JOURNAL OF SMALL BUSINESS STRATEGY

THE IMPACT OF SHOPPING AGENTS ON SMALL BUSINESS E-COMMERCE STRATEGY

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ABSTRACT

As the amount of information available to online consumers has grown, so has the need for tools to help consumers organize that information meaningfully to help them make better decisions. One outcome of the online information explosion is the growing popularity of computer-based intelligent shopping agents. A shopping agent is a computer-based program that facilitates decisions on behalf of the consumer. This paper provides small business owners with an introduction to intelligent shopping agents, presents examples of how these agents help consumers at various stages of the decision-making process, discusses the issues that small businesses need to address regarding agents, and offers recommendations for small businesses' agent usage.

INTRODUCTION

The 1990s have seen tremendous growth in the usage of the Internet. One of the most exciting areas of growth – one that could dramatically affect the very survival of many small businesses – is e-commerce. Some experts forecast worldwide e-commerce spending to hit $1 trillion in 2002 (Pastore, 2002) and business-to-business trade over the Internet to hit an astounding $2.4 trillion by 2004 (CyberAtlas, 2002). Despite a growing amount of research in this area, there is not yet a clear understanding of how e-commerce will change consumer shopping behavior, and how small businesses will have to adapt to succeed in this modified environment.

As compared to shopping in a traditional brick and mortar setting, online shopping has some unique advantages and disadvantages. One of the most prominent disadvantages to consumers shopping on the Internet is that they cannot see or feel the product or interact face-to-face with a salesperson. On the other hand, consumers get instant, round-the-clock access to a large number of retailers spread throughout the country (or even worldwide). As these e-tailers do not face the physical constraint of limited shelf space, they often carry a very comprehensive product assortment. For example, a virtual store like Amazon.com carries far

more books than any traditional book retailer. Not only is the variety of *products* available large, *information* available on these products also is voluminous on the web (Alba et al., 1997).

Online shoppers have at their disposal, a large volume of information about products and features at the touch of a button. Instead of driving to a few neighborhood stores and comparing prices and features of a limited number of alternatives, consumers can now simply sit at a computer and search through the vast Internet information repositories and find the best deal on the best product given their needs. Such a search could potentially cover dozens of stores and hundreds of alternatives available at these stores. Special software programs, called electronic shopping agents or shopbots, are revolutionizing the way people shop. Shopping agents help customers make sense of the vast amount of product-related data available on the Internet. These electronic agents can sift through and organize information to help consumers make better purchase-related decisions while shopping online. This paper examines how consumer shopping behavior is changing because of shopping agents and what small businesses need to know and do to survive in a market populated by such agents.

While several researchers have examined the overall impact of the Internet on strategy, the role of shopping agents in small business strategy needs further examination (see Choudhury and Galletta, (1998) for an analysis of the impact of e-commerce on small business strategy). The rest of the paper is organized as follows. First, an overview of shopping agents for small business owners is presented. Then, the agents' likely impact on online consumer behavior and how small businesses should evolve to adapt to these agents, is explored. Next, issues that small businesses need to address pertaining to shopping agents are discussed. Deriving from this discussion, a set of implications and recommendations for small businesses wanting to make the most of this growing technology is presented. It may be noted here that this paper focuses on strategic implications of shopping agents for small businesses and does not go into the technical aspect of agent installation and programming. Technical discussions can be found in Dasgupta, Narsimhan, Moser, and Melliar-Smith (1999), Hauptmann (1999), and Ciancarini, Tolksdorf, Vitali, Rossi, and Knoche (1998).

SHOPPING AGENTS

The first task for a small business owner is to understand what shopping agents are, what they can do for small businesses, and what benefits they can potentially provide to their customers. Shopping agents help customers make sense of product-related data available on the Internet. Online availability of large amounts of product-related data is both a boon and a curse to consumers. It is nice to have access to all the data before making a purchase decision, but at the same time, it requires consumers to spend a significant amount of time and cognitive effort to convert that data into usable information. Consumers first have to sift through the data to separate the relevant from the irrelevant, and then compare information about competing alternatives on various dimensions, and finally pick an alternative that meets budgetary and other constraints. This entire process could be fairly cognitive-intensive and may lead to what is commonly called an "information overload" for the consumers (Malhotra, 1982).

In the traditional or "non-virtual" world, consumers who were short on time or felt they lacked the expertise to process data efficiently, had an easy way out – they could delegate their shopping decision to surrogates (Aggarwal, 1998). For example, a buyer could ask a travel agent to search the available flights and purchase tickets for the best flight based on certain broad criteria supplied by him/her. Similarly, instead of spending considerable time in gaining expertise, one could seek expert recommendations from a stockbroker for investment choices and an interior designer for furnishing choices. Thus, in the traditional world, one

could "delegate" or "subcontract" a difficult, information intensive decision to an expert, a "surrogate buyer" (Hollander & Rassuli, 1999; Rosen & Olshavsky, 1987).

