The Value of User Centered Design in Product Marketing: A Simulated Manufacturing Company Product Offering Market Strategy

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Abstract. The field of manufacturing is mainly concern with the creation of products for consumers who demand these items. At Indiana State University's Advance Manufacturing Management (AMM) Program, phases of the entire value chain are emphasized to students in a senior level undergraduate course structured as a simulated industrial manufacturing company (SIMCO). The course entails design, prototyping, manufacturing and finally marketing of a product. While the first three phases are easily emphasized the final phase, marketing, lacks a holistic strategy that embodies the previous activity. Marketing activities are therefore disjointed, in turn, affecting the potential revenue of the product. This research project originated as a demonstration and proof of concept- human-computer interaction and marketing strategies become equally valuable as the product in the later stages of the value chain, where ecommerce is integrated.

The objective of this study is to determine the most effective marketing strategy for university-related products manufactured by students for ISU students, alumni and families. The uniqueness of the processes involved in the products manufactured and their target population affords a distinct comparative evaluation between two marketing strategies, where one promotes the product through emphasis on university pride/association and the other emphasizes general product characteristics. The analysis and results support the use of a customized marketing strategy with emphasis on ISU school spirit to increase customer information satisfaction and gain a competitive edge.

Keywords: Customer Information Satisfaction, Information Utility, Usability, Marketing Strategies, Psychographic Characteristics, Ecommerce.

1 Introduction

In academic settings, the replication of manufacturing environments can be a daunting task. Facilitating such an environment requires a diverse group of faculty that span the areas of product design through to product marketing and sales. Indiana State University's (ISU) Advanced Manufacturing Management (AMM) program is one such

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academic environment in which a manufacturing operation is replicated. This replication occurs in a senior level capstone class that employs students who are tasked with the operation of a company that designs, manufactures and then sell products. Typically, these senior level students have been exposed to product design methodologies, such as 2D and 3D solid modeling, in addition to tool and material processing technologies. Students organize themselves into groups that are typically responsible for the creation of new products or modification of existing products. The groups that they form are all part of a company known as the Simulated Industrial Manufacturing Company (SIMCO).

The skill set that these students possess resides mainly in the building and designing of products, creating a big disadvantage when products are to be marketed and sold. This disadvantage creates two interrelated problems, a lack of product exposure which in turn significantly affects cash-flow. An ad hoc marketing strategy is used and it involves the use of a website that acts as a platform for potential customers to view the products. Customers are solicited by word of mouth to view products on a webpage, which may or may not contain descriptions. Marketing tends to be very problematic because once the few customers that have been solicited enter the SIMCO webpage they are immediately turned off by the lack of cohesion and clarity. In an effort to make their products more attractive, its presentation becomes paramount. Simply redesigning their products from semester to semester, without gaining any new customers, has had a profound impact on SIMCO's profitability. The root cause effect is poor customer experience and satisfaction.

2 Background and Related Work

The need for a competitive edge has motivated website designers and marketing professionals alike to study factors impacting usability, customer experience, and customer satisfaction. One of the most impacting factors relates to information content (i.e. information utility, customer information satisfaction, value-added information) [1-4]. Determining *what* information is important and useful to customers is vital to the design process. The success of user-centered approaches that commence with methods to better understand the customer information needs are most effective. User-centered design and usability tools -focus groups, questionnaires, surveys, and task analysis- have all been used to identify *what* information is important for customer-based decisions[1,2,4,5]. Studies have shown that informations needs are influenced by product/service type sold and customer segments in the target audience [6].

Researchers have investigated the information needs of ecommerce customers for various products and services [1,2,4]. Results have indicated that the type of product serviced or sold has significant impact on customer information needs. Wang et. al. (2001) measured factors of customer information satisfaction for websites selling digital products/services. Wang's model for measuring included 7 factors highlighting that customers want information related to Customer Support, Security, Digital Products/Services, Transaction and Payment, and Innovation. The remaining two factors were related to the Ease of Use of the website and the accuracy of the Information Content. Buys and Brown (2004) demonstrated the shift of value placed on information items when customers used banking websites, where importance was

concentrated on information related to transactions and their accurate reporting. Savoy (2008) conducted a literature review of studies focused on customer information needs to develop a conceptual model of fundamental information requirements for all product/services and identified 7 factors: Price, Customer Service, Member Transaction, Shipping, Durability, Company, and Production Description. Product and/or service description is one of the most important information items on ecommerce websites. This gives users short on time, indispensable information about products and facilitates goal directed purchases [7,8].

