"AN INTELLIGENT SYSTEM TO HELP SMALL BUSINESS DISPOSE OF EXCESS INVENTORY."

Blaine T. Garfolo, CIS Dept., San Francisco State University, San Francisco, CA 94132
415.338.6083, bgarfolo@sfsu.edu

ABSTRACT

Small business has been a focal point of corporate and academic organizations, and a continuing theme of numerous trade conferences and journals. One area noticeably lacking in any discussion however, is that of how a small business with, by definition, limited resources, can successfully compete with large businesses in disposing of excess inventory. Our investigation led us to develop a system that could in effect, allow the small business to proactively chase the consumer with opportunities giving them a competitive advantage over large reactive organizations who merely deplete inventory though the standard sales channel.

INTRODUCTION

According to the Small Business Economic Indicators for 2002, there are a total of 22.9 million businesses in the U.S., of which 18.4 million were sole proprietorships [1]. When we consider the overall picture of business and define a small business to be one that has 9 or fewer employees, then small businesses are the lifeblood of the US economy representing 99.7% of all employer firms. In fact, small businesses employ about half of the private sector work force and account for approximately 66 – 75 percent of all new jobs [3]. Clearly the small business is an important economic force in the United States.

Some businesses remain small over their lifetime due to a variety of reasons such as financial constraints, market pressures, lifestyle choice, etc. Others evolve into medium to large-scale status. The relative number of small businesses however, does not change substantially over time, as the business growth cycle from small to large to small again is relatively constant. Regardless of the business classification (small or large), two facts are constant to both groups: each has to determine the best course of action for offering goods and services at a competitive price and secondly, at some point in time each will have excess inventory on the shelves. This paper will investigate the problem with excess inventory and how a small business can effectively compete with larger ones with respect to excess inventory liquidation.

SURVEY AND ANALYSIS

In general, there is a relationship that exists between excess inventory and the health of a business. Most businesses experience a lag time in adjusting inventory supplies with consumer demand. That is, all to often businesses wait to long to make supply adjustments based on declining sales. They experience a quick rise in inventory supplies and are caught with excess inventory on the shelves. Higher inventory levels fueled by lower-than-projected sales volumes leave manufacturers with excessive inventory. This problem has reached epidemic proportions and is readily visible in today's stressed economy [4].

The health of the economy can be measured in part by the Inventory Ratio Index. The IRI represents the relationship between the shipment, which indicates the demand and inventory, or simply, the demand situation of products. Over the past 3 years we have seen a slow steady climb in the IRI indicating retailers are getting increasingly burdened down with excess inventory.

For large businesses, this problem can be addressed in part by implementing a Rapid Inventory Reduction Program that may entail large promoted sales, donations to charity for the tax implications and severe cutbacks in supply side purchasing. Unfortunately, small businesses generally don't have the luxury of a large state/nation wide advertising budget or multiple outlets to shuttle inventory around to. Additionally, the average small business doesn't need tax write offs but rather needs income.

Increasingly, businesses both small and large alike are turning to a variety of outlet sources to liquidate excess inventory (Ebay, Yahoo, TradeOut.com, etc.). Even though this gives the retailer some relief, it is still dependent on the customer finding the "sale" and engaging in the transaction with the retailer for the product. In this respect, the traditional solution for inventory reduction is passive. Clearly, when a small business is matched against a larger business with its deep financial pockets and extensive advertising ability to draw in the customer, it will ultimately loose the battle of inventory liquidation.

In order to determine the optimal way a small business can cost effectively compete with larger businesses with respect to inventory reduction, business students at San Francisco State University went out into the local business community to find retail stores that fit our small business model. For the purpose of the study, we defined small business as one that has 9 or fewer employees, has been in existence for at least 3 years (to prevent skewing the results due to the learning curve of a new business [high mistake rate]). The segment of the retail community associated with giftware/collectibles was very receptive to working with the SFSU business students as the establishment welcomed any effort or suggestion to improve his or her own business performance. Giftware/Collectibles represents a segment of the retail industry that is most susceptible to economic fluctuations as it is an industry sustained by disposable income. As such, inventory levels can quickly become excessive as the economy rapidly changes. Of the 81 giftware/collectibles stores that were identified as fitting our definition of a small business, 10 stores were randomly selected to participate in this study.

