summarized view using a colorful heat map. The company was founded in November 2006 and is based in Potomac Falls, Virginia. According to a CrunchBase report, Summize received $750,000 in the angel round funding in June 2007 (CrunchBase, 2007b).

Summize aggregates “over 19 million reviews by 3 million people on 2 million products” (Summize, 2007a). Unlike other review aggregators which compute one single product score, Summize utilizes a color-coded rating “snip” to show sentiment distribution towards a product from green, meaning “great reviews” to red, meaning “wretched reviews” (Summize, 2007a). The site also tracks the buzz trend on the product by showing number of reviews posted in each moth.

Reviews gathered by Summize are user reviews from popular shopping sites such as Amazon.com and Yahoo!Shopping and expert reviews from professional sites such as CNet and PC Magazine.

Users can add their own reviews on the site and rate the usefulness of a specific review they read.

Figure 3-9: Screen shot of Summize Review Summary of Apple iPhone

Figure 3-9 shows the product review page of Apple iPhone (the search was conducted on November 20, 2007). The review summary section shows the tags used in the review comments, the sentiment distribution, the trend of review sentiment, and number of reviews by bloggers, normal users, and experts.

3.3 Analyzing Sampled Product Review Aggregators

The previous chapter analyzes product review aggregators in general using the holistic framework. This section further analyzes the sampled product review aggregators using the following criteria:

- *What (Information)*
  - *Target Product Category* – each review aggregator gathers reviews on specific product categories. Some review aggregators such as Retrevo and ViewScore focus on only consumer electronics. Other review aggregators (e.g. alaTest etc) collect reviews on a wide range of product categories.
  - *Reviewer* – reviews can be written either by expert reviewers or by normal consumers. While some review aggregators target both expert and user opinions (e.g. Wize.com, alaTest.com etc.), other aggregators lean more towards one than the other. FindProductReview analyzes only professional reviews. Buzzillions, on the other side, is all about aggregating consumer reviews.
  - *Region* – although most review aggregators found during the research are interested in reviews from U.S. web sites, there are global review aggregators, which search beyond the national boundaries for reviews in other countries. As the trend of globalization goes on, more and more products are targeting international markets. Online shoppers may be interested in knowing what consumers from other countries think about a specific product.

- *How (Post-Aggregation Process*) – product review aggregators add values to the opinions aggregated through the post-aggregation processing. The post-aggregation process can be simply re-grouping or re-formatting collected reviews. The old Retrevo site did just that; it categorized review results into several groups and offered users an easy-to-navigate interface to read review summaries. Other review aggregators (e.g. Buzzllions.com and alaTest.com) sum up individual review ratings into a single numerical value. Some review aggregators go even further to apply advanced statistical data mining techniques or natural language parsing technologies to process product reviews to gain deeper insights from public opinions.

- *Who (Beneficiaries – User Participation)* – the web is moving from the traditional publishing and view-only mode of old Web 1.0 paradigm to the new interactive and read-and-write mode of Web 2.0 (O'Reilly, 2007). Some product review aggregators respond to such movement by providing ways for users to provide feedbacks on reviews or share experience via virtual communities. Buzzillions.com designs an affinity recommendation system that allows users of similar interests to help each other.

Table 3-1 summarizes the analysis of the nine product review aggregators using the above criteria. From the table, one can observe that five out of the nine review aggregators gather both professional reviews and consumer reviews. Seven of them provide numerical product ratings, either using statistical algorithms or natural language parsing techniques to process reviews. More than half of the product review aggregators

allow users to write reviews/comments, build virtual communities and help each other in product research.

Table 3-1 Analysis of Sample Product Review Aggregators

Company	What (Information)			How (Technology)		Who (Beneficiaries)
	Product Category	Reviewer	Region	Post-Aggregation	Other Value-Add	User Participation
iNods	Wide range (Consumer electronics, home & garden, kids etc.)	Professionals, Users	USA	Numerical Calculation	Price and Specs	Yes
Retrevo	Consumer Electronics	Professionals, Users	USA	Numerical Calculation	No	No
ViewScore	Consumer Electronics	Professionals, Users	USA	Natural Language Processing	Price and Specs	Yes
Wize	Wide Variety (Electronic, Home & Garden, Kids etc.)	Professionals, Users	USA	Complex Statistical Method	Price, Store, and Specs	Yes
Buzzillions	Wide Variety (Electronic, Home & Garden, Kids etc.)	Users	USA	Numerical Calculation	Price and Stores	Yes
alaTest	Wide Variety (Electronic, Home & Garden, Kids etc.)	Experts and Users	International	Numerical Calculation	Price	Yes
ProductCritic	Camera, Camcorder, Cell Phone	Professionals	USA	Numerical	No	No
FindProductReview	Wide Range	Professionals	International	Numerical	No	No
Summize	Wide Range	Users	USA	Sentiment-rating	No	No

One can also project review aggregators onto the "Reviewer vs. Post-Aggregation Value-Add" and the "Reviewer vs. User Participation" matrices to understand their positioning strategy. Figure 3-10 and 3-11 show how sampled product review aggregators are positioned relatively to each other in those matrices.

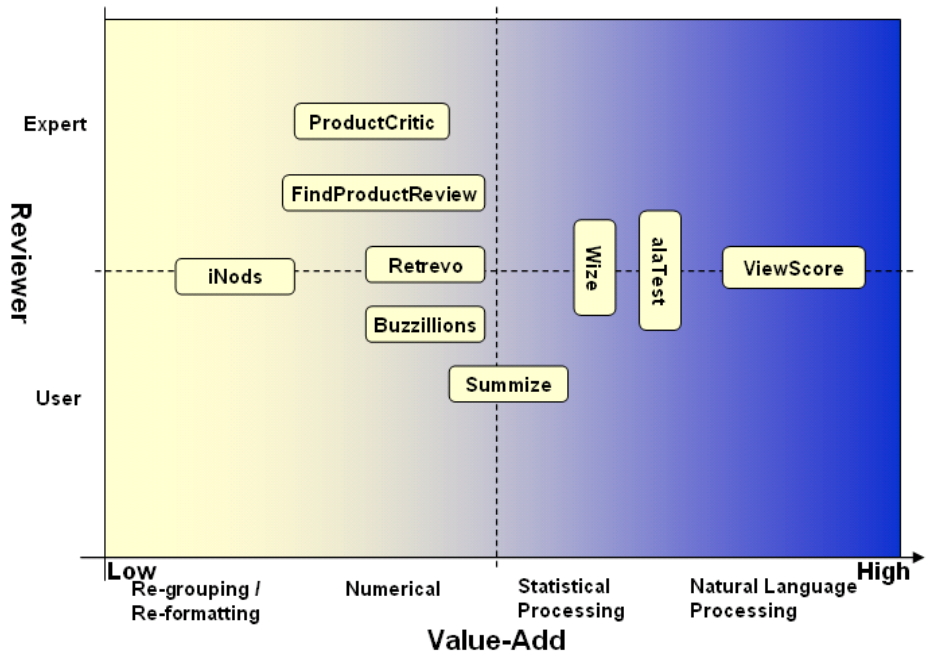

Figure 3-10: Reviewer vs. Post-Aggregation Value-Add

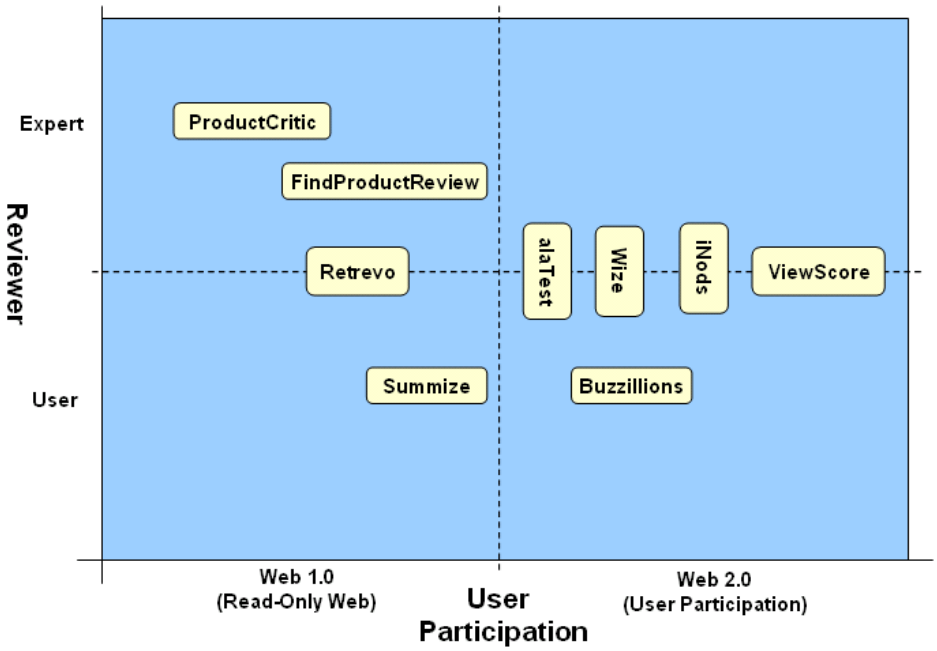

Figure 3-11: Reviewer vs. User Participation

3.4 An Experiment to Compare Review Ratings

Even though almost every product review aggregator computes a summarized review rating, due to differences in review sources, number of reviews gathered, and the method to compute the overall rating, the aggregated review rating from each aggregator differs from each other.

To understand the scale of such difference, an experimental study has been conducted to compare opinions analyzed by eight popular review aggregators on three consumer electronics products:

- Sony Handycam DCR-DVD201
- Apple iPod Nano (2nd Generation)
- Apple iPhone (4GB/8GB).

Table 3-2 shows the review ratings and number of reviews gathered by each review aggregator. The review rating highlighted in green indicates the highest rating of the product. The rating in red shows the lowest rating. The author has manually converted some of original review ratings to ensure that all review ratings are in the scale of zero to 100. For Summize, since it does not calculate a single numerical number, the author used the percentage of reviews showing "great sentiments" as a rough estimate for the overall review rating.

Table 3-2: Review Rating Comparison on Three Consumer Electronics Products

	Sony Handycam DCR-DVD201		Apple iPod Nano 2nd Generation (2GB)		Apple iPhone (4GB/8GB)	
	Review Rating	# of Reviews	Review Rating	# of Reviews	Review Rating	# of Reviews
Summize	41	46	85	297	57	927
Wize	43	89	80	2251	61	959
ViewScore	N/A	N/A	72.2	44	70.9	86
			Expert: 82 User: 95		Expert: 82 User: 50	
Buzzillions	N/A	N/A	90	81	N/A	N/A
alaTest	82	133	94	2457	99	1634
	Expert: 68 User: 76		Expert: 83 User: 88		Expert: 77 User: 72	
FindProductReview	48	5	88	12	78	129
ProductCritic	N/A	N/A	N/A	N/A	83	34
iNods	3	N/A	5	N/A	4	N/A

To visualize the differences, review ratings have been plotted in figure 3-13.

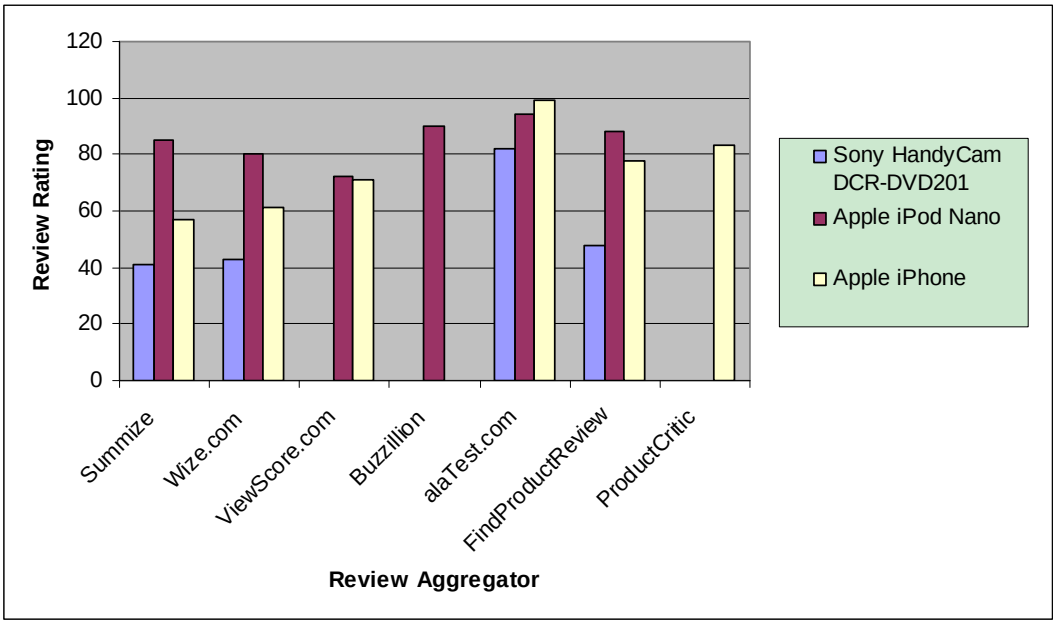

Figure 3-~~12~~13: Difference in Review Ratings from Sampled Review Aggregators

Using Apple's popular iPhone as an example, if you do a search in all eight review aggregators, you will get a wide range of review ratings, ranging from the lowest score of 41% showing "great reviews" (by Summize.com) to the highest rating of 99 (by alaTest.com). Figure 3-14 to figure 3-16 show the screen shots of Summize, Wize, and alaTest review summary pages of Apple iPhone.

The big rating discrepancies are caused by the following factors:

- Review Sources: each review aggregator uses a different set of web sources to search for product reviews. Both Summize and Wize gather reviews from U.S. web sites (either merchant sites or review destination sites). On the contrary, alaTest is a global review aggregator, which collects reviews from international sites. Having partnerships with online retailers, Buzzillions aggregates most reviews from those online retail stores

- Number of reviews: the number of reviews gathered by each aggregator also varies. Some product review aggregators such as Wize, Summize and alaTest collect more than million reviews over thousands of products while other aggregators only gather a few thousands of reviews. As one can observe from figure 3-14 to figure 3-16, Summize analyzes about 927 reviews while alaTest aggregates 1,634 comments, almost twice the number of reviews analyzed by Summize.

- Reviewers – who writes the reviews also contributes to the difference in overall review rating. Reviews can be written by professional reviews as well as by

consumers. Wize.com and alaTest.com target both professional reviewers and consumer reviewers. Summize leans more towards user reviews. Figure 3-14 shows that of 927 reviews on iPhone, only one review is from expert reviewer.

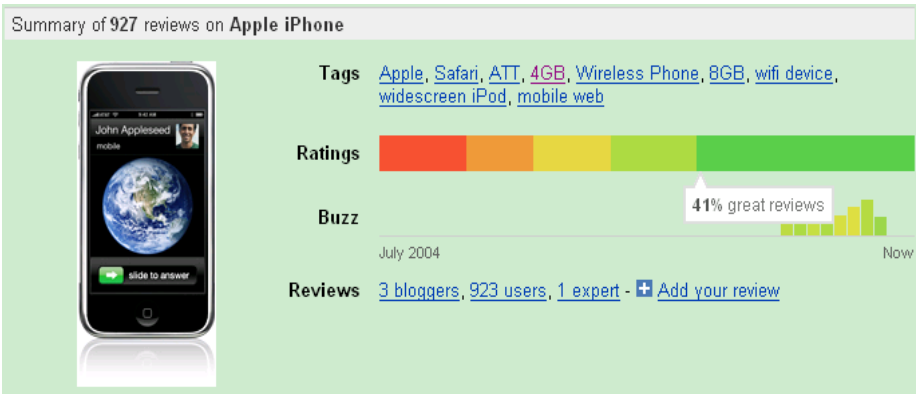

Figure 3-1314: Screen shot of Summize Review Rating of Apple iPhone

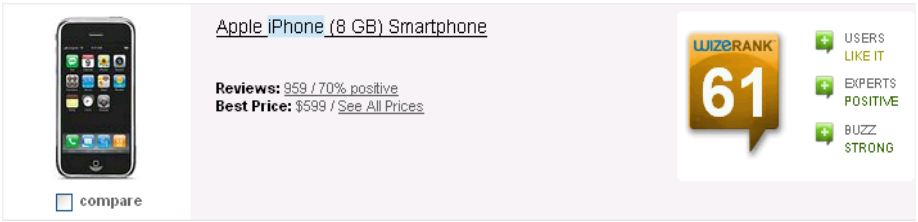

Figure 3-1415: Screen shot of Wize Review Rating of Apple iPhone

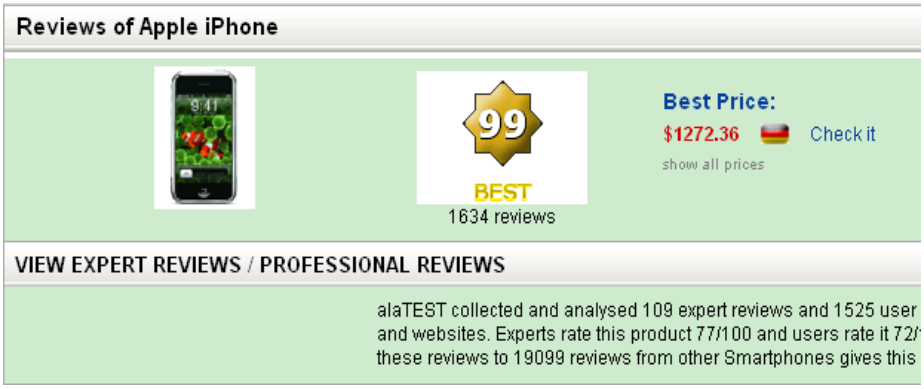

Figure 3-1516: Screen shot of alaTest Review Rating of Apple iPhone

- Calculation algorithm – each product review aggregator applies a different algorithm to compute the review score. Since the details of the algorithms are not disclosed, it is very difficult to compare review ratings from different review aggregators. Wize.com uses a complex statistical method to normalize review ratings and compute product ratings (Wize, 2007). alaTest calculates average ratings for expert reviews and user

reviews separately, and then assigns different weights to them to compute the final review rating (alaTest, 2007).

Because of the above factors, users should expect differences in review ratings from different product review aggregators. When searching for product reviews from the aggregators' sites, users should not depend heavily one numerical rating; instead, they should be aware of how aggregators calculate the ratings and have a more realistic view of overall opinions.

4 Market Analysis

This chapter will explore demand opportunities for online product reviews. It also studies what value-adds product review aggregators provide to consumers and online merchants. The chapter finally discusses the major players in the business eco-system and what impacts review aggregators bring to those players.

4.1 Demands for Online Reviews

As more and more retail stores are moving to the web front, increasing number of users are buying products online. When facing a purchase decision of a significant value, people would normally need some advice. If you were to buy a digital camcorder such as Canon HV20, where do you normally go for advice? You probably will pick up the phone and call a friend whom you consider the expert in consumer electronics. Traditionally, people consult with their knowledgeable friends or co-workers before they make significant purchases. With more experts and consumers write reviews on the web, the word-of-mouth content proliferates and shoppers start turning to this new type of "wisdom of crowd" to do their product researches. The Forrester report indicates that "71% of online shoppers read reviews; making it the most widely read consumer-generated content" (BazzarVoice, 2007a). In a BIGresearch survey, "92.5% of adults said they regularly or occasionally research products online before buying them in a store**"** (BigResearch, 2007). The JC Williams Group also "ranked consumer content as the #1 aid to a buying decision, cited by 91% of respondents" (BazzarVoice, 2007a).