In an online world, however, consumers normally do not have access to such surrogate buyers. Less than five years ago, consumers used to be largely on their own when it came to finding, organizing, understanding, and utilizing information available on the net. Rapid and path-breaking changes have taken place in the virtual world of e-commerce since then. We have since seen an amazing emergence of digital agents that perform essentially the same functions as human surrogate buyers. Called "intelligent shopping agents" (ISA), these agents help consumers sort through the large amount of available data and reach an optimal purchase decision. According to Bergen, Dutta, and Walker (1992), an agent is someone who undertakes an action on behalf of a principal. One important difference between traditional agents and computer-based ISAs is that the latter do not generally accept much legal or fiduciary responsibility to the consumer. They (or their makers) are not subject to the law of agency. We define an intelligent shopping agent as a computer-based program that facilitates decisions on behalf of the consumer. This definition is broader than the one used by Maes (1999) who defined agents purely in terms of their ability to build profiles of consumers. While Maes defines agents primarily in terms of their ability to help businesses build information on consumers, we define shopping agents from a consumers' perspective. Thus, shopping agents are defined here primarily in terms of their role in helping consumers make product choices. Consistent with Hollander and Rassuli (1999), we define the following features of a shopping agent:

- It is a computer-based program.
- It is expected to assist consumers in making choices or recommendations based on information gleaned from a variety of potential sources, and based on some consumer-defined criteria. At the very minimum, it rank orders or sorts available alternatives on some key criteria. Thus, computer programs that scour a database and present information in a format that facilitates better decision-making can be considered agents. With this definition, even a search engine that gathers information from a variety of sources and presents an ordered list to the customer is a simple agent. This paper focuses on agents that assist consumers in shopping for goods and services.
- Explicitly or implicitly, the shopping agent acts on behalf of the consumer and that the consumer's (rather than seller's) welfare is its primary responsibility.

Table 1 includes a listing of some key shopping agent sites. Why are shopping agents becoming popular? Why should small-business owners care about shopping agents? What benefits can shopping agents provide to customers of small businesses? In order to answer these questions, let us first examine the benefits that consumers can derive by using shopping agents. Shopping agents can offer consumers a variety of benefits. These benefits can be classified as individual and social (see figure 1). Individual benefits include *physical* information management and *psychological* burden shifting. Social benefits include better market policing and a more competitive marketplace.

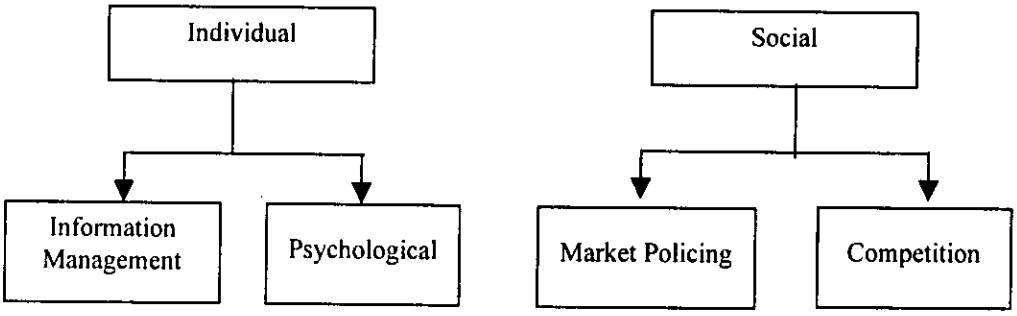
Individual Benefits

Information Management. One of the primary benefits to the user of an intelligent shopping agent is the management of information overload (Owen & Haugtvedt, 1993). While the Internet gives desktop access to a vast marketplace with widely dispersed vendors offering an incredible variety of products and product-related data, it is up to software front-ends to

Table 1: A Summary Listing of Key Shopping Agents

Shopping Agent	URL
Active Buyer's Guide	http://www.activebuyersguide.com/
Amazon Recommendation Services	http://www.amazon.com/recommendationservices/
BestBookBuys	http://www.bestbookbuys.com/
BizRate	http://www.bizrate.com/
BotSpot Shopping Agent List	http://www.botspot.com/search/s-shop.htm
BottomDollar	http://www.bottomdollar.com/
CDNow AlbumAdvisor	http://www.cdnow.com/albumadvisor/
CNet Shopper	http://shopper.cnet.com/
DealTime	http://www.dealtime.com/
eGain	http://www.egain.com/
MovieLens	http://movielens.umn.edu/
MySimon	http://www.mysimon.com/
NativeMinds	http://www.nativeminds.com/
Price.Com	http://www.price.com/
PriceGrabber	http://www.pricegrabber.com/
PriceWatch	http://www.pricewatch.com/

Figure 1: Shopping Agent Benefits



organize that data into meaningful information that consumers can use to their benefit. When consumers face a volume of information that they cannot handle, they may make sub-optimal purchase decisions despite having access to the information that can improve the quality of their decision-making. An interesting study by Häubl and Trifts (2000) demonstrated that computer-based agents could potentially have immense positive effects on consumer decision-making. Subjects using a computer-based decision aid that organized information on products meaningfully made *better* decisions despite expending *less* effort in the decision process as compared to subjects who had access to the same information without the computer-based agents.

It is important to note here that unlike some other tools that provide a disproportionate advantage to large firms (because of the ability of these firms to spend large sums of money on such tools), the use of shopping agents as information management tool benefits small and large firms equally. As Choudhury and Galletta (1998) point out, the Internet has the ability to level the playing field between large and small businesses. Small businesses can now make available information related to their offerings on the Internet, and shopping agents will

process and compile that information along with that provided by larger competitors in their overall recommendations without discriminating against small businesses. This has the potential of lowering the barriers to entry for small businesses that wish to compete in industries dominated by a few big players.

