

Mapping Non Profits with High Impact Interaction for Building Sustainability for Indian Women Artisans through E-commerce and Web-based Recommender Systems

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Abstract: *Our non-profit website intends to bring forth the talent in the rural areas and make sure their hard work is respected and valued. Many a times when the goods that are produced by their sheer talent and hard work go through the wholesalers and retailers. Profit margins added to them make the cost of the final product exorbitant and what the artisans i.e. the actual creators get in hand is meagre compared to the cost it is sold at. Our portal would act as a transparent medium to display the skills of the rural artisans and give them a fair opportunity to sell their products in the market directly and reap all the profit. This website also will have demonstrations that will enable buyers to understand the efforts that go into making these products. The paper also describes application of artificial intelligence methods to create a knowledge-based system supporting HCI-related activities in e-commerce software development process. The incorporation of a suitable recommender engine to understand the user's choice of products would in turn improve customer relations and product sales. Finally, we wish to introduce a scheme, channelizing part of the profit to the education of the children of these women and empower the future generation.*

Keywords: *HCI, E-commerce, Recommender Systems, Channelizing Profits.*

1. INTRODUCTION

The emergence of Information Technology in the last century as a **prime driver** and **facilitator of change** in the socio-economic development of the people has revolutionized lives across the globe. Aggressive investment in research & development in areas of Computer and Communication has yielded highly positive results. And, with the advent of **Internet**, international boundaries have melted away and the dream of a global village is eventually becoming a reality. The Internet characteristics of **simplicity, openness, availability and global ubiquity** are starting to impact all aspects of life, be it governance, education or business, in ways that were neither comprehended nor imagined a few years ago. Internet, more than any other infrastructure of IT, has introduced unprecedented changes in our daily lives so that even mundane activities are carried out in whole new ways.

A majority of our country's population lives in the rural areas and any development efforts made in the rural areas significantly impacts the country's development. Various governmental and non-governmental agencies have contributed significantly to improve the lot of the Indian rural poor and with good results. These efforts have attempted to address different needs of the rural poor. One such effort has been to provide sustainable self-employment to the rural poor by engaging them in micro-enterprises.

Serious attempts are made to exercise care while selecting the activities on which these micro-enterprises are based. In general, the focus is on selecting those activities that exploit the existing skill set of the rural poor and for which resources are available locally. However, the importance of a marketing infrastructure for these products cannot be wished away. In fact, the impact of a

near non-existent infrastructure to market these products on the rural poor will be far more severe as he/she cannot sustain the loss even for short periods [1]

2. PRESENT SCENARIO AND CHALLENGES

A look at the current marketing scenario indicates that many of the marketing issues such as demand assessment, brand identification, product promotions etc. have not been extended the desired attention. However, a few attempts have been made which merit attention. First and foremost is that most of the products, produced by rural artisans, are sold in local rural haats. Besides these haats, NGOs and the governments at various levels have also helped in promoting the sale of these products outside the confines of the local environs. For example, exhibitions and melas are organised in major urban centres to publicize and promote the sale of these products. In many states, the State Government bodies have made contribution to the sale of these products by extending preferential treatment to these products at the time of procurement. Even in the above cases where an attempt has been made to address the issues, the results have not been very forthcoming.

As an entrepreneur, the individual or group of rural poor engaged in manufacturing activities of the micro-enterprise faces a number of challenges. Some of these are given below