Clearly, there are strong interests and demands for online reviews. Figure 4-1 shows the chart excerpted from an eMarketing report studying the attitudes of the generation Y internet users toward online reviews (eMarketer, 2007a). It is interesting to notice that among 1,062 people being surveyed, 67% of them responded with "relying on online reviews for purchasing decisions".

Figure 4-1: Attitudes of US Generation Y Users towards Online Retail Reviews
(Source: www.eMarketer.com)

A Deloitte study indicates that online reviews have become an important source influencing online shoppers' purchasing decisions. In their study, 82% of the respondents who read reviews said that their purchase decisions had been influenced by those reviews (BazzarVoice, 2007a). Figure 4-2 also shows the "Word-of-Mouth" content as the leading influencer for consumers' electronics purchases (eMarketer, 2007b).

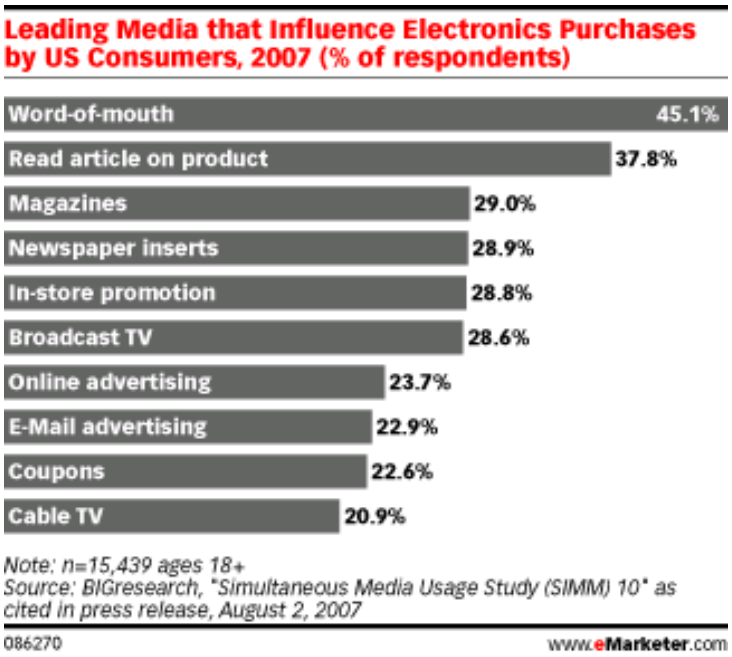

Figure 4-2: Leading Media that Influence Electronics Purchases
(Source: www.eMarketer.com)

Although this BIGresearch survey did not distinguish between online and offline forms of Word-of-Mouth, with the increasing number of reviews posted on the web, it is not hard to predict that online reviews will become a significant influencing factor.

4.2 Value Creation

This section analyzes the needs of both consumers and online merchants to understand the value creation process of review aggregators and the exact needs they fulfill.

4.2.1 Values for Consumers

Yannis Bakos points out that electronic intermediaries create values for buyers by reducing buyers' costs in acquiring product price and attribute information (Bakos, 1997). Consumers in the electronic market place are looking for products with best price and best fit. In a commodity market, consumers are primarily looking for the lowest prices. However, when products can be differentiated by features and qualities, consumers not only look for the best price, but also want to compare features and qualities to determine what products best fit their needs. With the large amount of

product information available on the web, it can take tremendous time and efforts for consumers to digest the information and make sense out of them.

Figure 4-3 shows that product review aggregators meet various needs of customers by aggregating different aspects of the product and vendor information.

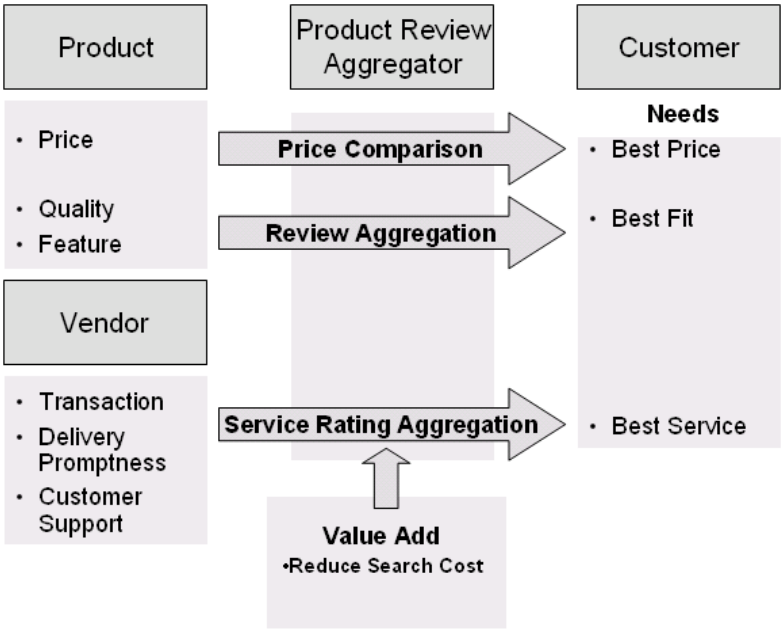

Figure 4-3: Review Aggregator Lowers Customers' Search Costs

Price comparison helps customers find best prices while product review aggregation guides users in locating products best fit their needs. Vendor service aggregation mashes up vendor information to help customers decide which retailer to use. Although some aggregators focus on one aspect of product or vendor information, many aggregators combine both price and non-price information to offer customers comprehensive aggregation services.

4.2.2 Values for Online Retailers

When buyers in the market place are searching for best products and services, sellers are also looking for the right buyers (Bakos, 2001). Sellers want to find out:

- What customers' preferences are
- What products are the most popular or the least favorable among buyers
- What customers complain about certain products or services
- How to attract more consumers to sellers' sites

Review aggregators close the gap between buyers and sellers. They lower sellers' cost in locating right buyers by referring customers to vendors' sites through review aggregations. A recent study about PetCo also shows that reviews can save sellers' cost by reducing the number of product returns (Social-Media-Optimization, 2007). When

customers find the products they like through reviews, the less likely they will return the products after the purchases. Merchants and manufacturers can leverage product reviews to understand better product defects and the reputation of products among customers.

Further more, online retailers can increase customer royalty, gain higher customer conversion rate, and improve their search ranking by providing online reviews (eMarketer, 2007c). Figure 4-4 shows such effects of online reviews on retailer sites.

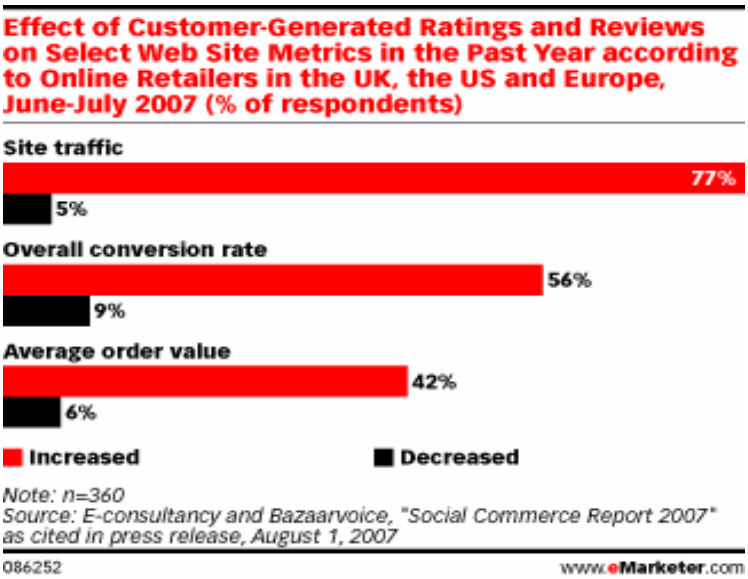

Figure 4-4: Effect of Customer Reviews on Online Retailers
(Source: www.eMarketer.com)

As online reviews gain popularities among consumers, they also become competitive advantages for online retailers. As shown in figure 4-4, sites offering online reviews can attract more consumer traffic to their sites and win more customer conversions. On the other side, a site without product reviews will run the risks of sending its customers to the competitor sites.

4.3 Product Review Aggregator Eco-System

At a very high level, the eco-system of a product review aggregator consists of reviewers, review aggregatees that include review hosting sites and online merchant sites, review aggregators, advertisers, and users (shown in figure 4-5). The product review aggregation directly or indirectly influences each player in the eco-system. This section will discuss in details such impact to each player.

Reviewer – reviewers are the content producers for product review aggregators. Without reviewers, product review aggregators would have no content to aggregate. However, review aggregators do not directly influence or motivate reviewers to write reviews. Typically, aggregatees (e.g. review hosting sites or online retailers) chase down

consumers to write reviews after their online purchases. Nevertheless, product review aggregators do give reviewers one more channel to have their opinions viewed. Reviewers' opinions also contribute to the overall product rating calculated by aggregators.

Reviewer can be professional reviewers or consumer reviewers. Professional reviewers conduct thorough tests on products. They normally evaluate similar products in a category and write reviews comparing the pros and cons of different products. Consumer reviewers actually bought the products and felt the needs to express their opinions. They typically own the products for a relatively long time. Consumer reviewers normally write reviews in their Blogs or on retailers' sites to share feelings from their own user experience.

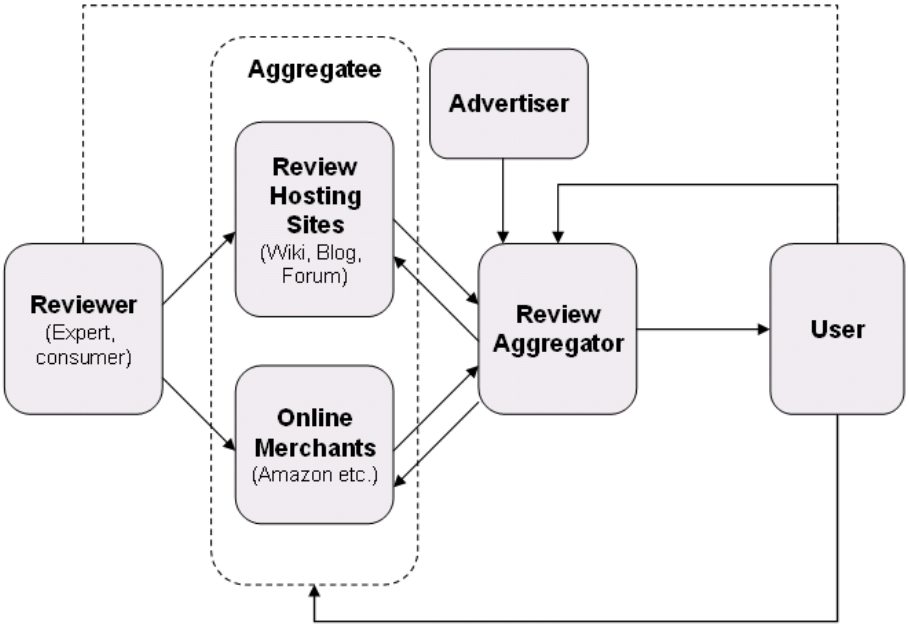

Figure 4-5: Product Review Aggregator Eco-system

Aggregatee – aggregatees act as content hosts or content publishers. Typical aggregatees are review hosting sites and online merchants. Review hosting sites invite consumers to read and write reviews. Different hosting sites may focus on different types of reviews. Blog sites, Wikis, or online discussion forums normally host consumer reviews. Sites such as CNet.com and PCMag.com devote to professional reviews. Besides review hosting sites, online merchants also contain a large number of product reviews. It is often convenient for consumers to leave reviews at the E-Commerce sites after their purchases.

Aggregatees are directly impacted by the review aggregation because it is their content that is aggregated. Some aggregatees consider review aggregators a big threat for aggregators take potential revenue traffic away from them and can potentially guide

customers to their competitors. Other aggregatees such as small to medium online retailers welcome review aggregators. To them, aggregators level the playing field and give small merchants a chance to compete with giant E-Commerce sites such as Amazon.com.

Product Review Aggregator – Aggregators act as information intermediaries between aggregatees (e.g. review content hosts and online retailers) and internet users. By aggregating reviews, aggregators build a product research platform for users and open a new media space to attract advertising interests. Some aggregators lean more towards users while other focus on building relationships with aggregatees. Review aggregators may or may not build formal relationships with aggregatees.

Madnick and Siegel point out several types of relationships between web aggregators and aggregatees. These aggregator-aggregatee relationships include aggregation without partnership, aggregation with partnership, and aggregation with ownership (Madnick and Siegel, 2002).

The same types of relationships with aggregatees also hold true for product review aggregators. In order to ensure the objectiveness of its aggregation service, Wize.com does not maintain close relationships with aggregatees. Its aggregation model belongs to aggregation without partnership. Buzzillions.com, on the other hand, builds strategic partnerships with online retailers. In fact, as one will see in a later case study, Buzzillions' parent company PowerReviews.com provides enterprise review services to online retailers.

User – normal users are non-paying but very important customers for product review aggregators. Aggregators offer review aggregation services free to normal users with the hope to build a substantial audience base so to attract either advertising opportunities or acquisition opportunities by large companies like Google.

Normal users of review aggregation services are mostly online shoppers. Product review aggregators give normal users one place to go to conduct their product research. Instead of surfing multiple sites for product reviews, users can save time and efforts by reading summarized reviews about products at the review aggregator site. Users can also assist each other in finding the right products through online communities. Some users can also become reviewers if they start writing reviews after purchasing the products.

Business users are paying customers and they can be market researchers or manufacturers. Market researchers pay for review aggregation services to obtain valuable data about what popular products are in the market place and what customer preferences and trends are for specific products. Manufacturers can also benefit from such review aggregation service by listening to customers' voice on their products and knowing what aspects of products that customer like or dislike. Product manufacturers then gain precious insights into how to improve their products.

Advertiser – advertisers are paying-customers and therefore key revenue sources for product review aggregators. To some review aggregators, advertising is their sole revenue source and therefore is critical to their survival.

To advertisers such as product manufacturers (e.g. Sony and Canon etc), product review aggregators would mean new venues for them to target their advertisements directly to users. As users are conducting product research on review aggregators' sites, advertisers have the opportunities to advertise their products according to customers' interests. By tracking what reviews users are searching or reading and through virtual user communities or user profiles, advertisers can tailor their adverting messages to targeted users and therefore increase the effectiveness of their advertisements.

5 Enabling Technologies

This chapter looks inside a review aggregation system to study its architecture. The underling technologies involved in each module of the system are described in details. The author also discusses the emerging technologies (such as natural language parsing) to show how new technologies may shape review aggregators in the future. In the end, the author presents a technical architecture analysis of sampled product review aggregators.

5.1 System Architecture of a Product Review Aggregator

Looking inside a review aggregation system, one can observe that the system consists of several key components: the data collection module, the review analysis and processing module, data storage module, and the presentation (user interface) module that takes users' inputs and presents results back to the users.

Figure 5-1 illustrates the overall system architecture of a product review aggregator.

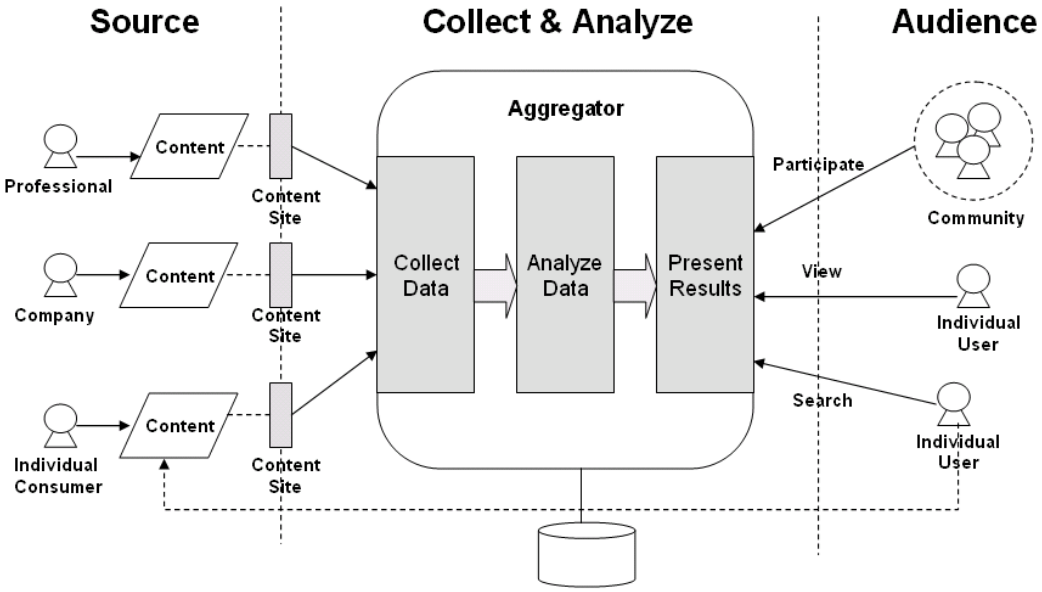

Figure 5-1: System Architecture of a Review Aggregator

Collecting Data – the data collection module is responsible for searching review sources (e.g. web crawling) and retrieving reviews. Some aggregators use the web wrapping technology to retrieve structured review information from review sources. Other review aggregators apply advanced natural language parsing technologies to extract reviews.

Analyzing and Processing Data – this module is the core of a review aggregation system. It includes the statistical processing algorithms to normalize review data and calculate an

overall review rating. Some review aggregators also perform sentiment analysis on reviews to compute sentiment ratings.

Storing Review Analysis Results – the data storage module is in charge of storing review analysis results an aggregator's database. For review aggregators that allow users to enter their own reviews, the data storage module will also store newly entered reviews. If an aggregator provides hosted review solutions to online retail stores, the aggregator's system will also store reviews for aggregatees. Some review aggregators also save users' profile information so that they can recommend reviews which can best match users' profiles.

Presenting Results – this module is the interface between a review aggregation system and users. The presentation module takes a user's input and passes it to the data analysis (or the business logic) module. After getting the results back from the analysis component, the presentation module will construct HTML pages and display results to end users.

The subsequent sections will describe technologies used in each key component in more details.

5.1.1 Web Crawling – finding review sources

Depending on the relationship with aggregatees, review aggregators may or may not need to crawl blindly on the web for reviews.

If there were no formal partnerships between a product review aggregator and its aggregatees, the aggregator would need to use the web crawler to search for review sources. Once it finds one, the web crawler will navigate through the structure of web pages and start retrieving reviews from the site.

Pant et al refer to a web crawler that retrieves pages around a specific topic as the tropical crawler (Pant et al, 2003). The web crawler used by the review aggregators belongs to this type since it focuses on reviews around specific product categories. Summize, for example, uses a web crawler to search broadly on the web for relevant review sites (Summize, 2007b).

For review aggregators that have formal relationships with aggregatees, they can access the aggregatees' sites directly and retrieve reviews based on pre-defined interfaces. Buzzillions is such an example. As its parent company PowerReviews provides the hosted review services to online retailers, Buzzillions can directly access the reviews residing in the PowerReviews' servers. Having a formal relationship with aggregatees saves Buzzillions a lot of time and efforts that it would otherwise need to spend on scouring the web.