Psychological Burden-Shifting. Another possible benefit of ISAs is psychological burden shifting. When consumers are uncertain about a product category, they can shift some of the psychological cost of making a *bad* decision by using a shopping agent. If the decision turns out to be sub-optimal, the shopping agent can be "blamed," thereby minimizing the psychological risk in the purchase decision. After the decision is made, cognitive dissonance may also be reduced because the burden of the decision has been shifted to an external entity. The positive effects of the reduced psychological risk may even result in consumers returning to ISAs despite the cost of past sub-optimal decisions. In other terms, the benefits of decision efficiency may outweigh the costs of decision sub-optimality. Another factor that may encourage users to return to ISAs is that it is often difficult to evaluate the "diligence" of the shopping agent in reaching an optimal recommendation. That is, consumers may not even be aware when the recommendation or product list ordering of the shopping agent was sub-optimal. In fact, recent research suggests that irrespective of the objective recommendation quality, consumers may perceive shopping agents to make high quality decisions for certain goods (Aggarwal & Vaidyanathan, 2000). Again, small businesses stand to benefit, as they are more likely to have lower brand recognition and be a more risky purchase proposition for the buyer. Even when buyers are not familiar with a small firm's brand, they may buy it based on a shopping agent's recommendation.

Social Benefits

Market Policing. The use of intelligent agents can also be beneficial to society at large. The online world is notorious for being filled with misinformation and scam artists. Shopping agents may be able to guide online shoppers away from such misinformation. Certain ISAs keep archival data on activities of sellers and buyers trading online. Consumers who are contemplating doing business with them can then access such data. This way, ISAs can help keep market fraud to a minimum. This benefit also works to the advantage of small businesses. Often, because of the misdeeds of a few dishonest firms, many buyers tend to classify all small businesses as unreliable or untrustworthy. As small businesses do not have large promotional budgets that could help create a positive corporate image in the mind of consumers, people tend to be suspicious of small, relatively unknown businesses. ISAs can provide objective, third party assurance to buyers about the genuineness of such businesses and their track record in satisfying past customers. Thus, ISAs can give small businesses a fighting chance by creating an environment of trust and cooperation. One price comparison agent that aggregates customer feedback to generate merchant ratings is BizRate.com (Vigoroso, 2002)

Competitive Marketplace. By making cross-competitor comparative analyses easy for consumers, agents can increase the level of competition to the extent that it depends on asymmetry of information. Consumers can thereby evaluate competitive offers on more tangible, objective criteria. Also, the monopoly power of larger players will get significantly reduced as consumers get access to the expertise of ISAs, thereby leveling the field for small businesses.

In the next section, a framework for understanding the role of shopping agents in the consumer shopping experience is developed. An understanding of how shopping agents facilitate consumer purchasing can help small businesses decide what types of agents are best

suited for their businesses and how they can leverage the power of ISAs to compete against the bigger players in their industry.

TYPES AND ROLE OF SHOPPING AGENTS

For a vast amount of consumer behavior research, the decision-making process has proven to be a convenient framework. One can classify shopping agents by the stages in the consumer decision-making process in which they assist. This approach is similar to that taken by Maes, Guttman, and Moukas (1999), in a similar context. The consumer decision process consists of six stages. According to Engel, Blackwell, and Miniard (1995), the stages are as follows:

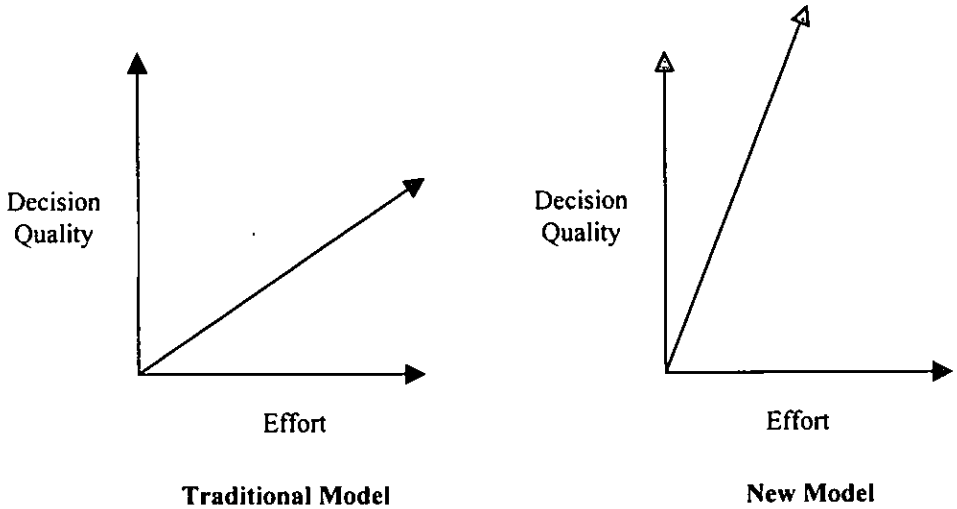
Need Recognition →	Information Search →	Alternative Evaluation →	Purchase →	Consumption →	Outcome Evaluation

While Maes (1999) argues that only the first four of these stages are the domain of agents, it is our belief that ISAs can play a role in all six stages. Discussed below are each of these stages, the type of ISAs that affect these stages, and how their involvement changes the decision structure.