- Most of the products are still sold at the local rural haats. This means that the products may not fetch a good price as there is limited demand for the products in the limited local market. Limited demand also implies a low turnover, resulting in turn in, low income for the producer. Also, as these consumers are not overly conscious of the quality, the chances for product improvement remain bleak.
- There is limited awareness in the global market either about the availability of these products or about the existence of these micro-enterprises and their activities. With limited publicity, the products can hardly hope to build a market for themselves.
- The exhibitions and melas are not a frequent phenomenon. Also, their venues keep changing and are limited to a few towns/cities. Thus, the products are not available all the time in most of the places.
- There is no denying the fact that an intelligent market analysis goes a long way in sustaining the market for any product. Though a formidable task in itself, it assumes gigantic proportions in the present context as the rural poor, with his limited knowledge and finances, can hardly be expected to carry out this exercise. Not only this, the existing marketing infrastructure is equally ill equipped to undertake the task. Nevertheless, such an exercise will help in analysing the market for customer preferences and accordingly sensitizing the rural poor producers to the demand patterns of the market [1]

3. KNOWLEDGE BASED SYSTEMS

The field of knowledge engineering currently focuses on creation, support and development of knowledge-based systems (KBS), which are systems that use artificial intelligence (AI) methods and technologies to support user decision-making process in a certain domain or to provide tutoring [2]. Generally, such systems are able to store knowledge, to use rules for reasoning, to explain inferred results and to self-learn. Thus, the main components of a KBS are knowledge base (declarative knowledge) and inference engine, while knowledge representation methods are used to acquire and manage knowledge.

4. HCI IN E-COMMERCE

Although human-computer interaction (HCI) quality is widely recognized as a major factor for success of e-commerce software projects, the practical adoption of usability engineering methods remains far from universal.

The dawn of the Internet era was marked with advancement of “discount” usability engineering or “guerrilla HCI” [3] that allowed usability engineering methods application to transit from expensive dedicated labs to the hands of any responsive software development team. Prototyping, heuristic analysis, usability testing, etc. – the maturity of HCI integration in software engineering is deservedly assessed on the base of these methods incorporation in development process.

However, results yielded by these powerful tools are highly correlated to usability specialists' skills, which in turn very much depend on experience [4]. Given the noted scarcity of resources in e-commerce software development projects; we feel that attention should be also allocated to ready-mounted HCI knowledge, to cater for all kinds of developers, ultimately seeking to improve interaction quality and usability.

Though successful attempts have been made to exploit the power of IT and the Internet for the benefit of the rural poor, most of them have had an indirect and delayed impact, not resulting in any direct, tangible and immediate benefit. For example., the creation of information kiosks (like Warana and Gyandoot projects) in the rural areas to disseminate information to the local rural people has proved to be a very effective means of disseminating information of importance to the local people. However, such information kiosks can hardly help the rural poor who suffer from want of basic literacy and livelihood. As rightly observed in the Background Report of Information Technology for Masses, focused attempts must be made to exploit the power of IT to provide new opportunities, preferably in a form that translates into financial benefits, for these people so that they are able to better confront the poverty. With their daily bread & butter assured, the rural poor will be in a better position to appreciate and reap the benefits of the information kiosk.

Intellectual wealth associated with Internet has been one of the major factors that has propelled its popularity and growth. Another factor that is assuming equal importance is the enormous growth potential that Internet holds for small and big businesses alike. Electronic Commerce or e-commerce, as it is commonly known, over the Internet is becoming a very attractive proposition for any entrepreneur including the rural poor. The advantages of conducting business over the web are many. The ones that specifically appeal to the problem domain at hand are outlined below:

- The major advantage that the Internet offers for a business is its global availability. Even a little known enterprise can realize the vision of expanding its market reach beyond geographic boundaries and local customer segments.
- The Internet allows an enterprise to conduct its business at a very low cost. The cost for operating and service support can be reduced greatly through the use of internet.
- It facilitates greater visibility; once the enterprise and its products are better known, more business flows in.