5.1.2 Information Retrieval – extracting reviews

Once the review sources are identified, the review aggregator would need to extract reviews from the source sites. If reviews are well structured in the way that a review aggregator can easily identify fields such as reviewer, review text, and review rating etc, the aggregator can use the web wrapper technology to extract relevant fields. Cameleon# web wrapper is such data extraction tool that lets users wrap web sites as data sources so that users can easily run SQL queries to retrieve data from those sites (Firat et al, 2000).

If aggregators were to retrieve free-form review content from Blog sites or online forums, they would need to apply natural language parsing technologies to extract relevant reviews. ViewScore develops a proprietary natural language parsing system to separate review content from other irrelevant texts (ViewScore, 2007).

5.1.3 Information Processing – analyzing and summarizing reviews

After reviews are extracted from source sites, different aggregator will employs different approach to analyze and process the review content. Some review aggregators calculate a simple numerical rating while other aggregators perform advanced statistical processing or sentiment analysis on the retrieved reviews.

Re-grouping and Re-formatting Reviews

Under this approach, a review aggregator simply re-formats or re-groups reviews gathered. It does not perform real analysis over reviews and nor does it do any calculation or parsing to provide users an overall review rating. The value-add offered by this type of review aggregators is therefore very limited. The review summary page is similar to the result page generated by a search engine. The only difference is that the review summary page from an aggregator displays only reviews of a specific product, while the search engine may return other information about the product.

Numerical Calculation

The simple way to obtain an aggregated review rating is to calculate an average score from the original review ratings. This approach treats all reviews equally. It does not take into the consideration the differences between expert reviews and consumer reviews. Nor does it weigh in factors such as the number of reviews and the polarization of reviews. Although it is easy for aggregators to compute a numerical value, the real value of such number is questionable because the numerical number may misrepresent the overall opinions behind it.

Advanced Statistical Processing Method

Advanced review aggregation systems use the statistical method to normalize review data and compute a consistent review score comparable across all products. Some products

may have fewer reviews than other products. One product may have only expert reviews while others may have both expert reviews and consumer reviews. Some product reviews are polarized. Other product reviews may narrowly cluster around a certain rating. The advanced statistical method considers all these factors when computing the aggregated review rating. It strives to remove errors or biases introduced by review sources (e.g. the sample size and the distribution of review ratings etc). The result is a consistent product review rating that users can use to compare ratings among different products.

Statistical methods may sound ideal. Since each review aggregator applies a different method to process review data it gathers, the aggregated review ratings may be comparable within the same review aggregation system. Review ratings from one review aggregator may not be comparable to the ratings computed by other review aggregators.

Overall Product Sentiment Analysis

Some review aggregators go beyond processing original review ratings provided by reviewers. They parse the whole review text to identify sentiment words embedded in the comment. Based on the sentiment words used in the review text, the aggregators try to gauge the overall sentiment of the reviewer towards a product. The result of such sentiment analysis reveals whether the reviewer feels overall positive or negative about a specific product. The aggregator performs the same sentiment analysis on all reviews related to a product and then counts the number of positive reviews vs. negative reviews. Some review aggregators calculate a sentiment rating while other review aggregators such as Summize.com display the distribution of review sentiments.

Product feature-based sentiment Analysis

Hu and Liu propose an alternative approach to the overall sentiment analysis. Instead of doing the sentiment analysis over the whole review text, Hu and Liu suggested that reviews could be analyzed at a detailed level so that sentiments on specific product features can be extracted (Hu and Liu, 2004). Reviewers normally do not just comment on the overall product. They typically comment on several product features in one review. Reviewers may feel positive about one feature, but negative on other features. The feature-based sentiment analysis would offer users a finer-granular and more accurate view of aggregated comments.

Figure 5-2 shows the operational sequence of the feature-based sentiment analysis approach (Hu and Liu, 2004). From the chart, one can see that when an aggregator extracts opinion words from review sentences, it will match those opinion words against proper product features so to generate the feature-based opinion summary.

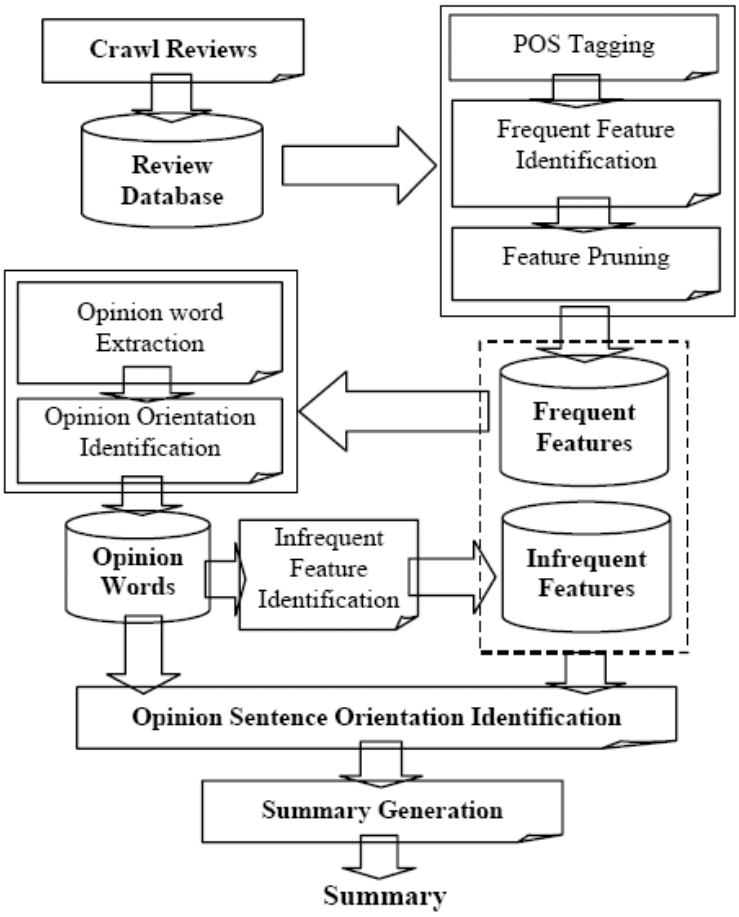

Figure 5-2: Operational Sequence of Feature-based Sentiment Analysis
(Source: Hu and Liu, 2004)

None of the sampled review aggregators offers the feature-based sentiment analysis. A start-up company, GeeYee.com, has developed a review analysis system based on what Hu and Liu suggest. It offers the product opinion analysis as a service to product manufacturers (GeeYee, 2007). As review aggregators look to differentiate their services, the feature-based sentiment analysis can be a valuable feature to add to their service offerings.

5.1.4 User Interface – getting inputs and presenting review summaries

Search Interface

Most review aggregators provide a simple search interface for consumers to search for reviews related to specific products. Users can type in either a product brand name or a product model label to retrieve relevant reviews.

Some review aggregators allow users to further narrow down on the search using additional product information as search filters. For example, Buzzillions.com has search criteria such as price range, product category, brands, and even the freshness of reviews (e.g. within 7 days). Users can use any combination of those criteria to refine their searches and find the most relevant product reviews.

Product Directory Listing

In addition to the search interface, some review aggregators provide the directory listing for various product categories. If users do not have a particular product or brand name in mind, they can browse the directory listing and look for products with the highest review ratings in the category. Some review aggregators recommend top ranked products to users based on review ratings and price. Other review aggregators use different fonts to show what product categories are searched most frequently by users and therefore are the most popular ones among consumers.

Building Virtual Community to Match Users' Profiles

Users may look for more than just aggregated reviews; they want to find relevant reviews matching their interests. Some aggregators introduce the web 2.0 concept into their services to build virtual communities among users. Those aggregators leverage users' profiles to match users with similar interests so that they can help users find the most relevant reviews. Some users are professional users of certain products and are interested in reading reviews from people with similar experience level. By grouping users based on their interests, aggregators can deliver more targeted reviews to users and increase the attractiveness of their services.

Allowing Users to Leave Product Reviews

Some product review aggregators also allow users to write reviews at their web sites.

Aggregators such as Buzzillions.com use a tag-based approach to capture structured reviews. Other than Amazon.com that asks users to leave free-form text reviews, Buzzillions.com provides a very structured review entry page so that users can quickly click and select appropriate options to build the review content. Wize.com also lets users comment on specific products. Its web site has a separate tab to distinguish comments from Wize users from reviews gathered from external sources.

5.2 Technical Architecture Alternatives

Aggregators may share the same system architecture as described in the previous section. However, the detailed technical architecture can vary significantly based on how each aggregator implements the system. The following sections will describe several popular technical architectures used by the product review aggregators.

5.2.1 Hosted Solution Architecture

The hosted solution architecture is also called the internet Application Service Provider (ASP) model (Furht et al, 2000). In the hosted solution architecture, product review aggregators are not only responsible for gathering and analyzing reviews, but also responsible for enabling aggregatees' online review systems as shown in figure 5-3.

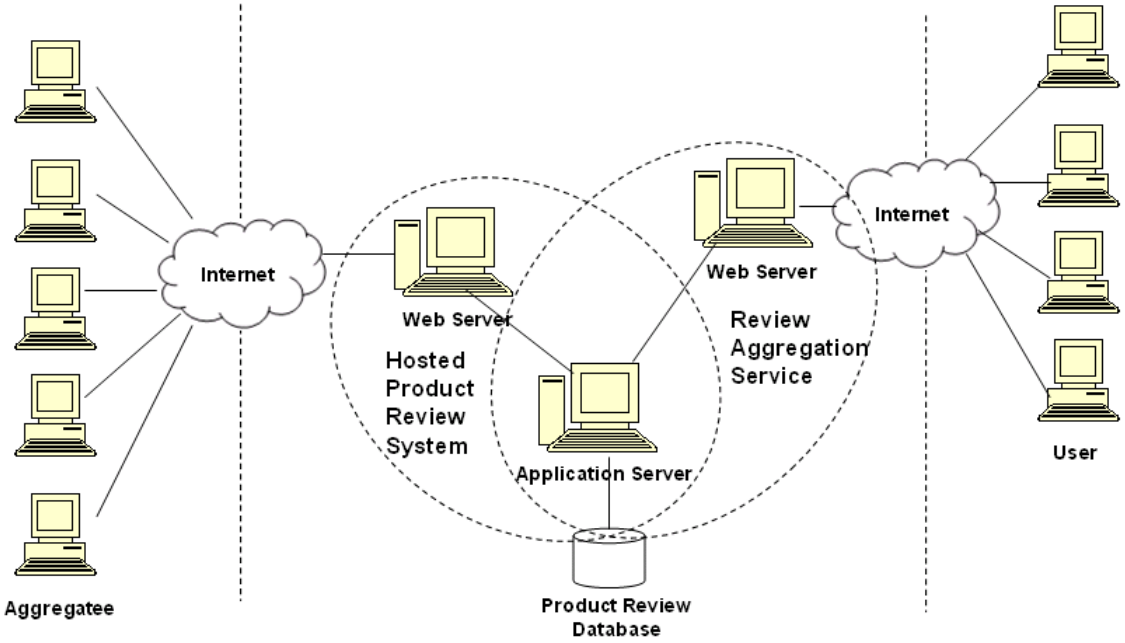

Figure 5-3: Hosted Solution Architecture

With the hosted solution model, aggregatees do not need to install the product review software in their server environment. They only need to incorporate product review snippets provided by the aggregator into web pages. The product review engine actually resides in the aggregator's server environment. Although aggregatees own the product review content, the content is stored in the aggregator's database.

On the review aggregation side, since product reviews are centrally stored in the aggregator's server environment, it saves the aggregator's efforts to blindly scour the web to search and retrieve product reviews. The aggregator can simply analyze the product reviews stored in the central database and generate review summaries for end users.

The advantage of this architecture is that the aggregator has the total control over the whole aggregation process starting from even the content creation step. Since the aggregator is in charge of creating and maintaining product reviews, it can specify the review content structure so to make it much easier for the review-analysis module to parse and analyze reviews.

There are several disadvantages of the architecture. First, this architecture requires a strong tie between aggregatees and the aggregator and it can potentially limit the number of aggregatees. Every aggregatee under this architecture needs to use the aggregator's hosted solution. If an aggregatee already has its product review systems, the aggregator would need a different approach to bring in and convert the review content. Another downside of the hosted solution is that the aggregator becomes the bottleneck of the system. In case of the service slowdown or a disruption on the server side, the aggregatees would not be able to service the product review content promptly and could even lose the product review content in its web pages.

5.2.2 Distributed Solution Architecture

The distributed solution architecture differs from the hosted solution model in that the aggregator does not host the complete system. The part of the product review service also resides in each aggregatee's server and communicates back to the review server engine running in the aggregator's environment. Each aggregatee owns and hosts the product review content.

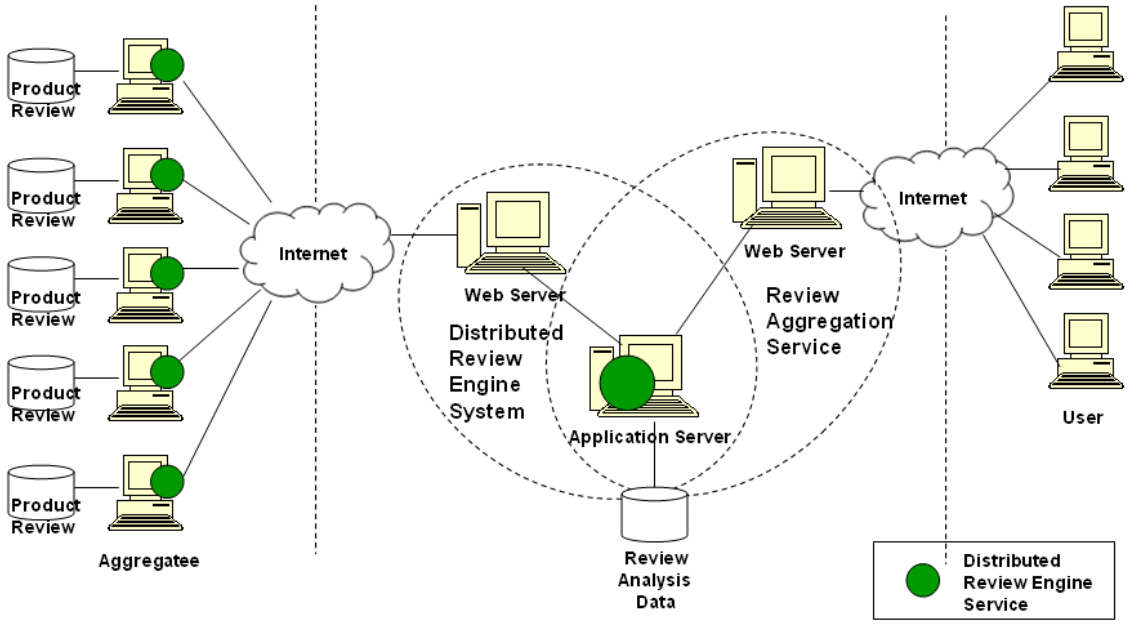

Figure 5-4: Distributed Review Service Architecture

As shown in figure 5-4, the review aggregation part of the architecture is very similar to the hosted solution model. The review analysis database in the aggregator's environment contains aggregated reviews from all its aggregatees.

The distributed architecture has a higher reliability than the hosted model because the aggregatee does not completely depend on the aggregator to render the product review page. Each aggregatee is relatively independent. It hosts its own product review content

and is able to service product reviews to its users regardless of the operation state of the review engine running on the server side. The distributed architecture also reduces the load on the server side as each aggregatee can service product review pages locally.

Among the sampled product review aggregators, PowerReviews' product review architecture resembles the distributed architecture model. PowerReviews uses the Asymmetrical ASP model in which the client can render product review pages independently (PowerReviews, 2007b).

One drawback of the distributed architecture is that the aggregatee still needs to install the review engine software on its server and it would also need to abide by the review content structure defined by the aggregator. Formal relationships still exist between aggregatees and the aggregator. The number of reviews aggregated will be dependent upon how many aggregatees an aggregator can sign up for its service. Another disadvantage of the system is that periodically the aggregator needs to synchronize the product review content with aggregatees. The aggregator cannot guarantee it has the latest review content from aggregatees at any given moment.

5.2.3 Product Review Syndication Architecture

Similar to the hosted solution model, in the syndication architecture, an aggregator provides the hosted review service to aggregatees. The difference is on how the aggregator publishes review results to the online consumers. Instead of creating one web portal where online consumers can go read review summaries, the aggregator builds a syndication platform, through which it distributes product reviews collected to other poplar product search sites (such as Google Product Search) or online shopping portals (such as Smarter.com). Figure 5-5 shows the details of the review syndication architecture.

BazzarVoice is such aggregator that uses the syndication model (BazzarVoice, 2007b). It provides hosted product review services to online retailers and at the same time, BazzarVoice distributes the product review content to popular search and online shopping sites.

Strictly speaking, the review system which uses the syndication architecture may not be qualified as an aggregator because it does not analyze and summarize product reviews and more important, it does not provide users one central web site to go for product research. The review syndication system is more like a re-distribution network which gathers product reviews and then spreads out the collected review content to appropriate destination sites.

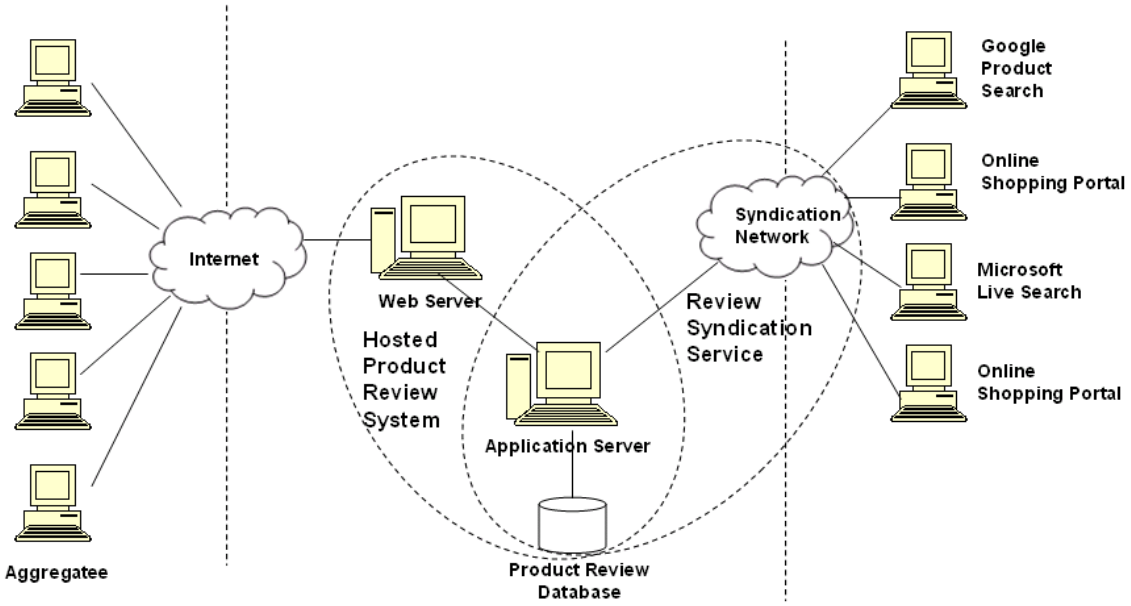

Figure 5-5: Review Syndication Architecture

The advantage of the review syndication system lies in the fact that the company does not need to invest in its own web portal. The company, therefore, would not worry about building the audience base for its own web portal; instead, it leverages the existing popular online portals and search engines to generate web traffic for its aggregatees. The focus of the review syndication system is on the back-end to offer aggregatees hosted review solutions. Most of the revenue comes from the subscription fees of using its hosted review services.