Analysis of the stores found that on the average, their yearly income was approximately $287,239 and had 6 employees. From an inventory standpoint, they held approximately $127,000 in inventory of which no demand items (no call for sales in 120 days) represented $63,000. Almost half of their inventory had no sales requests in 120 days! Unfortunately, a consequence of the excess inventory was reduced shelf space which, coupled with the monetary costs tied up in the inventory, further reduced their ability to compete. This, we determined was a normal cycle of this segment of the business industry and is borne out in their high closure rate. It is a "feast or famine" lifecycle tied very intimately to the health of the economy. As explained to us by one business owner "when everyone is working, it is an extremely lucrative business." This was verified by looking at their inventory ratio, the number of times the average inventory on hand is sold in a year. For example, an inventory ratio of 3.5 indicates the business sells its average inventory 3.5 times per year. The higher the ratio the more sales you generate. An examination of the stores in our study found that in good economic times, their inventory ratio was 5.5. Unfortunately, the last 3 years have produced and inventory ratio for our study group of 2.1 and as a consequence, excessive inventory levels.

Their standard approach to inventory reduction was to place the items on sale in a graduated fashion: 20%, then 30% and finally 40% discount over a 90 day period. Through the use of the standard passive

approach to inventory reduction (advertising to alert potential customers of the sales in the form of newspaper ads and direct mail flyers), the stores were able to reduce their excess inventory on average by 37%. They still suffered from an inventory glut. A review of their past financial data reveled that if an item reached the 40% discount level and had still not sold, it would take, on average another 97 days before the item was sold. Clearly an unacceptable situation.

HYPOTHESIS

What if we could fundamentally shift the way in which a consumer made a financial purchase? That is, instead of the traditional way in which a customer walks into a store to undertake a purchase or surfs the internet for that product, what if the product could find the consumer regardless of where the customer was at the moment? If we could make the inventory chase the consumer, then the business owner would have an advantage as now the product looks for the market instead of waiting for the market to look for the product.

In order to properly represent the consumer in the transaction, we had to develop the concept of a Personal Intelligent Agent (PIA). This agent would perform the functionality of a consumer in both the selection of product and its payment. PIA would act as an autonomous agent, a system situated within and a part of the environment that could sense that environment and act on it over time in pursuit of the customer's agenda. In essence, PIA would act on the instructions of the customer and use its knowledge of the customer's interest and wishes to do its work. The instructions would be setup by the customer in their action profile. PIA would continually act on the customer's behalf until they so revoked its authority to do.

Conversely, a PIA would also have to be developed to represent the retailer. The retailers PIA would represent them, find and engage the customers PIA and together determine if a transaction could take placed based on what the retailer had to offer and what the consumer was looking for (Figure 1).