Need Recognition: This is the first stage in the consumer decision process and occurs when the consumer recognizes a discrepancy between his or her desired state and current state. There are several sources of need recognition. A need could be aroused by external factors (such as an advertisement) or internal factors (such as a commitment to physical fitness). ISA's can play a role in this stage. The giant Internet bookseller Amazon.com uses a variety of ISAs on its web site. One such ISA – Amazon's "Notification Agent" can effectively trigger need recognition among consumers. After consumers provide the notification agent with their interests, it can inform them when something of interest to them becomes available. For example, if a consumer tells Amazon that she is a fan of Robin Cook's medical thrillers, the agent can automatically send her a message every time a new Robin Cook book is published. The notification agent may also drive her to action by offering her an advance order discount. Amazon also uses agents to offer its customers "bundles" at a reduced price in order to increase order size. Assuming that someone interested in a Robin Cook Thriller may also be interested in a DVD of the last movie based on his book, Amazon may offer a reduced-price bundle of the book and the movie to try and induce need recognition in the site visitor. Small businesses can use ISAs very effectively at this stage. They can use shopping agents to keep their current customers abreast of new product developments that could increase customer loyalty and retention. Small businesses in the MRO (maintenance, repair, and overhaul) industry could program their agents to send automatic notices to clients that need to place orders to replenish their depleting inventories.

Information Search: At this stage, the consumer, having recognized a need, searches for information on the alternatives available to satisfy that need. The use of ISAs is well established for this and the subsequent stage, alternative evaluation. Web sites that are, in effect, nothing but shopping agents are now becoming popular. For example, MySimon.com helps consumers with information search by claiming to be the "one-stop-shop" for all online purchases. It offers consumers the opportunity to search through a number of retailers in a number of shopping categories and even offers suggestions for gifts within each category. In the traditional (off-line) model, there exists a positive relationship between information search (costs) and the quality of decision (benefit). Thus, one had to expend more time and effort to

improve the quality of a purchase decision. However, with the advent of ISAs, this relationship has been significantly modified. Now, consumers can improve the quality of their decision *without* increasing their effort input (see figure 2). ISAs can assist consumers in their information search by searching and organizing data on products as well as vendors. This is referred to as product brokering and merchant brokering, respectively, and is discussed in the next section.



Alternative Evaluation: In order to evaluate competing alternatives, consumers need two things. First, they need to *establish criteria* on the basis of which they would compare alternatives. Second, they need to *apply* these criteria to evaluate available alternatives. In addition to ranking product alternatives, consumers may wish to rank merchants vending those products too. ISAs can help consumers in both domains. Ideally, they would help consumers decide on the most appropriate decision rules (criteria) to evaluate and pick among the alternatives. Some ISAs such as MySimon and ComputerShopper do offer selection guides (e.g., "How do you select a camcorder that's right for you?"), but these tend to be simple text documents rather than interactive agents. ComputerShopper also allows the user to search through its database of products and sellers either by manufacturer or by price range. In effect, it allows the consumer some (but limited) flexibility in defining the criteria that will be used to evaluate the alternatives. One very interesting example of an intelligent shopping agent that gets fairly detailed guidelines from buyers and then presents them with the best alternatives for their needs is the Active Buyer's Guide (http://www.activebuyersguide.com/) that assesses buyers' preferences on several dimensions and then tries to evaluate their hidden trade-offs before presenting them with recommendations.

However, most ISAs available for consumer use today are better at *applying* a decision rule determined by the shopper, to the collection of options gathered during the information search. Häubl and Trifts (2000) examined the impact of some computer-based decision aids that allowed consumers to view product information in various organized ways and found that with a lower amount of effort, consumers were able to make higher quality decisions. ISAs can help consumers choose a product (product brokering) as well as merchants (merchant brokering) to buy that product from.

Product brokering refers to the ability of the agent to assist consumers in selecting from the different product options that may satisfy a need. Many shopping sites offer agents that

perform product-brokering functions. For example, a very simple product-brokering agent at GreatFood.com allows consumers to specify a price range and then displays a list of gift products that fall within that price range. This is a single-decision-rule product-brokering agent. More advanced agents allow consumers to define several criteria which the agent then tries to simultaneously optimize in its recommendation. An interesting example of product brokering is CDNow's "Album Advisor" agent (http://www.cdnow.com/albumadvisor/). Using its vast database of consumer purchases and preferences, it recommends music that one may like based on what it knows about that person's general tastes and preferences.

Merchant brokering refers to the ability of the agent to assist consumers in selecting the best merchant from whom to buy a given product. One of the earliest merchant brokering ISAs was Anderson Consulting's experimental "BargainFinder" agent, which is no longer available. In this early shopping agent, one could enter an artist and CD title and it would automatically query several online music retailers and give the lowest price on the album. Interestingly, some retailers found this "price-shopping agent" to be undesirable and blocked access to the agent, not wanting to compete on price alone. On the other hand, several other retailers contacted Anderson Consulting expressing a desire to be included in the agent's search routine. The problem with BargainFinder was that it restricted consumers' evaluative criterion simply to price. Consumers interested in making a purely price-based decision found the BargainFinder agent to be extremely useful while some merchants fretted about the loss of their ability to compete on factors other than price (Moukas, Zacharia, Guttman, & Maes, 2000). If this were the future of shopping agents, merchants worried that all their products would become commodities and only the largest of online retailers, with the greatest buying power, would survive. Because a multitude of factors drive purchases, considering a variety of criteria is believed to be essential for the long-term survival of shopping agents (Vigoroso, 2002). However, the current focus on price is not necessarily bad for small businesses. Many small businesses enjoy very low overheads and enjoy cost-based competitive advantage. Such small businesses stand to benefit from pure price-comparison agents.