5.2.4 Aggregation Portal Architecture

The aggregation portal architecture is the most popular architecture used by product review aggregators. Figure 5-6 shows the system structure of the aggregation portal architecture.

Under this architecture, aggregators have no formal relationships with aggregatees. Aggregatees do not use any services from aggregators. In fact, most aggregatees have their own systems to host and service product reviews. Aggregators would need to crawl on the web to search broadly for review aggregatees, and once they find them, aggregators would extract and analyze reviews from those aggregatees. Some aggregatees are not even aware of the activities originated by the aggregator.

With the aggregation portal architecture, each aggregator builds its own web portal to service users. After processing the product reviews, aggregators publish the analysis results onto their portals.

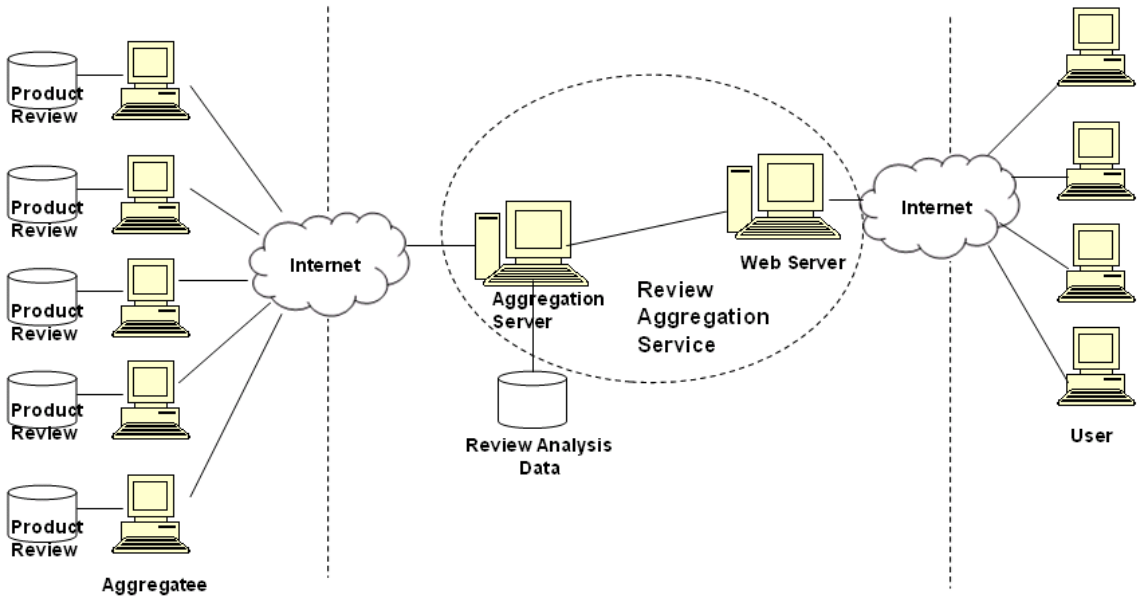

Figure 5-6: Aggregation Portal Architecture

One of the challenges presented by the review portal architecture is that aggregators need to extract and parse original product reviews. Unlike the hosted solution scenario in which aggregators generally define the review content structure, in the portal architecture, aggregators may encounter very different review content formats. Product reviews from some sources such as a Blog site may be free-form texts. It becomes critical for aggregators to be able to parse and consolidate various formats of product reviews.

One advantage of the portal architecture is that the aggregator no longer needs to sign up aggregatees to use its services; instead, aggregators can search for a broad range of product review sources. Product review aggregators such as Wize.com and Summize.com gather millions of product reviews. Summize collects more than 22 million product reviews (Summize, 2007).

5.3 Analysis of Sampled Product Review Aggregators

The author concludes this chapter with the technical architecture analysis on the sampled product review aggregators. Figure 5-1 shows the analysis results.

Table 5-1: Technical Architecture of Sample Product Review Aggregators

Aggregator	Technical Architecture
iNods	Aggregation Portal Architecture
Retrevo	Aggregation Portal Architecture
ViewScore	Aggregation Portal Architecture
Wize	Aggregation Portal Architecture / Syndication Architecture
Buzzillions	Aggregation Portal Architecture / Hosted Solution Architecture
alaTest	Aggregation Portal Architecture
ProductCritic	Aggregation Portal Architecture
FindProductReview	Aggregation Portal Architecture
Summize	Aggregation Portal Architecture

Based on the above analysis, one can observe that almost all product review aggregators use the aggregation portal architecture. Some aggregators use both the portal architecture and the syndication architecture.

6 Business Models

This chapter looks at the business aspect of a product review aggregator. It discusses the key elements in a product review aggregator's e-business model, which includes the revenue sources and the relationships with aggregatees and customers. The chapter also discusses common business models used by information aggregators and points out what business models are popular among product review aggregators.

6.1 Key Elements of an Aggregator's e-Business Model

Weill and Vitale define the e-Business model (Weill and Vitale, 2001) as:

"A description of the roles and relationships among a firm's consumers, customers, allies, and suppliers that identifies the major flows of product, information, and money, and the major benefits to participants"

Putting a product review aggregator under the lens of the e-Business model, one would identify the key elements of the business model as the major flows of information and money and a firm's relationships with its aggregatees, customers (online shoppers and advertisers), and online retailers. Since the information flow has been discussed in the enabling technologies chapter, in this chapter, the author will focus on the revenue flow and the relationships with aggregatees and customers.

6.1.1 Revenue Flow

As it is true with almost any business, a product review aggregator needs a stable revenue flow to sustain its operations. The typical sources of revenue for a product review aggregator include the advertising fees, the fees for sales referrals, and the fees for offering review aggregation services.

- Advertising fees – is the most popular way for an aggregator to generate revenue. As a product review aggregator attracts a large enough user base to read reviews on its site, it also creates an attractive media channel for product manufacturers and advertisers to market and promote their products or services.

  Most review aggregators under this study have built their network of sponsors. When users submit a search on a product, the aggregator returns the result page along with sponsors' advertisements relevant to the product.

  Some aggregators also participate in the Google AdSense program. The Google AdSense program offers a platform to connect advertisers with content providers (Google, 2007). When an aggregator registers with the AdSense program, the aggregator will include an advertisement banner in its web pages. As a user searches

for a product, the AdSense banner will display advertisements matching the content displayed. The aggregator will earn money if viewers click on the advertisement. The advantage of the AdSense program is that Google has already attracted and built a broad network of advertisers; therefore, by signing up for the AdSense program, the aggregator automatically gains the access to the big pool of advertisers.

- Fees through Sales Referrals – another way to generate revenue is through referring customers to online retailers. As customers are attracted to product review aggregators' sites, if those sites also list vendor information, customers can navigate to online retailers after their product research and this can potentially generate revenue for those retailers. Certain agreements can be made so that product review aggregators can share part of the revenue generated from the traffic directed to online retail sites.

  Many product review aggregators such as Wize.com and Summize.com provide price and vendor comparison information. Online shoppers can choose a vendor to purchase products after reading reviews. The detailed information of how the revenue is split between online retailers and product review aggregators is not available on either aggregators' sites or online retail sites.

- Fees from Customer Opinion Analysis Service - product review aggregators can also package aggregated review content and offer customer opinion analysis as a service to manufacturers and earn revenue from such service offering.

  Manufacturers are interested in knowing customers' opinions about their products. Product companies often conduct surveys to solicit feedbacks from consumers. As customer reviews are widely available on the web, those companies can also mine online review content and get some insights about consumer preferences and trends. Since aggregators already gather and analyze product review content, they can easily package the analysis results and provide specialized customer review analysis services to manufacturers. The review analysis service can be offered through the hosted solution model. Product companies can then subscribe to such services. By paying a monthly fee, product companies can log onto product review aggregators' sites to read review summaries on their specific products and compare reviews of their competitors' products.

- Fees from Online Review Enabling Services – many online retailers lack technical capabilities to launch their own product review services. Some application service providers such as BazzarVoice and PowerReviews see the opportunities and offer enterprise review services targeting online retail stores. Although those application service providers cannot be strictly qualified as product review aggregators, some of them such as PowerReviews do own review aggregation sites and are able to build synergies between the enterprise review enabling service and the review aggregation service.

6.1.2 Relationship with Aggregatees

The relationship between a web aggregator and its aggregatees can be generally categorized as “aggregation without partnership”, “aggregation with partnership”, and “aggregation with ownership” (Madnick and Siegel, 2002).

- *Aggregation without partnership* - Under this relationship, aggregators freely extract information from aggregatees’ sites without forming a partnership with or even notifying aggregatees.

- *Aggregation with partnership* - If an aggregator wants to facilitate the information extraction and gain further access into the proprietary data of aggregatees, it becomes necessary to build a mutually beneficial partnership with aggregatees. Madnick and Siegel point out that a formal partnership can be either partnership with partial collaboration, partnership with limited alliance, or partnership with equal degrees of collaboration.

- *Aggregation with ownership* – some aggregatees want to lock in the relationship with aggregators, they end up investing in the aggregator. According to Madnick and Siegel, either a dominant aggregatee or a consortium of aggregatees can own the aggregator.

Most of product review aggregators in this study fall under the first two categories: “aggregation without partnership” and “aggregation with partnership”. The author has not found any product review aggregator owned by its aggregatees.

Since consumer review content is widely available on the internet, aggregators generally can collect review content without formally maintaining a partnership with their aggregatees. However, some product review aggregators choose to form partnerships with aggregatees in order to simplify the data extraction and analysis process. With the partnership its parent company, PowerReviews, built with the aggregatees, Buzzillions is able to gather very structured review content. In fact, PowerReviews provides online review enabling services to aggregatees and defines the structure and format of online reviews created on the aggregatees’ sites. Therefore, Buzzillions does not need to deal with the issues normally faced by other product review aggregators, which are inconsistent and even conflicting content formats from various review sources.

6.1.3 Relationship with Customers

Weill and Vitale point out three important ownerships in any e-business model: ownership of the customer relationship, ownership of the customer data, and the ownership of the customer transaction (Weill and Vitale, 2001). Owning the relationship with customers gives an e-business the chance to gain a complete picture about its customers and thus be able to tailor its services specific to customers.

Although it is very valuable to own the relationship with customers, it is very difficult for an e-business to lock customers in the relationship. Customers always have a choice to walk away from the company and choose a competitor's products or services. This is especially true for product review aggregators. Even though every product review aggregator tries hard to collect as much content as possible and provide high quality services, hoping that customers will only use its service, the reality is that most online shoppers will use a couple of product review aggregators and compare review summaries and product rankings. For the product review aggregators under this research, no aggregator really owns the complete relationship with its customers.

Even though it is difficult to own the complete relationship with customers, a few product review aggregators still try various approaches to build a closer relationship with their customers.

One such approach is to create online social networks among users. A social network provides users who share similar interests, preferences, or profiles ways to interact with each other (Wikipedia, 2007). Through interactions, users experience more personalized and relevant services. Traditional review aggregation services do not distinguish among users. Aggregators treat every user the same way and always return the same search results no matter who does the search. Social networks help a product review aggregator differentiate its services by offering more user-centric services. Different user can get different product review summaries based on his/her different profile or different interests. Through social networks, product review aggregators are able to foster a closer relationship with customers.

Another approach is to offer member-specific services. A number of product review aggregators let users create online personal accounts to save their search history, user preferences, favorite products and reviews. Users can also subscribe to RSS feeds they are interested in and get real-time updates on product reviews. Some aggregators also allow users leave reviews at their sites.

6.2 Business Models for Product Review Aggregator

Since product review aggregators are a sub-set of web aggregators, most of business models found in product review aggregators are also a sub-set of business models identified for web aggregators.

Therefore, before looking at the business models for product review aggregators, in this section the author will describe popular business models used by web aggregators and then discuss what business models are relevant to product review aggregators.

Hu identifies nine business models for web aggregators (Hu, 2007):

1. Advertising – in this model, the firm's revenue primarily comes from advertising

2. Brokerage – the broker facilitates the transactions between buyers and sellers and earn money through transaction fees (Rappa, 2007)

3. Subscription – customers subscribe to the company's service and pay a periodic subscription fee (Rappa, 2007)

4. Licensing – this is similar to software licensing. The company charges the customers based on the use of their products in terms of either the number of users (seats) or the duration. (Rappa, 2007)

5. Information Intermediary - some firms hold independently collected data that provide valuable insights to various parties including producers and consumers in the market place. (Rappa, 2007)

6. Referral-based – in the referral-based model, the firm earns money by referring customers or qualified sales traffic to destination sites. (Lumpkin and Dess, 2004)

7. Customized services – based on the information about customers, some aggregators are able to provide targeted services specifically tailored to customers (Hu, 2007)

8. Professional service/Consulting – aggregators can also leverage the data they have collected and the information system they have built to offer consulting services to their customers (Hu, 2007)

9. Application service provider (ASP) – in the ASP model, customers do not need to install systems in their environment, and instead, access services hosted in aggregators' environments through the internet.

For product review aggregators, not every business model listed above is applicable.

- The brokerage model generally does not apply to the product review aggregator since online transactions rarely happen at the review aggregation site. The online purchase transactions normally occur at the online retail sites.

- Most review aggregators currently do not offer either consulting services or customized services; therefore, both the professional service model and the customized service model do not fit here.

- The application service model occurs only in the back end where some aggregators provide hosted review services to aggregatees.

- On the front end, aggregators generally provide the summarized product reviews service free to their users. However, aggregators could potentially package the summarized product review information and offer customer review analysis services to product companies and market research firms through the subscription or the licensing model.

- Although no product review aggregator has currently applied the information intermediary model, as the aggregated produce review content grows significantly and more online shoppers are attracted to use the review aggregation service. Aggregators could play a powerful information intermediary role to provide market insights to product manufacturers as well as product insights to consumers. The author predicts that the information intermediary model will emerge among product review aggregators in the future.

Based on the above analysis, the author suggests that the following business models (out of the original nine models of web aggregators) are more relevant for product review aggregators:

1. Advertising: as product review aggregators focus on accumulating aggregated product review content and attract online shoppers, the advertising model becomes the most applicable and popular model among review aggregators.

2. Referral-based: another popular way for product review aggregators to generate revenue is through referring qualified sale traffic to online retailers.

3. Application Service Model: as mentioned in the above analysis, the ASP model is applicable in between an aggregator and its aggregatees. Among the sampled aggregators, PowerReviews and BazzarVoice use the ASP model to provide hosted review services to aggregatees.

4. Licensing model and Subscription model – product review aggregators could use either model to provide services to product companies, manufacturers or market research firms.

5. Information Intermediary model – this is a potential powerful model for review aggregators. As the review aggregator gathers more and more product reviews and gain more insights into customer opinions, the aggregator could become a powerful information intermediary that knows more about products and customer opinions than any other player in the aggregation eco-system does. Although none of sampled product review aggregators is currently using this model, the information intermediary model is a powerful emerging model worth watching on.

6.3 Analysis of Sampled Product Review Aggregators

The author concludes this chapter with a business model analysis of the sampled product review aggregators. Table 6-1 shows the analysis results.

Table 6-1: Business Models of Sampled Product Review Aggregators

Aggregator	Revenue Flow	Relationship with Aggregatees	Relationship with Customers	Business Model
iNods	Advertising	Without Partnership	Membership	Advertising
Retrevo	Advertising	Without Partnership	Informal / Membership	Advertising
ViewScore	Advertising	Without Partnership	Informal / Membership	Advertising
Wize	Advertising	Without Partnership	Informal / Membership	Advertising
Buzzillions	Advertising / Revenue from sales referrals	Formal Relationship	Informal / Membership	Advertising / Referral
alaTest	Advertising	Without Partnership	Informal / Membership	Advertising
ProductCritic	Advertising	Without Partnership	Informal	Advertising
FindProductReview	Advertising	Without Partnership	Informal	Advertising
Summize	Advertising	Without Partnership	Informal	Advertising

From the above analysis, the author discovers that most sampled review aggregators rely on advertising as their main review source. There are typically no partnerships formed between aggregators and aggregatees. The relationship with customers is informal since users can freely choose among product review aggregators for their product research. In terms of business models, almost all product review aggregators use the advertising model.

7 Case Studies

In this chapter, three review aggregators are studied in depth to show what values each of them provides to its users, how each review aggregator leverages enabling technologies to offer value-add services, what business models each aggregator uses and how it will sustain or grow its business. The author also discusses the relationships with users and aggregatees.

Out of the nine sampled review aggregators, the author chose three review aggregators (Buzzillions, Wize, and alaTest) because of their unique characteristics.

Buzzillions and its parent company PowerReviews are running an interesting software-as-a-service business model. PowerReviews provides enterprise review services to online retailers and therefore maintains a very close relationship with them. The majority of review content aggregated by Buzzillions is from online retail stores. Buzzillions is an example showing how review aggregators can sustain its business by building strong ties with aggregatees.

Wize focuses on aggregating a large number of reviews and providing un-biased review aggregation services to users. To maintain its independence status, Wize does not build partnerships with any aggregatees. So far, the site has aggregated more than 2.7 millions of reviews over 78 thousands of products (Wize, 2007). Wize applies an advanced statistical method to process the large number of reviews. It has developed a proprietary review ranking system called WizeRank. The company also designed a syndication widget to help promote its WizeRank rating by allowing Bloggers or online retail stores to embed the WizeRank widget in their web pages.

The author picked alaTest for it is an international product review aggregator. The site differentiates itself by aggregating reviews from a wide variety of international sources. The number of reviews aggregated by alaTest is also in millions. To date, alaTest has gathered 1.5 millions reviews from over 723 sources (alaTest, 2007). Unlike most of the review aggregators that do not reveal review sources, alaTest officially publishes all review sources on its site. The site also supports several languages so that international users can easily read review summaries.

7.1 PowerReviews and Buzzillions – social merchandising solution

PowerReviews is a privately held company founded on November 11, 2005 by two Stanford students, Andy Chen and Robert Chea (LibertyHouse, 2007a). The two founders previously co-founded Fogdog.com, a popular online sporting goods store, and sold it to GSI Commerce in 2002 (PowerReviews, 2007c). PowerReviews was started with the goal to help online retailers incorporate Amazon-like review capabilities quickly and with not much engineering. The start-up company provides online retailers hosted enterprise review solutions using a number of patent-pending technologies such as the tag-based

reviews and Asymmetric ASP. PowerReviews targets long-tail retailers as well as big-name retailers. Many big-name retailers such as Staples, Toys “R” Us, Walgreens, and RadioShack have signed up for PowerReviews’ review solutions.

Buzzillions.com, on the other side, is the product review aggregation and the customer-facing portal for PowerReviews. PowerReviews launched the portal in April 2007 to aggregate reviews from its retail clients and give consumers a place to go to read reviews written by real buyers who are verified with online retailers (Buzzillions, 2007). Buzzillions.com covers reviews on a wide range of products from consumer electronics to office supplies and home furniture. On its web site, PowerReviews states that it has collected over 400,000 reviews from more than 1,000 retailer sites and on more than 120,000 products (PowerReviews, 2007a).

PowerReviews’ strongest competitor is BazzarVoice, an Austin, Texas-based start-up, which provides similar hosted review solutions to online retailers. Different from PowerReviews that offers enterprise review services free and monetize on the qualified sales traffic, BazzarVoice charges its clients a monthly fee for using its services.