Feedback from customer segments in target audiences provides great insight on information value. These segments can be formed using demographic characteristics. Past studies have found differences among customers based on gender, age, education, and culture [9,5,10]. Liao et al (2009) investigated the difference of information needs among US and Chinese online customers. For example, Chinese online customers value information describing cost-effectiveness, weight, warranties, and post-sales assistance more than US online consumers. In addition, US online consumers value information describing convenience features and new technologies used in the product more than Chinese online customers. Lingyu and Ying (2010) studied impacts of product picture information on online shopping impulses. The results indicated that products pictured with real humans had a significantly higher influence on female shopping impulse than male shopping impulse. Furthermore, Seock and Bailey (2007) published gender difference on online information searches and purchase behavior using 1277 college students. Results reported that female customers conduct a greater number of online information searches than males.

For consumers within each market segment or target audience, in addition to demographics the value of different type of information can vary based on customer attitudes, interests, and activities [3,11,12]. Seock and Bailey (2007) study also included 7 psychographic characteristics and their relationship with online information searches and purchase behaviors. It was reported that college students who were brand/fashion conscious and enjoy shopping were significantly and positively related to information searches and online purchases. In particular, customers who were brand/fashion conscious were interested in information describing new products and trends. Dutta-Bergman (2006) demonstrated that demographic and lifestyle factors contribute to the attitude toward advertising, which impacted both the information value of advertising and the support for its censorship. Fourteen lifestyle factors impact were evaluated and guidelines for advertisement strategies based on psychographic impacts, such as brand consciousness and innovativeness, on perceived information value. Brand consciousness customers rated advertisement information valuable for consumer purchase decisions. Arguably, advertisements could be viewed as an effective mechanism for reinforcing the consumption choices of the brand conscious shopper. Innovativeness was also positively associated with high ratings of advertisement information value. Innovative customers, who like to buy new and different products, were more likely to use advertising information. Thus, advertising is an effective channel for the communication of information about new products.

Accordingly, product/service descriptions and details are important to customer-based decisions. Furthermore, ecommerce websites could offer more information that would appeal to psychographic characteristics to increase customers' satisfaction with information and provide a competitive edge [13].

3 Methodology

The SIMCO course web designers are trying to find the feature, function, or information that will provide an edge. They believe that a design approach appealing to their target populations' psychographic characteristic is the key. As mentioned above the target populations are ISU students, ISU alumni, and ISU families. For this study, school spirit is the essential psychographic characteristic. It is hypothesized that the implementation of a website design that appeals to the customer's school spirit will increase customer satisfaction, purchases, and traffic.

For this study, we are focused on the early stages of the design process and concentrating on the information design and content. Thus, lower level hypotheses were derived - 1) Additional information describing how products were manufactured by ISU students and on ISU campus would appeal to ISU students as potential customers; 2) ISU students would prefer a website that provided additional information describing ISU student involvement and/or association. This study's evaluation plan included two websites demonstrating two marketing strategies. The first website was designed with only product-based information. This site included only standard product description information -Product Name, Product Cost, Product Availability, Product Material, and Product Styles. The second website was ISU-centric including the standard product description and additional information appealing to the customers' school pride, psychographic characteristic. This information provided the users with more detail of the related to the products' ISU student manufacturers and SIMCO course facility, which served as the manufacturing environment. To ensure the focus would be on the information content presented, both websites had the same page layout, colors, and limited functionality.

Participants were asked to browse both websites (Website 1 - Product-only Information; Website 2 – Product and ISU Student Work Information) and then complete a questionnaire. The average amount of time spent browsing each website was two minutes. The questionnaire included eleven questions related to the websites (2 – Minutes to browse website; 2 – Cross measures for website preference; 7- Individual website measures). The individual website measures used a 5-point Likert scale, with anchors of 1= Strongly Agree and 5=Strongly Disagree. In addition, there were four questions to collect demographic information, which is discussed below.

This survey was conducted online and the link was emailed to 174 students in the College of Technology at ISU. All participants were solicited over a six day period to view and answer a questionnaire based on the two websites. A total of 105 responses were received; however, only 67 responses were retained for analysis due to missing data. Calculated after the removal of 38 responses with missing data, the response rate (39%) was reasonable [14]. The participant group was reflective student population in the college, which tends to be male dominant. The majority of the participants were male (61%), and over 56% of the participants were between the ages of 18 and 23. Demographic data also revealed that 52% of the participants reported that they had been a student for at least three years. Psychographic data collected revealed that 68% of the participants reported an average level of ISU school spirit (See Table 1).

Table 1. Demographic Information

Gender	*Frequency*	*Percentage*
Male	41	61%
Female	26	39%
Age		
18-24	41	61%
25-32	15	22%
> 32	9	13%
No Response	2	3%
Years as ISU STUDENT		
less than a year	20	30%
1-2 years	10	15%
3-4 years	30	45%
5 years or longer	3	4%
No Response	4	6%
ISU school spirit or pride		
Below Average	9	13%
Average	45	67%
Above Average	12	18%
No Response	1	1%

4 Results and Discussion

Two questions directly asked participants about their website preference. The first question asked participants which website would you prefer to use. Responses demonstrated a preference for Website 2 (82%) over Website 1(18%). The other question was posed last in the questionnaire and asked if the website that presented ISU student work details better than the website with only product information. The results recorded counts - Yes: 52 (78%) and No: 15 (22%).