Today, several sites offer merchant brokering agents. MySimon.com is a merchant-brokering agent. Some merchant-brokering agents simply offer the convenience of finding the lowest price for an item from among the vast Internet marketplace while others also offer a single shopping cart and the ability to pay once for merchandise from a diversified base of retailers (e.g., Yahoo! Shopping at http://shopping.yahoo.com/). For computer hardware, PriceWatch (http://www.pricewatch.com/) is an example of a price search agent that provides information on the lowest priced sources by product category or brand. One disadvantage is its inability to easily combine brand, model, and product criteria in a single search. Other popular merchant brokering agents include PriceGrabber.com and BestBookBuys.com, the latter even factoring in shipping cost to recommend the source with the lowest overall cost. One important key to the future development of these agents is the trust they can engender among users that they truly represent the buyer and not the seller (Hansell, 1999).

Purchase: This is the stage at which the consumer actually makes the purchase decision. Agents that guide consumers through the process of placing items in electronic shopping carts, check out, and pay via credit card, can be considered to assist in this stage. The Yahoo! Shopping agent is an example of how an intelligent agent can offer consumers a single "check-out counter" for consumers shopping at a variety of Internet retailers. It is conceivable that in the future, computer-based ISAs negotiating and purchasing products on behalf of consumers will dominate virtual marketplaces. One experiment at creating an agent-negotiated marketplace is MarketMaker at MIT's media laboratory (http://ecommerce.media.mit.edu/maker/maker.htm). Here, buyers and sellers create agents that are let loose in the marketplace to negotiate on behalf of the client (either buyer or seller) to get the best deal possible. The buyer or seller simply creates an "agent profile" that

provides guidelines for a negotiation strategy and then lets the agent negotiate with other sellers' agents to find a good deal (Maes, Guttman, & Moukas, 1999).

Consumption: Even though this part of the process is primarily in the consumer domain, intelligent agents can play an important role in facilitating the consumption process. Consumers can be helped with product assembly, appropriate usage, and post-consumption disposal. For example, a site vending ethnic foods (such as ethnicgrocer.com) provides various exotic recipes and then provides the visitor with a list of ingredients that they can buy from that site to prepare that dish. Companies such as NativeMinds (http://www.nativeminds.com/) and eGain (http://www.egain.com/) offer virtual representatives that are intelligent agents that can handle customer service questions (Zhivago, 2001). Small businesses can employ similar smart agents to service common customer requests without having to commit to a large customer service staff. An agent can handle most routine service requests whereas the customer service staff can focus on the more unique or complicated service requests.

Outcome Evaluation: Finally, having purchased and consumed the product, consumers determine their satisfaction or dissatisfaction with the purchase. As with alternative evaluation, satisfaction with a purchase could be product-related or vendor-related. Outcome evaluation can also be influenced by ISAs. In the product domain, many online vendors are now making available feedback from current users to help prospective customers. Intelligent agents can sift through this information and incorporate it in their decision-making. As mentioned earlier, many shopping agent providers such as BizRate.com and Price.com are beefing up content, especially in the area of merchant ratings, to complement their price data (Vigoroso, 2002). In the vendor domain, again, the MIT media laboratory is experimenting with "seller reputation systems" that take feedback provided by buyers to create an online reputation profile of the seller. Future buyers can use this information to determine whether they (or their agents) want to deal with a given seller or not (Maes, Guttman, and Moukas, 1999). At the online auction site eBay, both buyers and sellers can look at feedback profiles to determine whom they want to do business with. These feedback profiles are based on actual comments left by satisfied and dissatisfied parties to the transactions. These types of agents can help small businesses in a significant manner. Many small businesses suffer from lack of recognition or trust. Instead of basing their decision on any objective criteria, customers may avoid small businesses simply because of lack of familiarity. Agents that compare customer feedback and seller reputation based on past transactions can overcome this hurdle for small businesses by providing a more objective assessment of their standing vis-à-vis their larger competitors.

Although there are a variety of ISAs that assist consumers in each of these stages (for one listing of shopping agents on the Internet, check out the collection of links at the "Bot Spot" at http://www.botspot.com/search/s-shop.htm), it should be remembered that many, if not most, ISAs assist consumers in more than one of these stages in the decision process. The ideal shopping agent would ask the consumer a series of questions *once* to develop a detailed profile of that consumer. Then, it would use that information to generate ideas, recommend products and merchants, negotiate a price, and update its database on the transaction. Such an agent is not too far in the future.

ISSUES BEFORE SMALL BUSINESS OWNERS

At the very least, it is important for small business owners to realize that issues such as the growth of ISAs is a strategic business issue and not a technical issue to be left to the IT department or a web site developer (Fingar, 1998). The power of the Internet to reduce or eliminate market information imperfections that bigger companies have used to their

advantage has been cited as a reason why such businesses are, in general, hesitant to embrace the electronic marketplace (Alba et al., 1997; Lynch & Ariely, 2000). However, strategically, small businesses considering transactions in an electronic marketplace need to consider the benefits offered by such an environment. Unlike a traditional store setting, the virtual marketplace allows small businesses to customize the entire shopping environment, with the help of shopping agents, to the particular needs of each individual customer (West, et al., 1999). With regard to ISAs, there are two broad issues that small businesses need to be concerned with. The first is whether to provide shopping agent technologies on their web site. The second, and strategically more important issue is whether to allow web-based ISAs to scan their database for information to be provided to consumers using such agent.

Should Small Businesses Have an Agent on Their Sites?