On the financing side, according to Liberty House VenturePedia, PowerReviews is in the Venture Funding 2 stage (LibertyHouse, 2007a). In December 2005, the company received $6.25 million in Series A funding from leading Silicon Valley venture capital firms Menlo Ventures and Draper Richards. Later in September 2007, PowerReviews “secured $15 million in additional financing led by Lehman Brothers Venture Partners along with existing investors” (PowerReviews, 2007d). According to a CNNMoney article, the company is not yet profitable and the company hopes to use the additional financing to increase unique visitor count by marketing. The CEO Andy Chen says that the company will turn profitable by “the end of next year” (CNNMoney, 2007).

7.1.1 Needs & Benefits

The niche Buzzillions and PowerReviews fill in is the online retailers that do not have the expertise or the infrastructure to set up their own online review systems. With the increasing demands for online reviews, an online merchant site without online reviews would run the risk of turning its customers away. PowerReviews sees the opportunities and offers to help online retailers build online product review services. The company develops the enterprise review solution and helps online retailers integrate the review solution into their sites. By doing so, PowerReviews builds strong strategic relationships with its partners. PowerReviews’ review integration services not only enhance the retailers’ capabilities to attract and retain customers, but also help the Buzzillions site gain accesses to extensive review content. Having the access to extensive and credible review sources is always a big challenge for review aggregators. By enabling online retailers with online review services, PowerReviews has in fact created a stable network of review sources for its Buzzillions site.

From customers' point of view, customers need more than just another review aggregation site. What customers have been longing for are advices from people who have bought the product or people who share similar interests. Customers want a smooth end-to-end shopping experience. First, customers need a place to conduct their product research, and when they product best fit their needs, they would want to compare prices and vendors, and eventually they would like to navigate to the online vendor site to purchase the product. Second, customers are looking for an easy-to-navigate interface and a quick and intuitive way to grasp other shoppers' opinions. Buzzillions is created to meet these customer needs. The site uses customer profiles and tags on product attributes and customer interests to help customers find reviews from others who are just like them. It also provides an easy-to-read review summary page to help customers quickly gain the insights into a large number of reviews. Buzzillions also includes vendors' links in every review summary page so that customers are only a click away to start their online transactions.

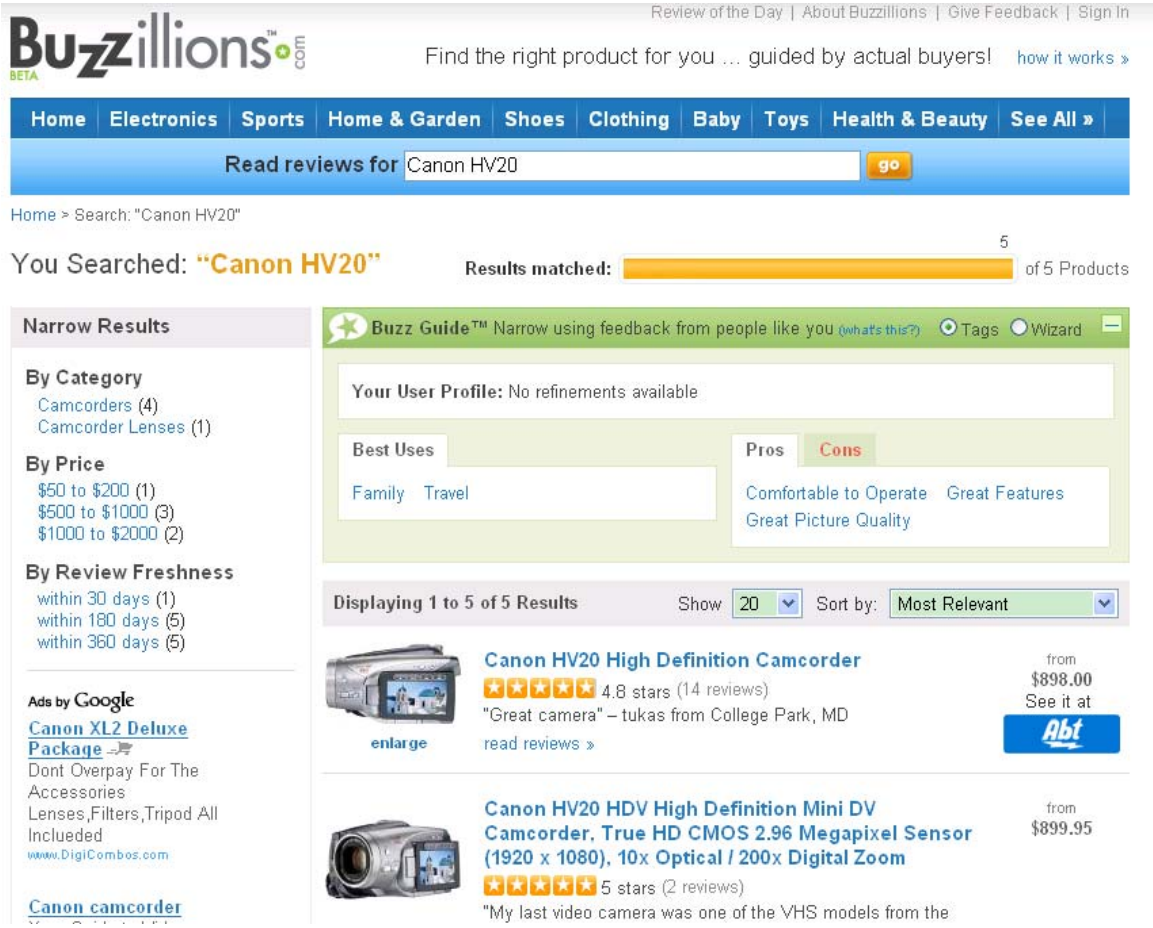

Figure 7-1: Screen shot of Buzzillions Review Search Results on Canon HV20 Camcorder

Figure 7-1 shows the review search result for the Canon HV20 digital camcorder. The "Buzz Guide" section lists "Pros" of the camcorder as "comfortable to operate", "great

features", and "Great Picture Quality". The "Best Uses" section tells consumers what this camcorder is good for, i.e. "Family" and "Travel".

7.1.2 Enabling Technologies

At the high level, Buzzillions/PowerReviews uses a structured way to capture product reviews, provides the tag-based review summaries to both consumers and online merchants, and leverages affinity programs for consumers with similar interests to recommend products to and share reviews with each other.

Figure 7-2 illustrates the system architecture of PowerReviews social merchandising technology (PowerReviews, 2007a).

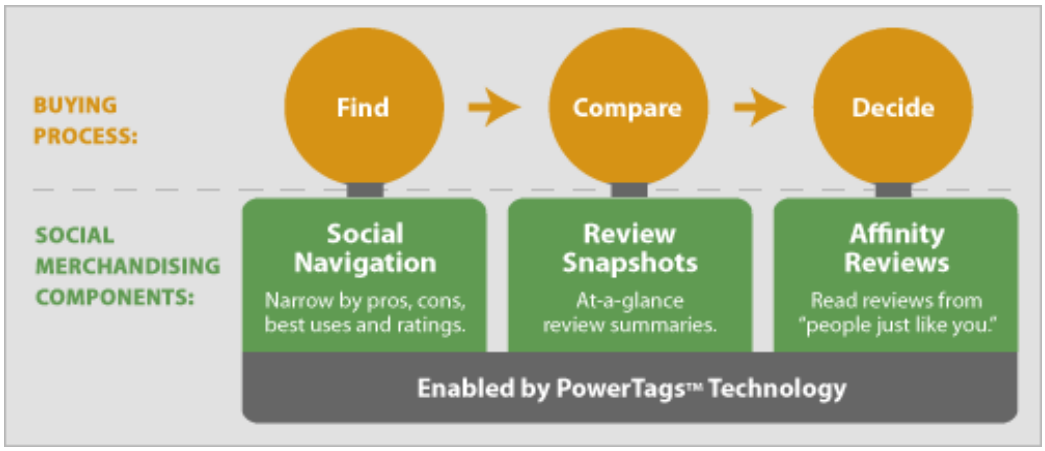

Figure 7-2: PowerReviews' Social Merchandising System Architecture
(*Source*: *http://www.powerreviews.com/social-shopping/solutions*)

Well-defined Review Structure

Buzzillions captures reviews in a structured format. Each review contains "pros", "cons", and "best uses". Consumer provides comments about a product based on those three categories using a tag-based system. The well-defined structure makes it easy for Buzzillions to process review data and quickly summarize opinions among reviewers. It also saves the aggregator's time and efforts to do natural language parsing if reviews were free-form texts. The site is able to offer users a review snapshot showing what features customers like or dislike and what the product can be best used for. Figure 7-3 shows the snapshot of review summary for the Canon HV20 digital camcorder.

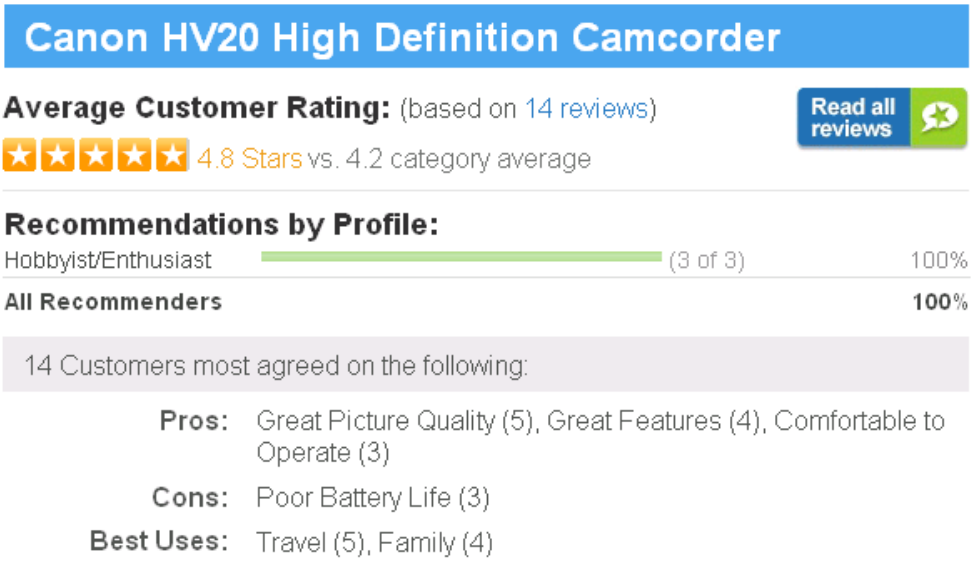

Figure 7-3: Screen shot of Buzzillions Structured Review Summary Section

Tag-Based Reviews

PowerReviews simplifies the review-writing process with a tag-based approach. Consumers can choose either to agree with previous reviewers' comment tags or to create new review tags that describe their opinions. This "tag" approach provides consumers a quick and easy way to write reviews. It also makes it more efficient for Buzzillions.com to syndicate reviews from retail stores and to tally opinions based on tags. The tag-based review helps drive customers to online retail sties. According to company's web site, "shoppers prefer PowerReviews tag-based reviews 2-to-1 over Amazon's traditional reviews!" (Buzzillions, 2007). Figure 7-4 shows the interface for creating tag-based reviews.

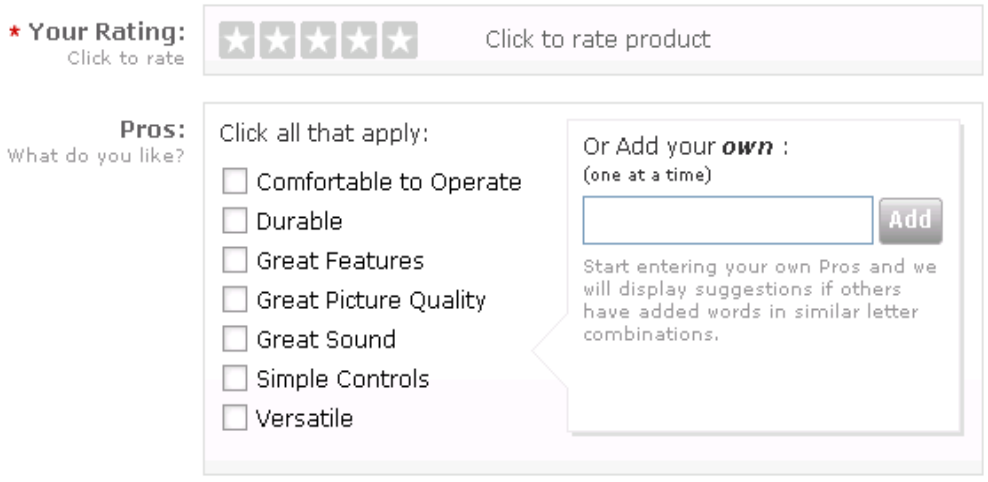

Figure 7-4: Screen shot of Buzzillions Tag-based Review

Affinity Recommendations and Reviews

Buzzillions differentiates itself from other review aggregators by the affinity program it runs. Most review aggregations sites, when presenting review results, do not take into the consideration of users who view the reviews. Those aggregators offer users a one-number-fits-fall rating. Buzzillions takes an innovative approach to gather reviews from people alike and provide relevant reviews to its users. Users not only can see recommendations from people like themselves, but also will know what those users think about the product after their purchases. Using the affinity reviews, the site builds a web 2.0 like virtual review community in which users can participate and help each other. The virtual community is a sticky factor for Buzzillions to attract and retain users to its site. It also increases the entry barriers for new aggregators to enter this area and helps Buzzillions maintain its competitive position.

7.1.3 Business Model

PowerReviews runs an interesting business model that closes the loop between online retailers and consumers. PowerReviews offers online retailers the review enabling services through the ASP (Application Service Provider) or the SaaS (Software as a Service) model. The Buzzillions site, on the other side, aggregates reviews from those retail sites to assist consumers in their product research. Once consumers make their buy decisions, Buzzillions brings them back to those retail sites to complete the loop.

Figure 7-5 shows an example of the product review page of an online retailer, Abt.com. The highlighted section says that the review is powered by PowerReviews.com.

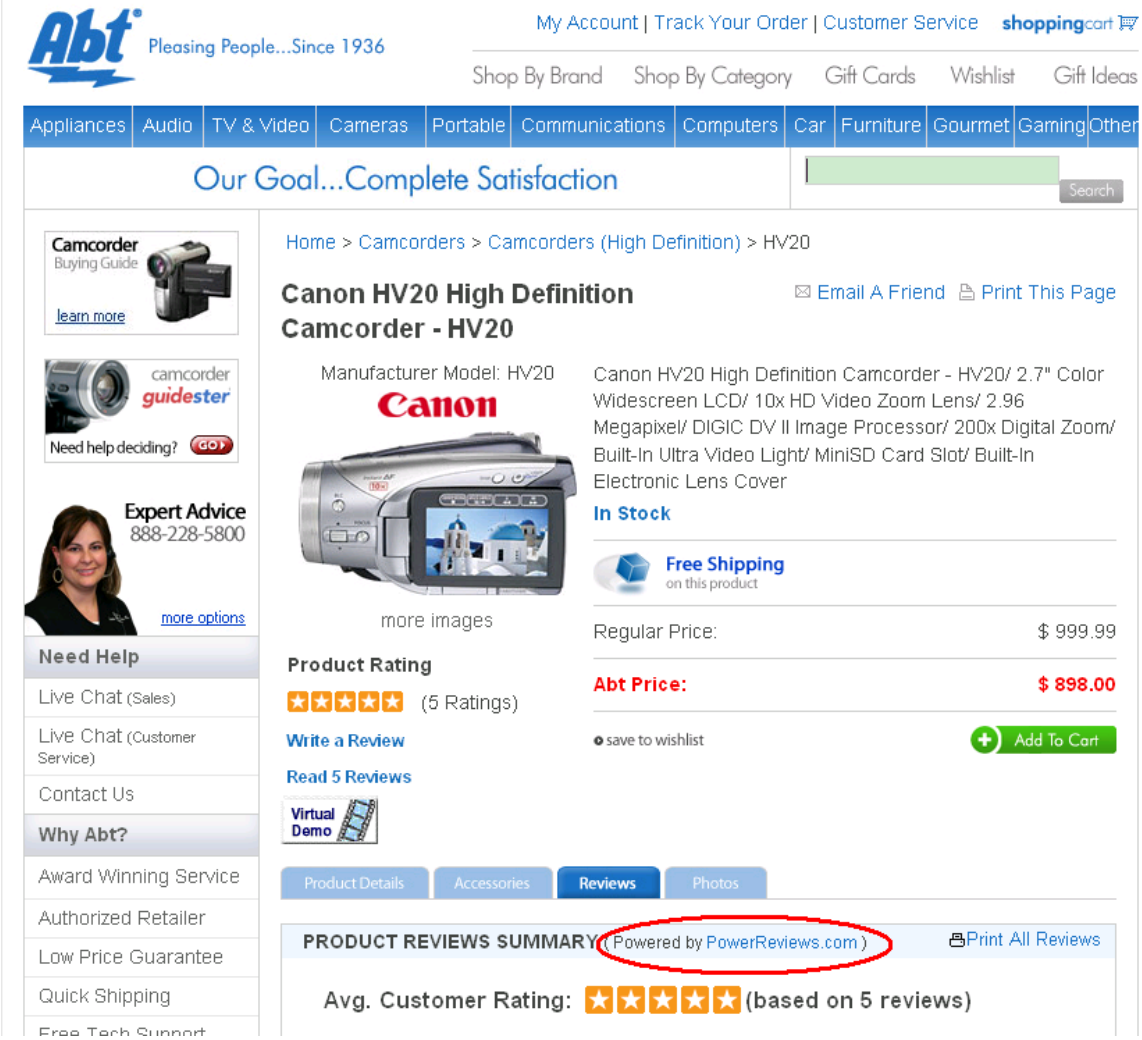

Figure 7-5: Screen shot of Abt Review Page of Canon HV20 Camcorder

Revenue Model – PowerReviews runs both the subscription model and the revenue-sharing model. For the service pricing, PowerReviews offers its clients two options. Clients can either pay a monthly subscription fee for using the review service or pay only for qualified sales generated from the traffic directed back from the Buzzillions site (PowerReviews, 2007b). In either option, clients own the review content. If the client chooses the second option, it is required to share reviews from its site with Buzzillions, but the use of the review service is free. Because they can use the review enabling service free, most retailers select the latter option to split the revenue with PowerReviews.

The business model of PowerReviews and Buzzillions can be depicted in figure 7-6 using the E-Business model schematics developed by Weill and Vitale (Weill and Vitale, 2001). From the chart, one can observe that PowerReviews and Buzzillions play nicely the information intermediary role in between online retailers and customers, with Buzzillions interfacing with potential customers and PowerReviews enabling online retailers. Unlike other players in this space that focus either on customers or on retailers,

PowerReviews targets both ends of the eco-system at the same time. Working tightly together, PowerReviews and Buzzillions build a unique channel connecting customers and online retailers.