There was one inquiry about the appeal of the ISU Student Work information included on Website 2. The responses to this question were recorded using the 5-point Likert scale, and the mean was 1.82 with a standard deviation of 0.95. Thus, the participants did find the ISU Student Work information appealing.

In addition, there were three questions repeated for each website using the Likert scale (see Table 2).

1. How useful was the product information provided on the website to you?
2. How satisfied are you with the information provided?
3. Was there any missing information that would prevent you from making a decision to buy a product?

The means reported for Website 1 ranged from 2.19 to 3.02 with standard deviations ranging from 0.92 to 1.05. The means reported for Website 2 ranged from 1.86 to 1.95 with standard deviations ranging from 0.80 to 1.04. Lower mean values indicate stronger agreement with the statements presented in Table 2.

Table 2. Statistical Analysis Results of Likert Scale Responses

	Website 1		*Website 2*		alpha < 0.05		
Questionnaire Item	**Mean**	**Std**	**Mean**	**Std**	**Diff**	**t-value**	**p-value**
Product Information Useful	2.19	0.92	1.86	0.80	0.32	3.16	*0.0024*
Satisfaction with All Information	2.36	0.99	1.95	0.96	0.40	2.82	*0.0064*
Information was Missing	3.02	1.05	3.23	1.04	-0.21	-1.97	0.0533

Based on the results of Paired T-tests for each item as illustrated in Table 2, there were statistically significant differences between the ratings of Product Information Usefulness and Satisfaction with All Information for Website 1 and Website 2. The ratings of both measures were higher for Website 2. Thus, participants found the product information presented on Website 2 more useful than the product information presented on Website 1. In addition, participants found the information presented on Website 2 more satisfying than the information presented on Website 1. There was no significant difference in the responses related to the perception that some information was missing on the websites.

Further, associations among the Likert measures for each website were inspected using a Pearson Correlation matrix. For both websites the highest correlations were among the Product Information Usefulness and Information Satisfaction ratings (Website 1 = .73; Website 2 = .67). Therefore, higher perceived usefulness of the product information was associated with higher perceived satisfaction with the information displayed on the website. For Website 2, there were strong correlations between ISU Student Work Appeal and Product Information Usefulness (.67) ISU Student Work Appeal and Information Satisfaction (.69). Therefore, high rates of appeal were associated with high rates for usefulness of the product information and perceived satisfaction with the information displayed on Website 2. Moreover, correlations among the measures aforementioned and the perception that Information was Missing were negative and low (less than .45).

The results support the tested hypotheses- 1) Additional information describing how products were manufactured by ISU students and on ISU campus would appeal to ISU students as potential customers; 2) ISU students would prefer a website that provided additional information describing ISU student involvement and/or association. Website 1 presented standard product information, which is what students are familiar with viewing when visiting other websites that sell similar products – ISU paraphernalia. Thus, the ratings were average and the students did not have a strong opinion on whether the website was missing any information. Website 2 presented the standard information plus additional information describing how the products were made by their peers. This information was included to invoke a response from students that appeal to a sense of school spirit or pride, which was reflected in the results[3,9,10]. The opinions about missing information were similar for Website 2, mainly neutral. It could be the case that product information that is normally used for

purchases is the most important as supported by literature [1,2,4]. Then, additional information appealing to other characteristics has an additive effect. Notice, that ratings for Product Information Usefulness were higher on Website 2 despite the fact that the Product Information was exactly the same as displayed on Website 1.

It is vital for companies to try and understand the nature of heterogeneity of customer preferences and information needs [6]. Smaller market segments formed based on demographic and psychographic characteristics, such as education level and school spirit, provide a deeper level of understanding the impact those characteristics have on customer information satisfaction, information utility, or value-added information. Devising marketing strategies and website design based on customer information needs is the first step to gaining a competitive edge.

5 Limitations and Future Work

The survey analysis and results supported the objective of this study and produced statistically significant results. However, this effort did have limitations and there are goals for future work.

ISU Student-Only Population. All of the participants in this study were ISU students and as the results depict the levels of school spirit did not vary greatly. In a future study, the authors would like to include a more diverse group of participants with different levels of affiliation/ association with ISU and a wider range in levels of school spirit/pride. Then, an experiment can be devised to investigate how levels of school spirit/pride affect website preference and customer information satisfaction ratings.

Non-randomized Ordering. Due to some technical limitations with the experimental software, the order in which the students visited the two websites was not randomized. The ordering could have had an impact on the ratings recorded by students, especially related to perceived missing information. It would be advised to randomize the order in future studies to reduce order effect.

Limited Website Functionality. For this study, the websites functionality was limited to focus the participants' attention on the information presented. In the next study, the websites will have more functionality to allow the participants to evaluate a higher order of usability.

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