In-store agents have the goal of helping site visitors identify a product that meets their needs more efficiently. Thus, in most cases, it would not hurt to have a shopping agent that helps customers shop more easily. Instead of worrying about *if* one should have an agent on his/her site, small business owners should be pondering on *what type* of agent would be most beneficial to their customers. Various capabilities of currently available computer-based ISAs were discussed above. This will allow for more informed decision-making on what types of ISAs to provide on a site to make life easier for customers. Presumably, small businesses would be more interested in product brokering agents and other agents that do not compromise their business by leading their customers to other sellers. On the other hand, some online sellers actually use price-based agent searches on their site as a demonstration of their price-based competitive advantage. For example, on locating an item on the site, Half.com actually performs a real-time price search and displays competitive market prices for the product found by the consumer. This search highlights the price advantage held by Half.com on its product listings. The purpose of on-site agents would simply be to help consumers make the best decision possible. It would be extremely beneficial to first assess the steps that consumers typically undertake to make a purchase in a relevant product category, and then design an agent to help at various stages of this process. This will help build a more loyal and satisfied customer base that will return for repeat business thereby ensuring the long-term viability of the business. By providing continuously updated, detailed information on customers, agents can help small businesses better serve customer needs. Agents can be used to identify cross-selling opportunities. For example, the finding that customers purchasing a wok at a kitchenware site also tend to purchase flatware can lead to a highlighted link to flatware for all future consumers shopping for a wok. Today, Amazon uses its information on consumer site behavior to encourage site visitors to increase the size of their purchase. A consumer looking up information on a new Eric Clapton CD on the site is immediately given the option of purchasing the new album *along with* his previous album for a discounted price. Amazon's agents even directs the visitor to its other "Zshop" sellers who may have related items of interest (Taylor, 1999). Many sellers have also found that agents allow a degree of interactivity that almost replicates the functions of a knowledgeable salesperson (Internet Retailer, 1999). In that sense, ISAs could serve as virtual sales representatives that work 24/7 to assist site visitors make better purchase decisions.

Should Small Businesses Let Shopping Agents Access Their Sites?

The second, and more difficult question to answer is whether to let independent ISAs browse your site for information that is then returned to potential customers. As mentioned earlier, one of the first ISAs for price comparison on the Internet was BargainFinder. On finding that users of this agent could, with the click of a single button, find out who had the best price on the Internet, many online retailers started blocking access to the agent. BargainFinder simply evaluated merchants on the basis of price and ignored all the other features that online music

retailers had built into their sites. Understandably, many retailers did not want to compete simply on price. Today, a new type of agent is popular on the Internet. Agents like Jango are created so that each product information request originates not from the agent's server, but instead from the consumer's browser. For a merchant, the request for information sent by a consumer using Jango would be indistinguishable from a single request originated by that consumer. Thus, owners of small businesses have no way of blocking agents like Jango from using information in their online databases and hence may be forced to interoperate with such agents (Moukas et al., 2000). However, the broader question on whether access to a small business' information by ISAs is desirable or not remains. We are of the opinion that ISAs are here to stay and as their sophistication increases, their use by consumers in online shopping will increase. Trying to avoid being cataloged by ISAs may cut a small business out of a large and growing market of "hot" consumers – consumers who are ready to buy online. Even price focused agents may be a great source for leads as they typically bring in more experienced online shoppers who need little assistance in the transaction, navigation, or checkout process (Gassmann, 2001). Small businesses should see merchant-brokering agents as an opportunity, not a threat. The best strategy may be to embrace these intelligent agents and monitor their development and growth in the electronic marketplace. Undoubtedly, agents of the future will provide information to consumers that encompass more than price. Agents will let consumers not only pick the criteria to be used in the evaluation of alternatives, but also weight the criteria based on personal preferences (Vigoroso, 2002).

So how can a small business level the playing field by appearing on the list of recommended products at shopping agent sites? Although each shopping agent site has its own list of requirements for getting listed, there are some general guidelines that would serve a small business going online well. Following are some specific recommendations:

- **Secure transactions**: Most agent sites require their merchants have secure online ordering systems on their sites with electronic shopping carts and order tracking systems. This is not as difficult as it appears at first. There are many off-the shelf packages available for merchants looking to put their businesses online and most of these offer electronic shopping carts (e.g., WebCart at http://www.mountain-net.com/ and SoftCart at http://www.mercantec.com/). For small businesses not yet online, major shopping sites allow merchants to create online storefronts in a snap. These online storefronts often include basic e-commerce functions such as electronic shopping carts and secure ordering, sometimes for a small fee. For example, Amazon offers zShops for merchants to build an online presence instantly and get access to Amazon's vast customer base (http://www.amazon.com/). It is also important for small businesses to have other off-line ordering options on their web site. For example, MySimon.com requires merchants listed in its shopping agent database to have both secure online ordering and telephone/fax ordering capabilities.

- **Quick Loading Pages**: In order to ensure that the shopping agent can compile data and present it to the consumer in a reasonable amount of time, many shopping agents time-out after a few seconds and do not report results from merchants who did not respond to the shopping agent request in a short period of time. Thus, a site that does not respond to information requests quickly either because of a slow network connection or graphic intensive pages, is unlikely to have the opportunity to get into consumers' consideration sets. So how quick do pages need to load? A good guideline is the one established by MySimon for its merchants – pages need to load in eight seconds or less in order to be considered by their shopping agent. Taking some occasional network congestion into account, small businesses may be better off trying to achieve a page load time of five seconds or less. This may point to the importance of having an appropriate database of products. Having a simple HTML

page present a complete listing of products for sale may hurt your chances of being found by search engines.