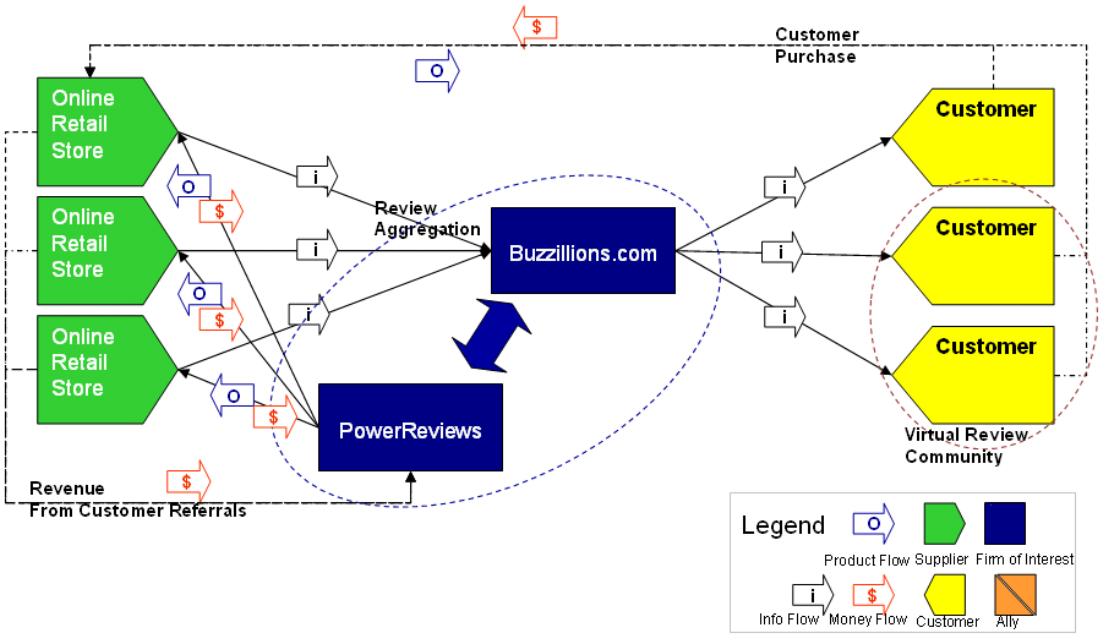

Figure 7-6: The Business Model of PowerReviews and Buzzillions

Relationship with Aggregatees - By offering online retailers its review enabling expertise and infrastructures, PowerReviews builds close relationships with its aggregatees. Although it does not own the review content, the company runs the review aggregation engine and controls the whole consumer review process.

Since PowerReviews can profit from its strategic relationships with aggregatees, this relationship with aggregatees fits in the category of the "financially independent aggregator with collaboration" (Madnick and Siegel, 2002). PowerReviews' aggregatees can be called the "collaborating aggregatees". According to Madnick and Siegel, a formal relationship with aggregatees lowers the integration and aggregation cost for aggregators. This is especially true in the PowerReviews' case. As PowerReviews designs the review content format and the review-writing process for retailers, it makes it much easier for Buzzillions to aggregate the well-structured reviews.

PowerReviews also levels the ground for small to medium retailers to compete with dominant E-Commerce sites such as Amazon.com. Smaller retailers normally lack of expertise and IT infrastructures in setting up their own online review systems. With the deep domain knowledge and the economy of scale achieved through servicing other retailers, PowerReviews is able to offer efficient and low-cost review services.

Relationship with Consumers - On the web front, Buzzillions attracts online shoppers by the extensive product coverage, the in-depth reviews, and the close ties with online

retailers. As the number of aggregated reviews rapidly increases and virtual review communities grow bigger, Buzzillions is able to build a stronger tie with online shoppers and therefore attract more advertisement opportunities.

Other Opportunities - When PowerReviews gains more insights into consumer preferences and trends on products, it can also generate additional revenue by offering consumer insights services to product manufacturers to help them design and develop products better matching customer interests.

Critical Success Factors – PowerReviews needs to sign up a sizable network of online retailers in order to sustain its software-as-a-service model. The number of retailers is also critical for Buzzillions as Buzzillions needs to aggregate large enough reviews to attract more customers and then capitalize on the sales traffic it directs to retailers.

Summary

By enabling consumer reviews on retail sites, PowerReviews brings a wide range of review sources for its review aggregation site. By referring consumers back to online retailers, Buzzillions builds better relationships with retail sites and generates revenue for both retailers and itself. PowerReviews' two-pronged strategy closes the loop between consumers and online retail stores and makes it a competitive player in the review aggregation space.

Table 7-1 summarizes the main characteristics of PowerReviews and Buzzillions.

Table 7-1: Holistic Analysis of PowerReviews and Buzzillions

Questions	Explanation
Why (Needs)	* Find right products (customers) * Get advice from shoppers with similar interests (customers) * Attract customers to its site by offering reviews (retailers) * Generate more revenue by helping customers find best-fit products (retailers) * Gain insights into consumer preferences (retailers)
What (Information)	* Consumer reviews over a wide range of products (> 120,000) * Structured review format ("Pros" and "Cons" etc.) * User Profile
How (Technology)	Post-aggregation Process * Tag-based structured review * Affinity recommendation & reviews
Who (Beneficiaries)	Shoppers, Retail stores
How Much (Business Model)	- Software as a Service (SaaS) - Subscription fee or Revenue-Sharing - Advertising

7.2 **Wize.com – "millions of opinions, one score"**

Wize.com is a Silicon Valley start-up that gathers and analyzes both expert reviews and consumer reviews on the web. The company was founded in August 2006 by the internet entrepreneur, Doug Baker, who successfully founded several internet companies including Private Accounts, which was sold to ETRADE in 2000. Wize.com's vision is to build a comprehensive product research platform to help consumers make smart purchase decisions. The company leverages "the wisdom of crowds" (Surowiecki, 2005) to provide online shoppers insights into products they are interested in. So far, the site has collected more than 1.5 million opinions on over 75,000 products (Wize, 2007).

According to its web site, Wize.com secured $4 million in Series A Financing from the Mayfield Fund and Bessemer Venture Partners in January 2007. The company's revenue mainly comes from advertising. The detailed financial data is not disclosed by the company.

Figure 7-7 shows the Wize review search page of Canon HV20 Camcorder.

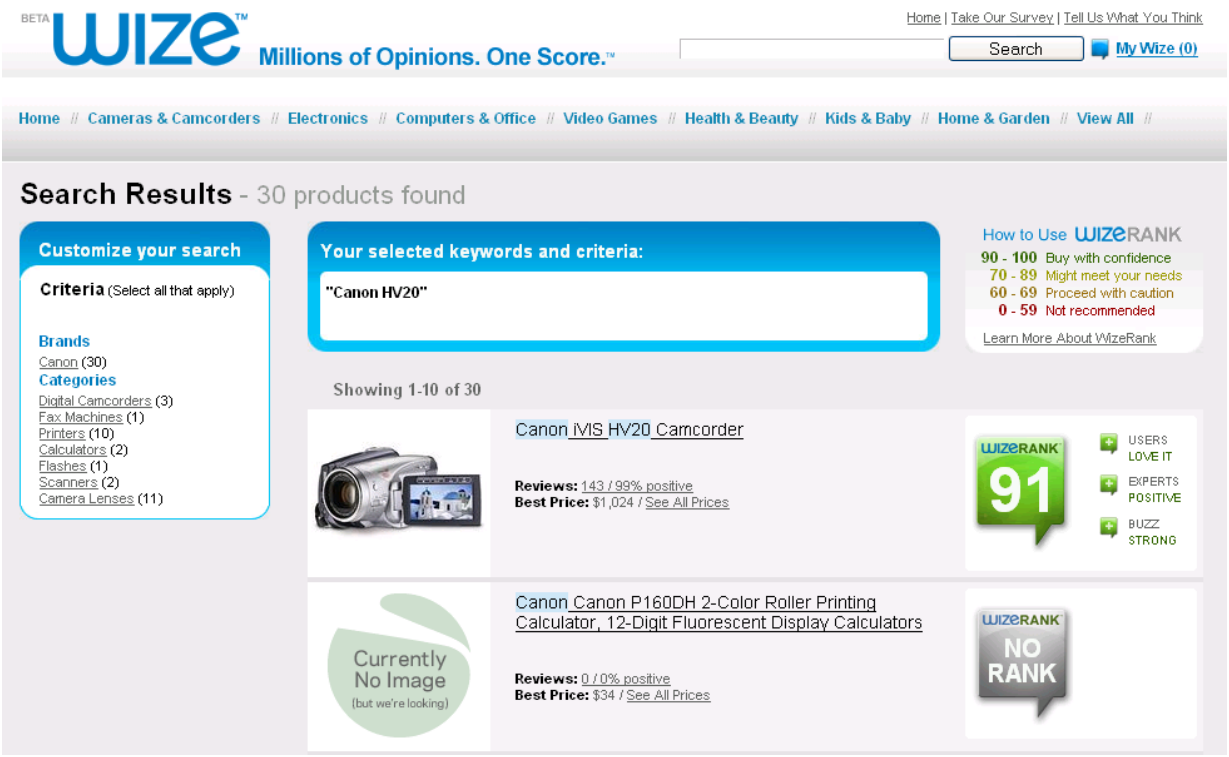

Figure 7-7: Screen shot of Wize Review Search Result Page on Canon HV20 Camcorder

7.2.1 Needs & Benefits

Wize primarily focuses on the needs of the consumers. When consumers are searching for the right products, they look for:

Independent and objective review aggregation service – consumers want to read un-biased review summaries about products. Reviews on some retailer sites are from manufacturers or advertisers to promote specific brands and therefore biased.

Wize maintains its independent stance from manufacturers and advertisers. No manufacturers or advertisers can buy or influence their product ranking on Wize (Wize, 2007). To ensure that reviews are as objective as possible, Wize staff team inspects review sources and eliminates those sites that are associated with manufacturers. In addition, Wize avoids the revenue sharing model with manufacturers and primarily depends on advertising for its revenue source.

Reviews from both experts and consumers – online shoppers want expert opinions. Expert opinions are normally very thorough and in-depth. Professional reviewers such as people from CNet.com conduct comprehensive tests on products. They compare the test results of a specific product with those of similar products to give consumers better insights.

Shoppers would also like to read reviews written by actual users. Actual consumers express opinions from their unique experience of using a product. They often reveal certain aspects of products that are often overlooked by expert reviewers because consumers normally use products for a much longer time than professional testers.

Wize aggregates both professional and consumer reviews. The professional review sources include CNet, TrustedReviews.com, and GadegetCentre etc. For consumer reviews, Wize.com extracts individual reviews from E-Commerce sites such as Amazon.com and Shopping.com. The site also gathers user reviews from Blogs, wikis and online forums. When a consumer searches for a specific product on Wize.com, as shown in figure 7-8, the result page shows the overall sentiment of experts as well as users along with the number of reviews analyzed in each category.

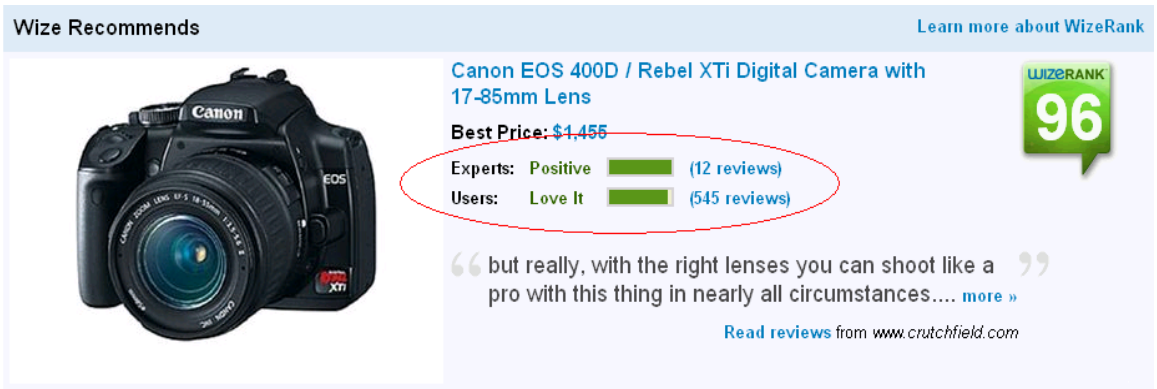

Figure 7-8: Screen shot of Wize Expert Rating and User Rating of Canon EOS Digital Camera

Large number of reviews – consumers want to read many reviews before coming to a general conclusion of what other people's views are on a product. The smaller number of reviews customers read, the more biased or incomplete picture they will get about a product. In order to gain a more realistic picture of all opinions, consumers would need to read a large number of reviews.

Wize.com collects more than 1.5 million reviews and covers over 75 thousands products (Wize, 2007). Compared with Buzzillions.com, Wize aggregates more reviews and targets a much broader range of products. If one searches for a Canon EOS 400D digital Camera on Wize, one will get a summary view of 12 expert opinions and 545 user reviews. Doing the same search on Buzzillions.com would not return any results. In another experiment, searching for a Canon HV20 Camcorder on Buzzllions.com gets 14 consumer reviews while Wize shows 154 reviews that include 11 expert reviews and 143 user reviews.

Quick and easy way to digest reviews – consumers may not want to spend too much time on conducting product research. They typically do not have the luxury and it is also impossible to read every single review available on the web. Customers normally read the first one or two pages of reviews on a site and then move on to make their decisions with the hope that what they have read can represent the rest of reviews on the site.

Wize has developed a numerical ranking system, WizeRank, for users to get a quick sense of a product's review rating. The WizeRank score ranges from one to 100. In addition to the numerical ranking, the site also displays the sentiment ratings of experts and users. In the Canon EOS400D example (shown in figure7-8), users will find out that experts feel "Positive" about the camera and normal users really "Love It". In the review summary section, Wize also displays the number of reviews in each category (both expert reviews and user reviews) to give users a sense of how many reviews are processed.

Wize strives to provide users an objective view of all opinions about specific products. In order to ensure the objectiveness of its aggregation service, Wize does not affiliate with any manufacturers and retailers. Wize's review processing team screens review sources to ensure that review sites are independent from merchants and manufacturers.

7.2.2 Enabling Technologies

On the technology side, Wize employs the advanced statistical analysis method to process the large number of reviews it gathers. To promote its WizeRank rating, Wize develops a targeted feed syndication widget for people to incorporate it to their web pages. Bloggers and online retail sites can easily embed the syndication widget in their sites to show the WizeRank of relevant products.

Statistical Review Ranking Algorithm

Wize designs a proprietary statistical algorithm to calculate the WizeRank score. In order to normalize reviews from different sources, Wize considers the following factors (Wize, 2007b):

1. Different rating scales – original review ratings vary by scale; some review systems use the ranking of one to 100 while other systems apply the five-star rating scheme. Wize cleanses original ratings by converting them from different scales into one ranking scale – from one to 100. During this standardization process, Wize also adjusts each individual review score based on whether a reviewer gives an easy or tough score.

2. Number of reviews – generally speaking, the more reviews a product has, the more reliable and the better the overall review ranking will be. If a product has only five reviews, its Wize Rank will be lower than and less reliable than that of the product that has over 500 reviews.

3. Variation in Reviews – when review ratings show a wide range of fluctuations, it generally signals the uncertainties about a product. When reviewers have similar opinions on a product, their review ratings will cluster around the mean. Wize weighs in the variance of original ratings during the WizeRank computation.

4. Expert versus User Reviews – Wize assigns different weights to expert reviews and user reviews based on the number of reviews and the statistical confidence (variance in ratings) in each category of reviews. For expert reviews, Wize adjusts the rankings according to the correlation of expert ranking and overall consumer sentiments in the product category.

The advanced statistical algorithm helps Wize compute a relatively accurate sentiment rating from all reviews gathered. It also gives users the confidence in using WizeRank score to make their buy decisions.

Product Feed Syndication Widget

To promote its WizeRank rating system, Wize creates a feed syndication widget that can be easily added to other web sites. The widget uses the keywords from the hosting page to search for relevant product reviews on Wize. Once Wize finds the rating information about the specific products, the widget will display the WizeRanks of the products in the snippet window. As an incentive to encourage the use of its widget, Wize shares the revenue with Blog sites when users click on the links in the widget.

"My Wize" Personal Space

Users can create their own space on Wize.com through “My Wize”. If you find products which are of interests to you, you can save those products into the “My Wize” folder. You are able to add or edit notes for the products saved in the folder.

Feature-based Review Search

In addition to the WizeRank, Wize provides users a feature-based mechanism to search product reviews. At the top of its “User Review” section, it displays the features of a product as shown in figure 7-9.

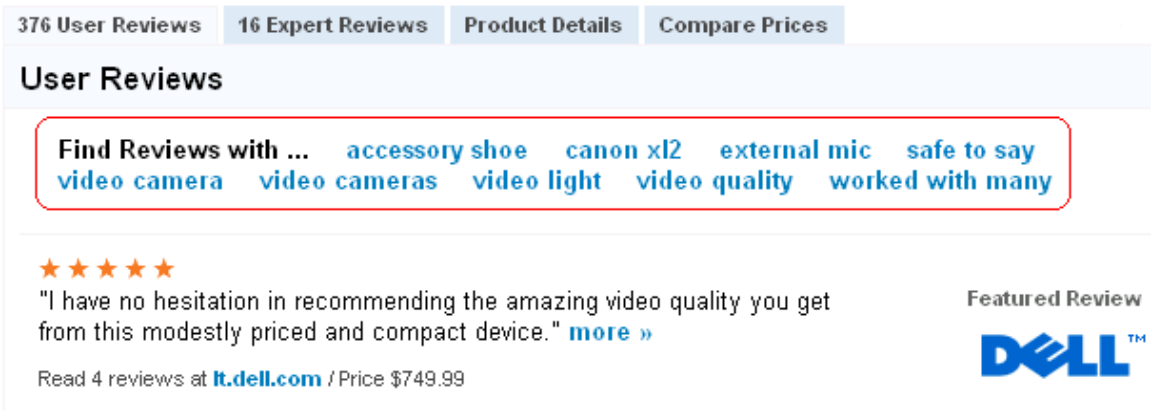

Figure 7-9: Search Reviews by Product Feature

For example, if one searches for “Canon HV20 Camcorder” in Wize, he or she will get 143 user reviews (shown in figure 7-9). The result page also shows that you can find reviews that contain features such as “accessory shoe”, “external mic”, and “video quality” etc. Users can click on a feature to read reviews mentioning such feature.

7.2.3 Business Model

Revenue Source - Wize relies on advertising as its primary revenue source. Part of the revenue also comes from the sales lead generation. After users read reviews on the site and find the right products to buy. Users can click on the sponsored vendor link to buy the products. Wize displays the comparison of various online vendors on price, tax, and service so that users can compare and choose which vendor to go for their product purchases. By providing links to online vendor sites, Wize can generate sales leads for those vendors and therefore earn some revenue on the qualified sales traffic.

Relationship with Aggregatees - From the aspect of aggregatees, Wize does not have formal partnerships with them. Its relationship with aggregatees can be qualified as the “Financially Independent Aggregator” and the “Unsuspecting Aggregatees” (Madnick and Siegel, 2002). Some aggregatees may not even notice the aggregation activities initiated by Wize. The company scours extensively on the web for product reviews. Overall, Wize searches over 7,000 web sites (Wize, 2007a). To ensure its independent

aggregation status, Wize does not affiliate with any aggregatees, manufacturers, or advertisers.

Emphasis on consumer relationship - Wize's business model emphasizes on building a strong and close relationship with consumers. By aggregating a large number of reviews and offering free product ranking services, Wize makes itself a popular and trusted product research destination for consumers. Maintaining a close relationship with consumers gives Wize a competitive advantage. As its customer base grows, the site can become an attractive media space for advertisers to run targeted advertisements.

Critical Success Factors - The critical success factors for Wize include the quantity and quality of reviews it aggregates, the relevancy and accuracy of its review rankings, and the number of customers using its service.