Accuracy, speed and availability have remained prominent characteristics of the various elements of IT and Internet framework. These offerings must be carefully picked up, seamlessly assembled and relentlessly sustained to strengthen and enrich the endeavours of the rural poor while at the same time overcoming the limitations confronted by them. [5]

5. ARCHITECTURE OF KNOWLEDGE BASED SYSTEM IN HCI

As mentioned before, HCI knowledge, at least at guidelines level, does not have strictly objective and quantitative nature or may be even contradicting. This, in addition to the auspicious intelligence amplifying framework, contributed to our belief that the results provided by related KBS should not be entirely formal and would require its users, who are presumably interface or web designers, to make ultimate decisions. That is, the system would both generate web pages templates using formal rules and provide a set of possibly informal guidelines related to the context of a particular e-commerce development project. This inevitably leads to the necessity to determine the factors defining the context of an e-commerce website development. Obviously, requirements exert the highest influence over software being created; and two types of requirements are generally identified – functional and non-functional. The former mostly cover the functions performed by a software system, while the later among others involve compliance, reliability, security, and, of course, usability requirements. Based upon this dialecticism, we emphasized two factors that are highly important for e-commerce software: business goals, which generally mark out functional requirements, and target user attributes, which mostly define non-functional ones. In the next chapters we'd like to explore these factors in more detail and further justify their remarkable effect on e-commerce software development projects context. [2]

6. TARGET USER IN HCI AND E-COMMERCE

Since the term “computer-human interaction” gradually transformed into “human-computer interaction”, user remains in the main focus of the field. Most aspects of interface quality are relative in nature, i.e. interface can be “usable” only relatively to a particular, determined user group. The identification of such target user group and definition of its representatives’ typical attributes is thus imperative on the initial stage of any project involving human interaction with computers, and especially in e-commerce domain, where interaction quality is considered to be of special importance.

Interaction Aspects

By and large, interaction may be categorized into several aspects: physical, cognitive and emotional. Physical aspect is concerned with how interface devices are used as real world objects, how software system affect human senses, such as vision, hearing and touch, and what are the effects and limits of this impact, etc. Cognitive aspect, which is generally believed to be more complex, relates to human capabilities to assimilate and process information, as well as to learning, memory organization and operation, structure and content of user thesaurus, user mental model of a software system and so on. Emotional aspect, the research interest towards which manifested a notable increase during the last decade, covers subjective feelings and impressions arising in the interaction process, the causes of their emergence and their effects on the interaction efficiency, user motivation or even self-esteem. In e-commerce, emotional aspect receives special attention, as it is related to issues of trust and confidence, which are of particular importance in this industry. It is obvious that these aspects are closely inter-connected – human perceives any software system’s signals on all levels, i.e. through physical senses, with cognition and in the context of emotional condition or reaction. Attention or concentration is another example of important factor in interaction that is formed throughout all three aspects: physical, cognitive and emotional. Currently, certain fundamental interaction engineering principles that are based on more or less common human physical or cognitive capabilities were found, such as the renowned rule about 7 plus or minus 2 chunks of information best stored in short-term memory. Yet, the share of such universal findings in HCI knowledge is relatively small, and it means that target user attributes, potentially influencing all aspects: physical, cognitive and emotional, need to be considered in interface design.

User Attributes

The attributes, virtually limitless in number, that characterize a particular user group and affect certain interaction aspects, may be divided into two groups: user personal attributes and context of use factors. The former is believed to have significant effect in interaction with computers – for example, it was found that among top 10 factors influencing hypertext system usability, 4 related to individual user difference. The following user personal attributes would be considered the most important ones in terms of HCI and e-commerce:

- Age (or, rather, age group).
- Experience level, divided into general experience in IT, plus domain experience and particular software system experience (or experience in ecommerce).
- Gender.
- Socioeconomic factors, such as nationality (culture), education level (literacy), wealth, etc.