- **Prominent Contact Information**: When a shopping agent scours the net and offers users a list of recommendations, it is, in effect, risking its brand by linking merchants with consumers. If one of MySimon's users, for example, has a bad experience with a merchant recommended by the agent, it is possible that the user will never return to MySimon even though the shopping transaction was between the user and the merchant. Therefore, most agents are careful of the list of merchants they accepts into their fold. One way of protecting against fly-by-night operations is to require merchants to prominently display contact information including a physical street address and telephone numbers. Small businesses serious about becoming a part of shopping agent merchants should ensure that their site demonstrates the legitimacy of its business by providing a physical contact address and a phone number manned by "real" people for any questions or complaints customers may have.

- **Wide Product Assortment**: Many agents will not consider a merchant unless it has a sufficient assortment of goods to offer their customers. It is important to remember that a shopping agent's job is to provide the best possible assortment of choices to its users. It is more efficient for the agent to compile this assortment from fewer merchants than to scan thousands of merchants who each offer only a single item of interest. Therefore, in the interests of optimizing the search algorithm, agents prefer to use merchants who have a reasonable assortment of products. A small business specializing in only a single product is less likely to get databased by shopping agents than one having fifty or a hundred products to offer. Small business should try and build a good assortment of products to offer online and ensure that this complete assortment is available for sale online.

- **Clear Privacy Policy**: A purchase transaction between a customer and a merchant is a play of trust for both parties. Customers not only pay for the purchase, but also reveal private information such as credit card information, shopping preferences, address and phone number, etc. More and more online shoppers are getting concerned about the merchants' use of such information. Given the growing importance of this issue, many shopping agents are expecting their listed merchants to have clear privacy policies that are easily accessible on their site. Independent of agents' requirements, it is probably a good idea for merchants to develop clear privacy policies and display these prominently on their site. Sites such as Trust.e (http://www.truste.com/) and the Better Business Bureau (http://www.bbbonline.org/) provide several online resources for small businesses looking to establish a strong privacy policy.

RECOMMENDATIONS FOR SMALL BUSINESSES' AGENT USAGE

Given that it is in the best interest of small businesses to embrace the emerging ISA technology, let us now examine how small businesses can benefit from it and what actions they need to take to make sure they do not miss out on this opportunity.

Information Asymmetry

One of the commonly cited difficulties of small businesses is their inability to match the sales and advertising budgets of their bigger competitors. This asymmetry in promotional expenditure creates an information asymmetry in the market where bigger competitors enjoy considerable clout because of better brand recognition and market access. Shopping agents

can work to the advantage of small businesses by eliminating, or at least substantially reducing, some of these asymmetries. By comparing brands on tangible attributes (instead of intangibles like brand or reputation), shopping agents can put the small businesses' brands in a consumer's consideration set, thereby improving the chances of purchase of such brands (Gassmann, 2001). Thus, small businesses stand to gain more relative to their bigger competitors, by using or cooperating with shopping agents.

Getting Noticed in the E-Market

At times, small businesses may offer products with one or two unique features that even their bigger competitors do not offer. However, typically, consumers are either unaware of such features or do not care about them. As bigger competitors with their huge promotional budgets do most of the consumer education, they also get to decide which attributes of the product get highlighted. Obviously, this ensures that only those attributes are made salient in such promotions that are advantageous to the larger competitors. Häubl and Trifts (2000) found that consumers seem to construct preferences when using a recommendation agent for shopping. That is, the mere inclusion of a subset of attributes suggests to consumers that those attributes are more important in evaluating that product. Thus, sellers can presumably influence consumer perceptions of the value of their product by using an agent that comparison shops using attributes on which their products do well, regardless of the "objective" importance of the attribute in the performance of the product. So far, it was extremely difficult for small businesses to educate consumers about other attributes on which their products fared better. Now, shopping agents make this impediment easier to overcome. If a small business provides a shopping agent at its site, it can pick which attributes get compared, and it can therefore show how its product is superior on those attributes to competitors' products.

Tagging for Inclusion

One historical fact that has contributed to the development of software agents is that the web has its roots in problem solving and knowledge representation. In the pre-Internet world, although the use of computers in business was widespread, there was no effort at developing a common information representation scheme. Small businesses on the web across the world now share a common method for representing item information. This allows the efficient development of software agents to gather and parse data for the needs of consumers. This has two important implications for small businesses. First, small businesses need to ensure their data is "tagged" appropriately based on developing standards. Of late, Extensible Markup Language (XML) has emerged as a dominant tagging standard for web-based documents. XML is a meta-language that allows the structure of documents to be defined. In every document, say a product catalog, there are different types of information, for example, product name, product description, price, shipping weight, etc. The XML specification defines a standard way to add markup to documents (Walsh, 1998). It was created so that richly structured content could be used over the web. XML tags describe the *structure* of a document and not simply the *appearance* of the document (which is what HTML does) (Simpson, 2000). Small businesses need to use XML to tag their data. Many shopping agent sites such as Excite Merchant, require merchants to send regular "data feeds" for the agent database. These feeds have to be in the particular format needed for their systems to parse that data. XML tagged data can be rendered into any of the formats needed by agent sites. Efficient tagging, on the other hand, can make sure that a business' products show up in comparative evaluations, even when agents use different tag identifiers. Second, and a more strategic implication for small businesses is that they need to lobby with agent developers to make sure that product attributes on which their products fare better, are included in an agent's feature list.