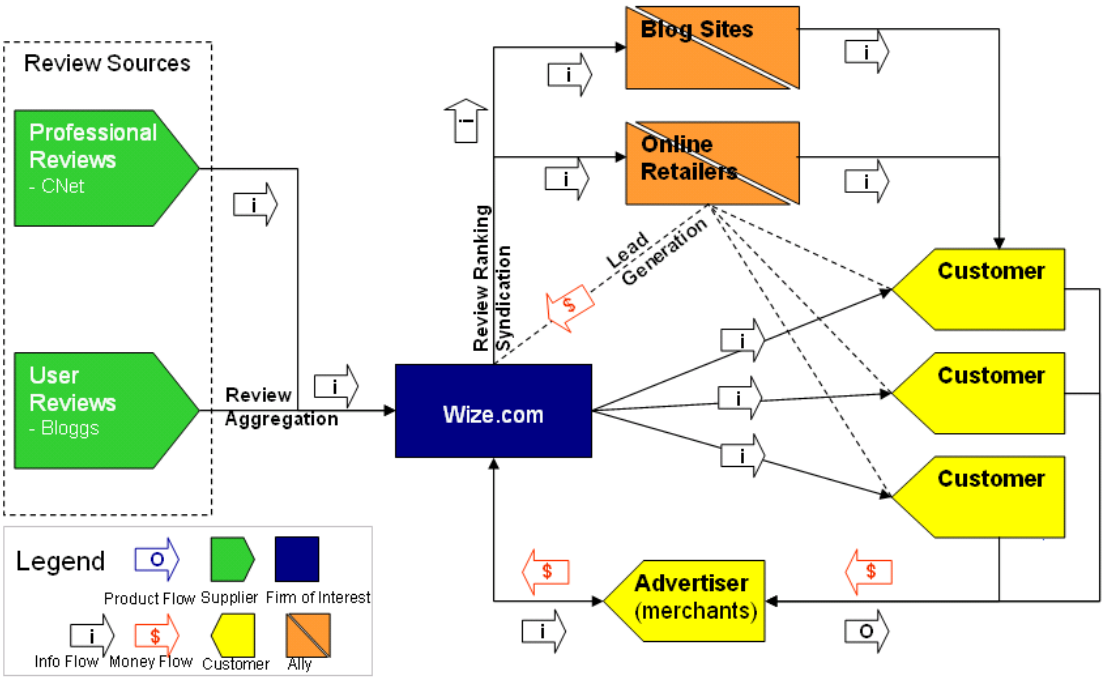

Figure 7-10: Business Model of Wize.com

The business model diagram (as shown in Figure 7-10) shows that Wize collects professional and user reviews from a wide variety of sources. Reviews are processed by Wize to create review summaries and WizeRank ratings. Then through the syndication widget, Wize distributes the product review rankings to Blog and online retail sites. Blog and online retail sites also direct customer traffic back to Wize.com.

Summary

Table 7-2 shows the holistic analysis of Wize.com. Wize taps into the wisdom of crowds to give users insights into products in which they are interested. The site aims to become a comprehensive product search platform for consumers. As the number of aggregated

reviews continues to grow at Wize.com, its WizeRank can become a powerful review ranking system that customers can rely on to understand product qualities. The site can therefore attract more consumer traffic and generate more advertising revenue.

Table 7-2: Holistic Analysis of Wize.com

Questions	Explanation
Why (Needs)	* Find right products (customers) * Independent review site (customers) * Digest large number of reviews (customers) * Quick and Easy-to-read Summary (customers)
What (Information)	* Professional Reviews (CNet, Consumer Report etc.) * Consumer Reviews (Blogs etc.)
How (Technology)	Post-aggregation Process * Advanced Statistical Method * WizeRank feed syndication
Who (Beneficiaries)	Shoppers, Bloggers, and Online retailers
How Much (Business Model)	* Advertising * Lead generation

7.3 alaTest.com - aggregating reviews from worldwide sources

alaTest (www.alatest.com) is a global review aggregation site, developed by the International Consumer Services Sweden (ICSS) AB. The ICSS AB is headquartered in Stockholm, Sweden. Arie Stuik, Peter Bjork, and several private investors own the ICSS AB (alaTest, 2007). The VenturePedia database shows that alaTest was founded in May 2005 and has a 15-person international team. The company currently does not have any fundraising planned (LibertyHouse, 2007b).

Similar to Wize.com, alaTest analyzes both expert reviews and consumer reviews. The site maintains a broad network of global partners that include CNET Channel and PC World. The site currently aggregates more than 1.4 millions reviews from over 714 international review sources (alaTest, 2007). alaTest also supports 12 languages and users from those countries can read review summaries in their own language. In addition to the review summaries, the site also provides price and vendor comparison services and guide consumers to local vendors after users make their purchase decisions.

Figure 7-11 shows the screen shot of the alaTest homepage.

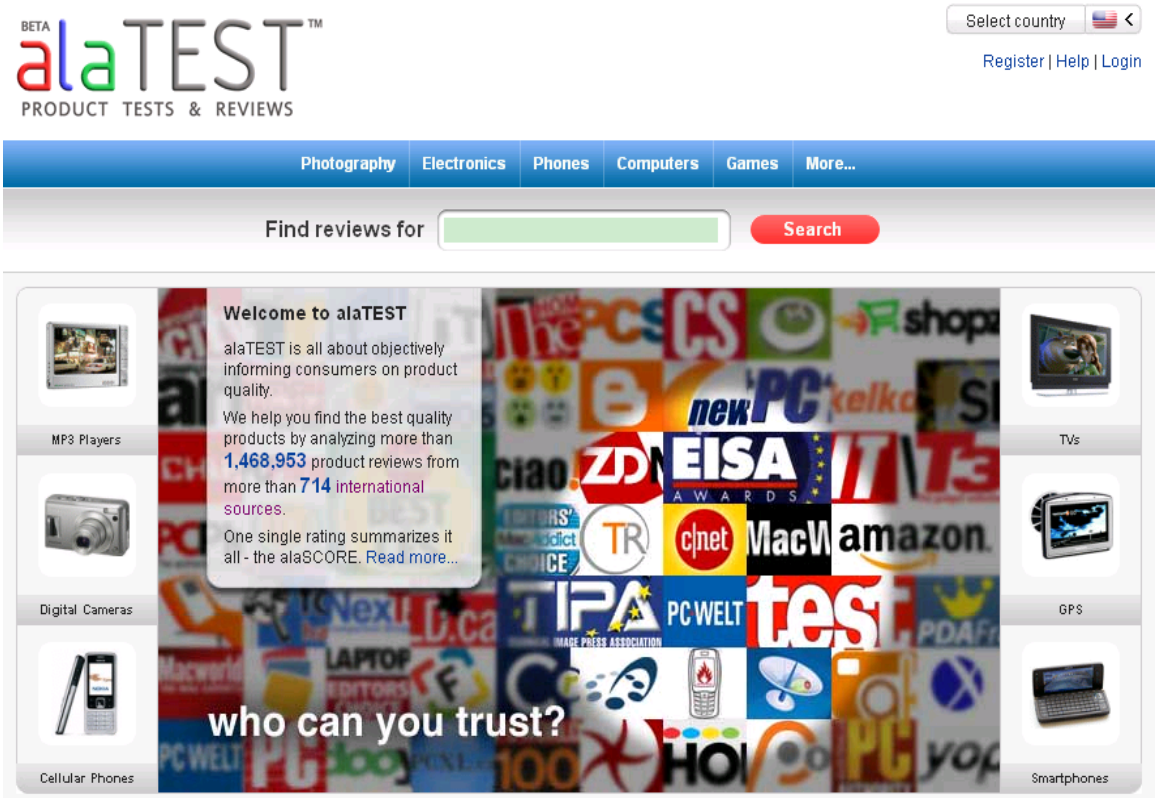

Figure 7-11: Screen shot of alaTest Home Page

7.3.1 Needs & Benefits

alaTest helps customers find quality product reviews from international sources. After aggregating reviews, alaTest provides users an easy and quick-to-navigate interface for digesting reviews and making their purchase decisions. Since alaTest targets international users, it satisfies a slightly different set of needs than a regional review aggregator such as Wize.com.

Reviews from a wide range of sources including international sources – as the global commerce continues to grow and reach out to more countries, the same products may be sold to and used by people from all over the world. Certain products are sold in one region for a long time and are just introduced to a new regional market. Consumers may not find many reviews from the new region; however, if the aggregator also gathers product reviews from the products' original markets, consumers in the new market can still gain insights into the products by reducing reviews from original markets.

As goods and services are marketed in the global scope, information also flows beyond country boundaries. alaTest facilitates such information flows and provides users the global view of products. The site indicates that it collects reviews from over 714 international sources (alaTest, 2007). Almost every product review page at alaTest contains reviews written in non-English languages.

Read review summaries in their own language – most product reviews are written in English. For people from non-English speaking countries, they cannot benefit from the large amount of information already available on certain products. The same scenario can happen for users in English-speaking countries as well. In case people want to understand the qualities of products imported from other countries, how can people find out the opinions of customers in the products' origin countries?

Without the help from international review aggregators such as alaTest.com, users would need to translate reviews and convert review ratings by themselves. alaTest offers a language-friendly user interface. Users can select their own language and then read the review summaries translated for them. Currently, alaTest only translates the high-level review summaries. The detailed review content is still in its original language, which users may need to rely on the Google's translation service or other language translation service to understand the review.

International price and vendor comparison – customers want more than product reviews, they also want to know about product specs, price, and vendor information in order to make good purchase decisions. When it comes to international customers, they would like to get price and vendor information in their local area as well in the global region. alaTest.com gathers the price and vendor information from many countries. Customers can compare prices and vendors internationally as well as regionally. However, the price comparison does not include international shipping rates and foreign taxes, making it difficult for customers to know the true cost. For purchasing the products, customers will most likely choose a vendor in their own region.

Large number of reviews – the more reviews an aggregator gathers, the more time and efforts the aggregator would save for its customers. If an aggregator collects only a handful of reviews, customers can read those reviews by themselves and further more, they may not get the true picture of people's opinions about the products. Customers would want to hear broad opinions about specific products so to understand better the products they are interested in buying. alaTest.com satisfies this need by gathering more than 1.4 million product reviews. This number is increasing every day as the site continues to crawl on the web searching for more products and reviews to analyze.

7.3.2 Enabling Technologies

alaTest applies the statistical method to compute a numerical alaScore for every product so that users can easily compare reviews among products in the same category. As shown in figure 7-12, the review summary section displays the expert ratings versus the user ratings. In computing the alaScore, alaTest weighs in the expert opinions more than the consumer comments (alaTest, 2007). The site also shows the age of the reviews to help users determine the relevance and reliability of the reviews. The details of the technologies used by alaTest.com are described in the following sections.

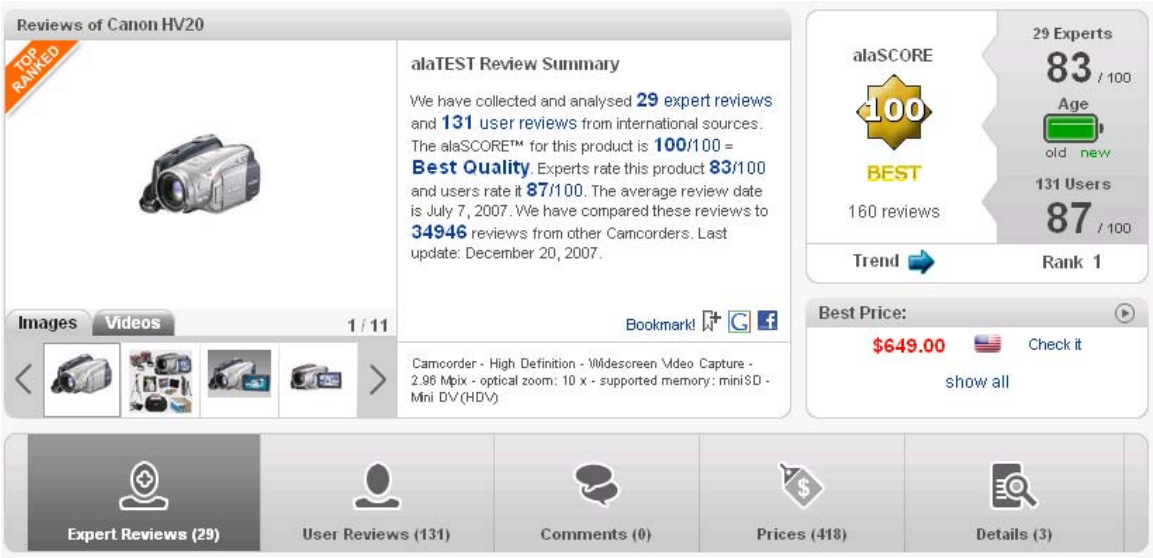

Figure 7-12: Screen shot of alaTest Review Summary Section of Canon HV20

alaScore Review Ranking System

alaScore is a relative review rating system and the score scales from zero to 100. The rating of a product is computed in relative to the ratings of other products in the same product category. alaTest.com takes into consideration of the following factors when calculating the alaScore:

- Review Sources – reviews come from professional review sites or consumer review sites. They can also come from sites narrowly focusing on a specific product category or from sites that cover a broad range of products.

  alaTest weighs more on professional reviews than on consumer reviews because of the depth of the knowledge and the expertise the professional reviewers possess and the extensive tests they run on products. Product review sites covering broader product categories will contribute more to the final review rating than the sites that review only one type of products. Finally, as product reviews are generally positive, instead of taking the absolute score for one product, alaTest compares one product rating against other products' ratings to determine the relative alaScore for the product.

- Age of reviews – products evolve over time and newer models of the same products are introduced into the market place constantly. As time goes on, reviews written years ago may not be helpful to the current users. Customers want to know how recent the reviews are and whether those reviews are still relevant in helping them make purchase decisions. To help customers understand the time dimension of product reviews, alaTest computes the average age of reviews on a product and displays it in the summary page.

  alaTest also develops an easy-to-follow color schema and rating icon system for customers to get a quick grasp of product reviews. Overall, the alaScore ranking system normalizes reviews from a wide range of sources and provides consumers a consistent quality rating system to compare products.

Sentiment Analysis on Consumer Reviews

alaTest handles customer reviews in a different way than handling expert reviews. It conducts sentiment analysis on consumer reviews. To understand the underlying sentiment of a product review, alaTest parses the review content and based on the sentiment words used, the system determines whether the review is generally positive or negative. In the user review section, alaTest displays the average review rating along with the number of positive reviews versus the number of negative reviews.

Figure 7-13 shows that among 29 user reviews on Canon HV20 camcorder from CNET.com, the average user rating is 84 out of 100. Twenty-seven users are positive in their reviews while two users comment negatively about the camcorder.

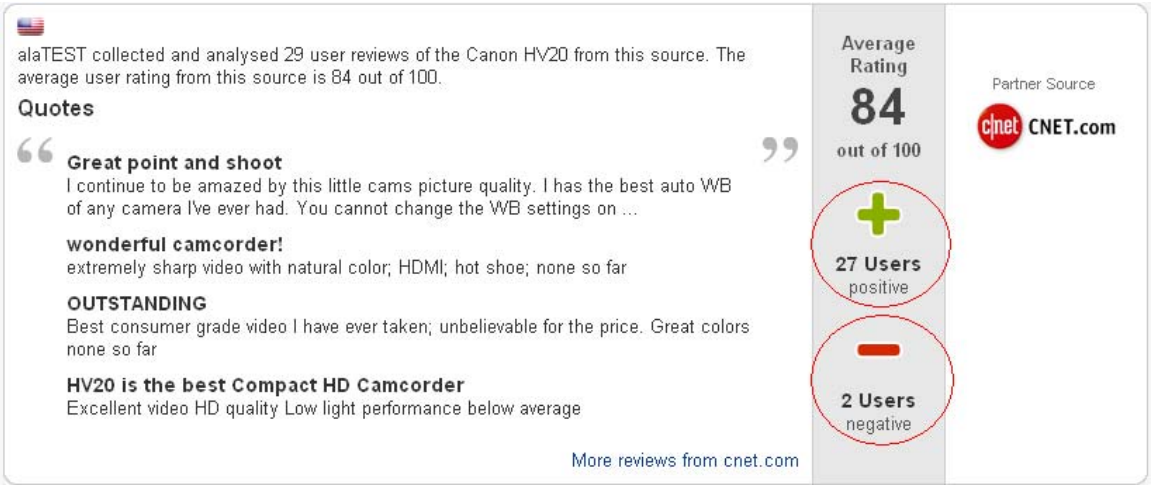

Figure 7-13: Screen shot of Sentiment Analysis on Canon HV20 Camcorder

RSS Feeds to Syndicate Product Reviews - alaTest offers the RSS feeds so that partner sites can obtain real-time product review summaries. If users of the partner sites want to read more about the product rating, they can click on the embedded link to visit the alaTest site. The RSS technology allows alaTest to distribute its product review analysis to as many destinations as possible and increases the awareness and adoption of its alaScore system.

7.3.3 Business Model

Figure 7-14 illustrates the business model of alaTest.com.

Revenue Source – alaTest relies on advertising as its revenue source. The site displays advertisements from Google AdSense as well as from online shopping comparison sites. When a user searches for reviews on a specific product, the result page shows the review summary along with related advertisements. The user can click on a vendor in the Google Ads snippet and if that click results in a sales transaction, alaTest will get its share of revenue from Google.

Another revenue stream comes from the partnership with online retailers. Since alaTest offers the price comparison service and includes links to online stores in the search result page, it can get additional revenue through the sales leads generated for the online retailers.

The third revenue source is manufacturer. Manufacturers want to know how and where their products are tested worldwide and the test results. alaTest can sell consolidated product review analysis to manufacturers. However, it is not clear from alaTest site whether it has already offered such services.