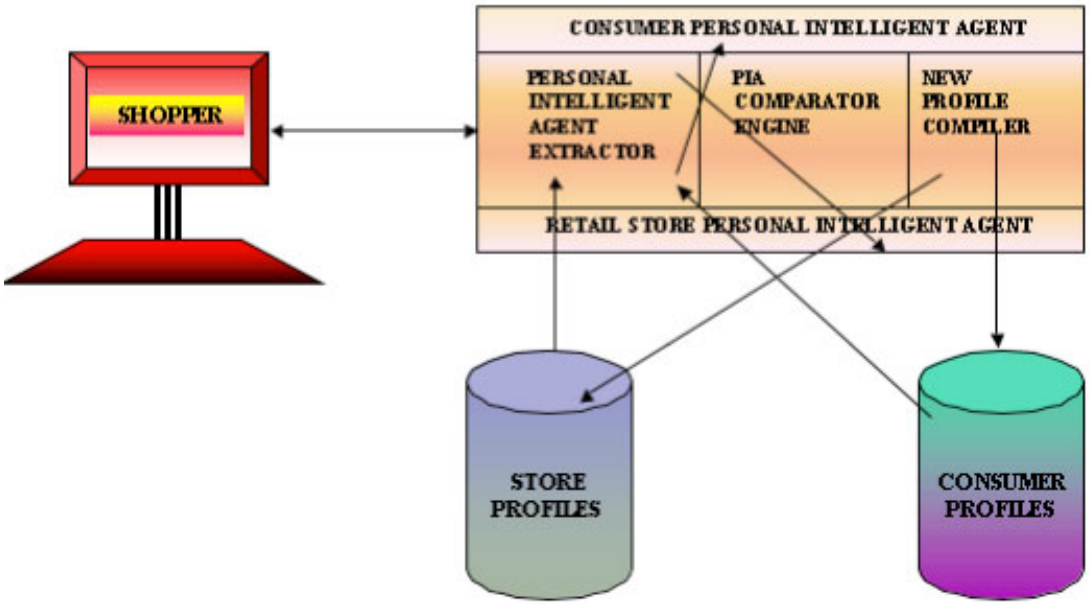

Figure 1 – Interaction between customer, retailer and their PIA's

The PIA approach is completely different from the traditional "person present" approach to shopping where an actual person either needs to be physically present in the store, physically present on the phone talking with a retailer or physically present at a computer terminal surfing the internet for the product. And unlike the internet approach where the user issues a static "one time only" query through a standard search engine (such a google or yahoo), PIA remains active working on behalf of its user forever or until its authority to represent its user is removed.

It was our hypothesis that this proactive approach for inventory reduction would be far superior to the traditional reactive "sale" approach currently employed by retailers.

RESULTS

We loaded the inventory data for the 10 stores in our study onto a web server and instructed the retailers to determine the pricing for each product. This would allow them to maintain both standard pricing and sale pricing in the inventory. We then instructed the customers to create their unique profile and "rules for engagement". That is, what would you like your PIA to be on the lookout for and what criteria do you want to set in order for a "successful" engagement to be determined.

The system was activated and the retailer PIA's began to look for targets of engagement in the customer's stored profiles. Within moments, 172 potential transactions were identified, financial information retrieved and the sale written up. The system remains "awake" as long as there are targets to engage. As our study was static (no new customers entering the system to provide for new transaction interactions), the PIA's quickly became dormant, as all possible targets of engagement had been interacted with.

For a new opportunity to present itself, that is, for a new customer sale transaction to take place, the retailer would need to make some adjustments to their inventory pricing structure. This is quite similar to the cause and effect that happens in the standard retail sales model (customers drop off, lower cost of goods to consumer, customers pick up). After adjusting the inventory pricing (putting goods on sale), the system detects a change and wakes up the PIA's. The retailer PIA's actively begin looking for targets of engagement within the customer profiles. The system detected 37 new targets, engaged the customers PIA and concluded the sales.

The effect of this system on our small business retailer was stunning. The retailers saw an accelerated inventory ratio cycle. What would normally have taken several months of passive "watching and waiting" for customers to come in and engage the sales people, now happened almost instantly as the system actively sought out and targeted the qualified customer. Consequently, not only did the product cycle quicker, it was not necessary to discount as deep.

FURTHER WORK

The implications of this work are far reaching. With the proper adaptation, the PIA model can be customized to work across any internet business. This could rapidly accelerate inventory reduction in both the business-to-business model and the business to consumer model. Further, by enabling the PIA access to all of the customers financial information, not only could the PIA engage the retail site, but also select the best form of payment to secure the sale. For example, the PIA could choose from among several of the customers credit cards and select the card with the most favorable interest rate, longest time before billing, most reward points, etc. The PIA would truly be the customers Personal Intelligent Agent acting in behalf of the customers best interest, securing what ever goods or service that the customer authorized.

REFERENCES CITED

[1] 1992 and 1997 Economic Census. www.census.gov Updated August 2002.

[2] IDC Research. "U.S. Return on Investment in the Internet Economy to be Realized by 2000." September 15, 1999.

[3] Small Business Economic Indicators for 2002, June 2003.

[4] "Inventory Management Study to Seek Industry Consensus and Behavioral Changes to Address Major Aftermarket Issue", MEMA 2002.