Revenue Models for Inclusion

It is entirely possible for a small business to tag its product database effectively, and still not get listed because relevant agents are not accessing its database. This could happen because of the different revenue models agents use. Shopping agents sites range in their revenue models from listing only those sites that have made a payment (e.g., PriceWatch and AOL) to treating every site equally without any payment (e.g., BestBookBuys). In the middle are sites that give sellers who make a payment a preferential position in the listing (e.g., CNet Shopper and MySimon). Small businesses need to identify key agent sites for their product categories and their respective revenue models. If the only way to get included in a major agent's listing is by paying a small percentage of revenue to that agent, then small businesses need to include that expenditure in their costing structure to make sure their products are included in such agents' comparative listings. Most shopping agent sites offer free listings to merchants but require payment for preferred positioning. The payment for preferred positioning may be worthwhile given the finding that although shoppers using MySimon have the option of reordering the recommended product list by price, most don't. The payment model may involve fixed payment for preferred positioning, payment for click-throughs, or even a bid process, by which the highest bidder gets the best placement in each category such as at BizRate.com. Some of the more widely used shopping agent sites that small businesses may want to consider getting affiliated with are: MySimon.com (http://www.mysimon.com/), BizRate (http://www.bizrate.com/), Bottom Dollar (http://www.bottomdollar.com/), Deal Time (http://www.dealtime.com/), PriceGrabber (http://www.pricegrabber.com/), and Yahoo! Shopping (http://shopping.yahoo.com/).

Getting Repeat Business

For small businesses that enjoy a cost-advantage over bigger competitors, using an agent can work to their advantage. Lynch and Ariely (2000) found that facilitating between-store comparisons *increases* the price-sensitivity of consumers for non-unique products. Thus, small businesses with lower-priced products stand to benefit from such comparisons. On the other hand, if a small business sells high quality, differentiated products, they are not disadvantaged by such comparisons. The same study found that if the cost of searching for information on product *quality* was high, facilitating store comparisons *did not* raise the price sensitivity of consumers. Also, easier search facilitates customer retention. Small businesses have traditionally suffered from what is referred to as "double jeopardy." First, small businesses have fewer customers, and second, these customers are less loyal than customers of larger businesses. Shopping agents can help small businesses not only in getting more customers, but easier comparisons will improve retention and loyalty of such customers.

Currency and Speed of Access

Shopping agents can vary in terms of how frequently they query source sites for data. Some agents regularly crawl the web (e.g., once a day) to update their database, which is then used to perform the task requested by the user. Other agents actually query remote sites in real time every single time a user requests information. For example, Half.com tries to provide customers comparison price information for the products they sell on their site. Every time a product is listed for a customer, an agent travels the web and gets comparison price information from several sites on the web. Still other sites use a combination of these two methods. For example, ClickTheButton.com used stored information if it was less than two hours old. If the data requested by the user was over two hours old in its database, it got fresh data from the web. The implications of this for small businesses are twofold. If a dominant agent queries in real time, then that imposes extra load on a small business' site. During peak

hours, network congestion or a slow server may cause timeouts thereby excluding that small business from the comparison list. Small businesses therefore need to make sure that they have the necessary equipment and bandwidth to avoid such timeouts. Second, small businesses should execute "dummy runs" of product comparisons on their own on a regular basis to find out how their products stack up against their competitors'. If a small change in price improves a product's ranking substantially, then such changes may more than make up any loss in revenues, because of higher turnover.

CONCLUSION

It would be shortsighted to base online marketing strategy on the current state-of-the-art of shopping agents. Clearly, shopping agents currently have shortcomings (Quick, 1998; Spring, 1999). As agent technology improves, it is likely that ISAs will start to consider the variety of factors that consumers in the real world use when deciding what product to buy and from whom. Even the most basic of ISAs that operate on a simple rule like "list all products in the catalog priced between $10 and $20" use some Boolean logic to present useful information to the consumer. Undoubtedly, ISAs of the future will grow in their "intelligence." There is already considerable work underway on "learning" neural network systems, fuzzy logic systems, and even genetic algorithms (Fingar, 1998). Several companies are working on systems to take into account factors besides price in helping consumers. In fact, many believe that the future of online shopping agents depend on this happening (Vigoroso, 2002). Unfortunately, while significant developments are inevitable, they are also likely to be slow (Allen, 2000).

Contrary to Maes (1999), we do not believe that online markets are inherently buyer-centric. That is, according to Maes, the "ease of comparison shopping will make prices fall" (p. 76). While this may be true for generic products, the efficiency of online marketplaces also allows sellers to reach buyers who have the highest reservation prices. Sellers on auction sites such as eBay have found that they are able to get *higher* prices for their merchandise because they are able to suddenly reach a vast number of buyers who have significantly higher price thresholds than those within their local, geographical markets. Thus, the Internet has the potential to *increase* the prices sellers can charge for specialized or niche products. By helping sellers build more detailed profiles of consumers, agents may also help usher in a new age of relationship marketing where the complete marketing mix is customized to the unique needs of each online shopper. Thus small businesses do not necessarily have to lower their prices to compete in a market dominated by ISAs. They could instead differentiate and use ISAs to find customers who are willing to pay the premium price for differentiated products.

The fact that many current ISAs are simple and overemphasize the role of price in the transaction should not prevent small business owners from embracing shopping agent technology. After all, the continuing survival of these agents depends on the number of users of these agents. If consumers want to buy based on price only, then one *does* need to have the best price in order to survive. If consumers care about anything more than price, ISAs that compare merchants on the basis of price alone, will quickly fall into disuse. This is the essence of the marketing concept and ought to underlie any decision to embrace ISAs. Understanding the role of ISAs and their development will help small businesses grow their online business. Knowing how agents are developing may even allow them to strategically position their e-business and product databases to take full advantage of the global, computer-based electronic commerce

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