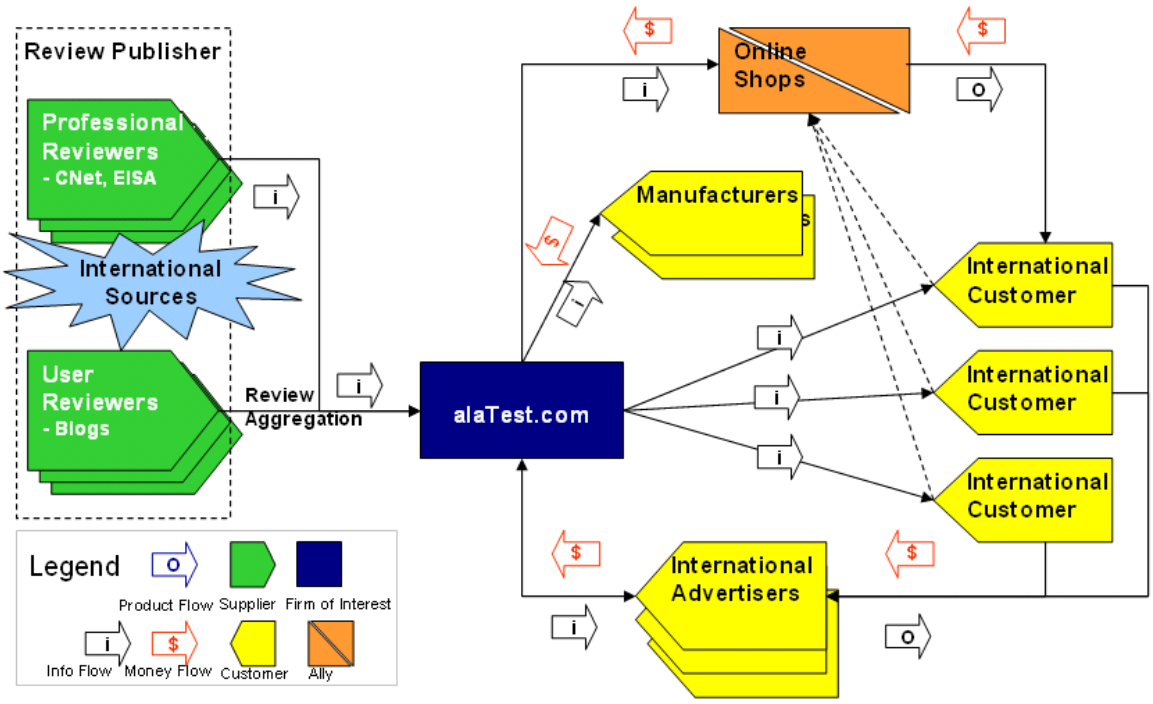

Figure 7-14: Business Model of alaTest

Relationship with Aggregatees – alaTest maintains formal partnerships with aggregatees. In fact, alaTest site dedicates a page to list all its 714 review sources (alaTest, 2007). User can also select a country and view all the review sources in that particular country. To enroll in the review source list, the review publisher can register with alaTest to publish its reviews. alaTest acknowledges the sources of all reviews it aggregates by including links to the review sources. Users can read the short summary of a review or click on the associated link to read the full text of the review.

alaTest's relationship with aggregatees belongs to the category of "Financially Independent with Partial Collaboration" (Madnick and Siegel, 2002). Under this relationship, aggregatees are well aware of the aggregation activity from alaTest and are willing to collaborate with alaTest in the aggregation process. Building a formal relationship with aggregatees can reduce information integration costs for aggregators. Since content ownership and intellectual property laws or regulations may vary from country to country, maintaining a formal partnership with aggregatees can steer aggregators away from unnecessary legal disputes.

Emphasis on customer relationship – alaTest's customers include consumers, advertisers, and manufacturers. Like Wize.com, alaTest strives to build and own a close relationship with consumers. To attract and retain end users, alaTest continues to crawl on the web and gather as many reviews as it can and provides high quality review rating and price comparison services. On the advertiser side, alaTest participates in the Google's AdSense program to tap into Google's extensive network of advertisers. From the manufacturer's perspective, alaTest provides the manufacturer the media scanning service.

Critical Success Factors – since alaTest already aggregates a large quantity of reviews from numerous international sources, the critical success factor will be how reliable and objective its post-aggregation analysis process is. Can users really depend on alaTest review summaries and alaScore rating to make better purchase decisions?

In addition, as new review aggregators emerge on the horizon, alaTest needs to be aware of its competitors and ensure that its proprietary ranking system stays comparable with the ratings of its competitors. The company also needs to continue differentiating its post-aggregation services so that users can keep coming back to its site for product research.

Summary

Table 7-3 summarizes the holistic analysis of alaTest. alaTest takes the review aggregation service to the international level. By gathering reviews from worldwide sources, alaTest provides users a global view of what people say about certain products. The site certainly provides a unique perspective to its users by tapping into the wisdom of the international crowds. Its aggregation service will be increasingly valuable as the trend of globalization continues.

Table 7-3: Holistic Analysis of alaTest

Questions	Explanation
Why (Needs)	* Find reviews from international sources (customers) * Read reviews in their own language (customers) * Large number of reviews (customers) * Reliable and objective review ratings (customers) * What people say about their products (manufacturers)
What (Information)	International review sources (professional reviews and consumer reviews)
How (Technology)	Post-aggregation Process * alaScore review rating algorithm * Review aging meter * RSS feed syndication
Who (Beneficiaries)	Shoppers, Bloggers, and Online retailers
How Much (Business Model)	* Advertising * Lead generation * Media scanning services to manufacturers

8 Conclusion

As the online word-of-mouth content continues to grow, there will be increasing needs for opinion aggregators to gather and analyze public opinions and offer insights to online users and merchants. In this research, the author applies the holistic framework to analyze the web aggregator and the opinion aggregator in general. A special type of opinion aggregator – product review aggregator is researched in detail to understand its market needs, enabling technologies, and business models. The author then samples a number of product review aggregators to gain an overall understanding of what product review aggregators look like, what customer needs they satisfy, and what services they offer. Case studies are conducted on three product review aggregators to explore their service features, technology innovations, and business models. The author finally concludes the thesis by summarizing general findings of this research from the perspective of aggregators, aggregatees, and customers. The challenges and issues faced by product review aggregators will be discussed in the end.

8.1 Aggregators

A product review aggregator satisfies online consumers' needs to gain quick insights from a vast amount of review content. Online retailers also benefit from such review aggregation service by retaining their current customers and attracting new ones. It is apparent that a product review aggregator creates values for online consumers and retailers. For the question of how an aggregator can capture some of those values created and sustain its business, the author has generalized the following findings from this research.

Most product review aggregators are start-up companies

Most review aggregators studied in this thesis are start-up companies and in the stage of accumulating aggregated review content and building up the audience base. These companies are fairly small in terms of size and revenue. Revenue data are not publicly available since these product review aggregators are privately held. As start-up companies, aggregators in a large degree depend on the investment funding to support their operations. For example, PowerReviews secured over 20 million dollars of investment funding (PowerReviews, 2007). Wize.com received roughly 4 million dollars of initial investment from venture capital firms (Wize, 2007).

It is still too early to observe that any product review aggregator has either succeeded or failed. The market analysis section of this thesis has clearly identified the needs and potential demands for such review aggregation service; however, it is unclear whether those potential demands can be translated into sustainable revenue streams and any of the product review aggregators will grow into a giant web entity like YouTube. Product review aggregators that provide online review solution as a service to aggregatees will likely to sustain over the long run as they have more stable service revenue coming from

online retailers. On the other side, review aggregators that solely depend on the advertising revenue will need to build up the aggregated review content and the user base quickly in order to attract sufficient adverting money.

Common elements of design are emerging

Although there is no single dominant design (like YouTube in the online video domain) in the review aggregation field, common design elements appear in many product review aggregators:

- Search interface - Every aggregator has a search interface by which a user can look for product reviews by a brand name or a product model name. Some aggregators also provide directory listings so that users can easily navigate through different product categories to find reviews specific to a product.

- Overall review rating - Almost every aggregator provides a summarized review sentiment rating in terms of either a numerical rating or a heat-map showing the distribution of review ratings.

- Separating expert reviews from users reviews - For aggregators which analyze both expert reviews and user reviews, in addition to an overall review rating, separate ratings of expert reviews and normal users are also displayed so to give users a clear idea of what experts think about a product versus what normal consumers feel about the product.

- Display original reviews - Most review aggregators display the first one or two lines of an original review with a link to the source.

- Include price comparison and links to online retailers - More and more review aggregators include other information such as price comparison, product manuals and online vendors in their web sites. Review aggregators are moving towards a comprehensive product research platform for consumers.

Common design elements are evolving as product review aggregators continue to improve their web designs. New design elements are emerging from time to time. Throughout this research, the author noticed dramatic web design improvements in quite a few sampled review aggregators.

One example is Retrevo, the vertical consumer electronic product search engine. When the author accessed the Retrevo site at the start of the research (e.g. September, 2007), the site looked very much like a product information portal that listed links to different product information such as manufacturer info, reviews & articles, and forums. The site did not summarize reviews and neither did it calculate an overall review rating. By definition, Retrevo was not a product review aggregator since it only gathered product reviews but did not analyze and process review information. However, Retrevo revamped its web design completely in two months. When the author revisited its web site at the

end of the research, the site added a product summary section that contains aggregated expert and user sentiment ratings, the price range, and a product price-feature matrix showing the relative positioning of a product in terms of its price and features. Some of the common elements described above such as the search interface and a summarized sentiment rating can be found in the updated Retrevo site.

Another example is Summize. The site innovated the way to display the overall review sentiment. Summize does not calculate a single numerical rating; instead, it shows the sentiment distribution through a heat-map. The site also has other innovative features such as the buzz tracking and recent Blog posts. As these features start attracting online users and prove to be useful, one can expect those features to become new common elements that may appear in other product review aggregators as well.

Need to aggregate a large number of reviews and from a wide variety of sources

The quality of the review aggregation service depends largely on the number of reviews aggregated. After all, it is a review aggregator. If it only gathers hundreds of reviews, users may not get a complete picture of what others think about certain products. Users benefit the most from its service if the aggregator collects a large amount of information. From the study in this thesis, a couple of review aggregators are able to reach the level of million reviews. Wize.com claims that it analyzes about 1.5 millions reviews (Wize, 2007). alaTest.com also aggregates more than 1.4 million reviews and the number is still growing (alaTest, 2007). Summize is the largest among the review aggregators found in this research. It gathers over 22 million reviews written by more than 3 million reviewers (Summize, 2007a).

Besides the number of reviews, the review sources are also critical to the quality of the review aggregation service. Instead of narrowly focusing on one type of reviews (either expert reviews or consumer reviews), aggregators should include various types of reviews and should gather reviews from a wide range of web sources. Aggregating product reviews from a wide range of sources can give users a broader view of opinions on specific products. alaTest aggregates both expert reviews and consumer reviews and search reviews from over 714 international sources. The more sources a review aggregator gathers information from, the closer the summarized review will represent the actual opinion of the crowds.

Become comprehensive product information aggregators

To make a purchase decision, online shoppers would need more than just product review information, they would want to compare prices and know which vendor provides the most reliable service. The implication for aggregators is that aggregating just product reviews may not be enough for customers, review aggregators should consider moving towards comprehensive product information aggregators by including pricing, features, product manuals and vendor information.

Although it is unclear at the moment what product review aggregators will eventually evolve into, if they just focus on the product review aggregation, the growth opportunities may be limited. It is believed that the review aggregation is a good way to start a business; however, to grow and sustain the growth, over the time review aggregators would need to add other value-add services as well.

Need to involve users - as the trend to the web 2.0 continues, review aggregators should also think about how to involve users and build virtual communities among them. Offering users ways to participate in the opinion exchanging process will attract more users to the review aggregators' sites. As the online community grows, aggregators will maintain a better and closer relationship with their users. When aggregators are on the way to become powerful information intermediaries, owning the relationship with users will give them a competitive advantage (Weill and Vitale, 2001).

8.2 Aggregatees

The emergence of product review aggregators has different implications to aggregatees and therefore causes different reactions from them. Some aggregatees consider aggregators a threat while other aggregatees collaborate with aggregators to compete with big players. As aggregators expand their service offerings by incorporating price and vendor information, some aggregatees move the opposite direction to include consumer reviews and become aggregators themselves.

The implications to various aggregatees are summarized below:

Large E-Commerce sites

To large E-Commerce sties such as Amazon, product review aggregators pose a serious threat since product review aggregators can take consumer traffic away from them and potentially guide customers to their competitors.

For Amazon.com, book buyers are attracted to its site in a large degree by its online book reviews. In a research done to study the effect of consume reviews on online sales at Amazon.com and BarnesandNobel.com, two professors from Yale's management school found that Amazon.com provides better services for it hosts longer reviews and has larger review coverage (Chevalier and Mayzlin, 2006). Chevalier and Mayzlin also discovered that an improvement in a book's reviews on one site could increase the relative sales at that site.

As product review aggregators gather more and a broad range of reviews, they would reduce the attractiveness of reviews provided by one E-Commerce site. Amazon's competitive advantage over book reviews could be weakened. Customers can potentially go to a review aggregator site to read all the reviews and then select an E-Commerce site to go based on the price and the service offered. The reduced attractiveness of product reviews can potentially lead to reduced relative sales for E-Commerce sites.

Large E-Commerce sites can counter the attack from product review aggregators through continuous service innovations. For example, Amazon.com goes beyond text reviews and adds an online video review service that allows consumers to record a video clip talking about the products.

Small to medium online retailers and traditional retailers

Both small to medium online retailers and traditional retailers (as they move to the web front) realize the importance of having product reviews in their sites. However, either because they lack of technical capabilities or because they are not large enough to attract enough product reviews, those retailers need ways to improve their review capabilities.

Some online retailers use aggregators' hosted review services so that they can access much broader product reviews. Aggregators also help level the playing field for smaller retailers to compete with big ones such as Amazon.com by referring customers to those retailer sites. Under this strategy, aggregatees maintain formal partnerships with product review aggregators. Aggregators can benefit from such partnerships by securing review sources and earning stable revenues from either the hosted review services or the sales referral service.

Other retailers choose the syndication strategy. These retailers also use the hosted product review solution offered by some application service providers. However, those application service providers do not aggregate reviews from all their clients to a central portal site. Instead, those service providers have syndication networks and can distribute reviews to popular search sites. Customers can be directed back to the online retailers when they conduct product search on Google Product or Yahoo Shopping sites and read syndicated product reviews from the retailers.

Review hosting sites

To online review hosting sites, product review aggregators are competitors since they all try to attract consumers to read reviews. Different from review aggregators, online hosting sites do not gather reviews from other sources; instead, they invite users to write reviews at their sites.

The biggest challenge for review hosting sites is to attract people to write reviews. This is especially true for consumer review sites since professional review sites such as CNET.com hire experts to conduct tests and write evaluation reports. Some consumer review sites offer incentives to encourage customers to contribute reviews. Epinion.com, for example, pays reviewers to provide product feedbacks. Attracting consumers to write reviews is more difficult than gathering reviews already existed. It will cost time and money for hosting sites to sign up enough reviewers and accumulate enough content. Searching iPhone in Epinions.com returns only 22 reviews while the same search at Wize.com returns over 1000 reviews.

The professional review hosting sites may have a better chance to either compete or co-exist with online review aggregators because of the unique review service they offer. Some of the professional review sites such as CNET.com include user opinions as well. They can potentially collect user opinions from external sources and become aggregators themselves.

8.3 Customers

A product review aggregator clearly benefits its customers by facilitating their product research process. Customers can have one place to go to read relevant reviews, get an understanding of overall sentiment about specific products, and compare review ratings of similar products. With the price and vendor information presented by aggregators, customers can also check different prices and choose an online retailer to purchase products. The product review aggregator certainly reduces customers' search cost in terms of time and efforts to find a product with the best fit (Bakos, 1997).

However, customers should be aware of the quality of the review aggregation service. Every aggregator applies a different method to process reviews and calculate review ratings. Review ratings can vary significantly from one aggregator to another aggregator. In addition, the review rating may not even be a good indicator of the product quality. An empirical study done to understand the product review distribution on Amazon.com shows that the 53% of products have a bimodal and non-normal review distribution (Hu et al, 2006). Hu et al point out that review ratings of those products can actually mislead consumers. Therefore, instead of simply relying on a single rating, customers may want to read a number of reviews to get a sense of the overall sentiment. Summize' way of showing the distribution of product reviews gives customers a better picture of aggregated reviews.

Another point worth mentioning is that most review aggregators provide the one-size-fits-all service to mass customers and do not address specific customers' needs. A general review rating may reveal a high satisfaction level from one customer segment, but that review rating may not be helpful to customers from other segments. Aggregators should go beyond the product-centric general approach and think about providing needs-centric services to target specific consumers (Lee, 2007). Lee suggests that aggregators should uncover customers' interests and needs first and then rank products based on the relevance of reviews written by users of similar interests. Customers can get better and more relevant services from the needs-centric aggregation approach.

8.4 Challenges and Issues

To provide reliable and quality review services, product review aggregators face a few challenges:

Quality of Review Sources

Aggregators need to ensure that product reviews come from quality and trustable sources. Although there are abundant product reviews on the web, not all product review sources offer equal quality product reviews. It may be easier to identify high quality professional review sites such as CNet.com than consumer review sites. Some product review sites provide financial incentives to users to write product reviews. Certain users that are attracted by money may game the system and leave bogus product reviews. Other product review sites may be affiliated with product manufacturers or specific online retailers; therefore, the product review content hosted on those sites may not be objective. The product review aggregator really needs to identify and root out un-trustable product review sites and ensure that the product review content collected are as objective as possible. Most review aggregators strive to maintain independent status from specific product manufacturers or online retailers. Some product review aggregators such as Wize.com even have dedicated teams to audit and verify product review sources and make sure that those sites provide objective product reviews.

Variety and Complexity of Product Review Data

After trustable sources are identified, aggregators would need to analyze and process product reviews to filter out irrelevant or duplicate content, consolidate product reviews of various formats, and conduct the statistical processing on the review content. The normalization of product review data is a big challenge for aggregators. One example is product review rating. Review ratings come with different scales. The aggregator needs to convert the rating data to a common scale so that those ratings can be comparable to each other. However, different scale levels are only a small and probably the easiest part of the problem. Aggregators also need to consider other factors such as the number of reviews, the level of sentiment (e.g. very negative vs. overly positive) presented in the reviews, types of reviewers (e.g. professional reviewer vs. consumer reviewer), and polarities of reviews (e.g. evenly distributed vs. opinions are clustered around two ends). Most aggregators apply their proprietary algorithms to process product reviews. There is no standard method or algorithm of analyzing or mining product reviews. With the data mining and text mining technologies become mature, one can expect that some standards around product review mining algorithms may emerge.

Is the Summarized Review Rating Useful for Comparing Products?

Most review aggregators compute a summarized product review rating. A single aggregated review rating may be convenient for users to quickly make the sense out of people's comments and to compare ratings of different products. However, solely relying on this one number can be misleading in many situations. Users certainly need a better way to distinguish a polarized review distribution and a true medium review rating. Some review aggregators start using a different approach. Summize.com, for example, does not calculate a single review rating; instead, it uses an innovative heat map to display the review distribution. Other review aggregators such as Wize.com take into the consideration of polarized reviews in the calculation of the final rating.

One may argue that professional reviewers who run tests on different products in the same product category can provide relevant comments to help users compare products. However, the review ratings may be less comparable for consumer reviews. As each product targets different customer segment, each product then has a different group of consumers writing reviews for it. The two different customer segments can both be very happy with their products and thus the review ratings of two different products can be very close to each other. However, one product may be targeting high-end users and the other product may be designed for amateur users. The quality and price of two products will then vary significantly. One easy mistake to make is for users to read the summarized consumer review rating and think the qualities of two products are comparable.

To make product review ratings meaningful, aggregators should also provide the product context information for the review rating. Other information such as price range, feature set, and targeted customer segments should also be provided along with the review rating to give users a complete picture of where the product is positioned. Consumer electronics review aggregator, Retrevo, designs a matrix to show where the product is at in term of features and prices. Users can find products with similar features and price mix and compare their reviews.

How to Make Review Summaries Relevant to Users

Another challenge is to make product review service relevant to users. Most of the review aggregators provide product-centric and one-size-fits-all services and do not consider consumers' specific interests and needs (Lee, 2007). Aggregators gather and analyze all relevant reviews on a specific product and then present the same product review summary to all users.

However, not all the reviews on a product are relevant to a user. Different users may use the same product for different purposes and therefore the reviews are relevant only under an intended purpose. For example, some users use a digital camera mostly for family use while other users may use it primarily as a hobby. The expectation and satisfaction on the same camera can be very different, and so do the reviews. Users would be more interested in product reviews written by people with similar interests and use the product for similar purposes. Buzzillions.com tries to match product reviews with users' interests. It helps users find reviews that are more relevant.

As more aggregators start building user communities and capturing user interests or behavioral data, they would be able to offer more targeted product review services to users.

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