In turn, the context of use may be defined as technological, physical and social environment in which interaction takes place. Sometimes, though, the broader view does include user personal attributes and user tasks into the context of use. In e-commerce domain, the context of use factors are potentially limitless, as they closely intertwine with the entire marketing background related to brand, product or service (e.g. information forming the purchase decision). Such marketing-borne factors are generally highly dependent on the circumstances of a particular project and are revealed with traditional marketing methods – surveys, focus groups, etc. As for more universal and measurable context of use factors, we would suggest the following:

- Internet access speed.
- Available software – first of all, internet browser and accessible e-payment systems.
- Access point (home, office, etc.) – which is both physical and social context. [5]

7. RECOMMENDER SYSTEM

Recommender systems are changing from novelties used by a few E-commerce sites, to serious business tools that are re-shaping the world of E-commerce. Many of the largest commerce Web sites are already using recommender systems to help their customers find products to purchase. A recommender system learns from a customer and recommends products that user will find most valuable from among the available products.

The products can be recommended based on the top overall sellers on a site, based on the demographics of the customer, or based on an analysis of the past buying behaviour of the customer as a prediction for future buying behaviour. Broadly, these techniques are part of personalization on a site, because they help the site adapt itself to each customer. Recommender systems automate personalization on the Web, enabling individual personalization for each customer.

7.1. Recommender Systems Enhance E-Commerce Sales in Three Ways

Browsers into Buyers: Visitors to a Web site often look over the site without ever purchasing anything. Recommender systems can help customers find products they wish to purchase.

Cross-Sell: Recommender systems improve cross-sell by suggesting additional products for the Customer to purchase. If the recommendations are good, the average order size should increase. For instance, a site might recommend additional products in the checkout process, based on those products already in the shopping cart.

Loyalty: In a world where a site's competitors are only a click or two away, gaining customer loyalty is an essential business strategy. Recommender systems improve loyalty by creating a value-added relationship between the site and the customer. Sites invest in learning about their users, use recommender systems to operationalize that learning, and present custom interfaces that match customer needs. Customers repay these sites by returning to the ones that best match their needs. The more a customer uses the recommendation system – teaching it what they want – the more loyal they are to the site. “Even if a competitor were to build the exact same capabilities, a customer ... would have to spend an inordinate amount of time and energy teaching the competitor what the company already knows.”[6] Finally, creating relationships between customers can also increase loyalty. Customers will return to the site that recommends people with whom they will like to interact. [7]

8. ITEM-TO-ITEM CORRELATION IN OUR WEBSITE

Item-to-item correlation recommender systems recommend products to customers based on a small set of products the customers have expressed interest in. For instance, if a customer has placed a few products in shopping basket, the recommender system may recommend complementary products to increase the order size. Item-to-item correlation recommender systems can be Automatic, if they are based on observations of the customer's unchanged behaviour. They can also require some Manual effort, if the customer must explicitly type in several items of interest in order to generate a recommendation. Item-to-item correlation recommender systems are usually ephemeral, since they do not need to know any history about the customer to generate a recommendation based on the products the customer has selected.

8.1. User Inputs

The recommendation technology stated above requires some form of input upon which to base the recommendations. Typically this input is provided by the customer(s). However, it is possible that the input may also be provided by the business as well. The system in our website utilizes one or more of the following inputs.

Purchase Data: Which products a customer has purchased. Systems such as Amazon.com's Customers who Bought and MyCDNOW make recommendations based entirely patterns of "co-purchase" between multiple customers. In principle, this may be augmented with how many of each product the customer has purchased.

Likert: What a customer says he thinks of a product, typically on a 1-5 or 1-7 scale. The scale may be numeric or textual, but must be totally ordered. Systems such as eBay's Feedback Profile and Levi's Style Finder utilize Likert inputs.

Text: Written comments intended for other customers to read. Usually not interpreted by the computer system. Currently included in systems such as Amazon.com's Customer Comments.

Editor's Choice: Selections within a category made by human editors, usually employed by the E-commerce site, though independent editors are possible in principle. Editor's choice is important in both Reel.com's Movie Matches/Map and Moviefinder.com's Match Maker. [7]

9. CONCLUSION

Keeping in mind the profitability of the rural artisans, the task of marketing their products effectively, rests on our e-commerce website that can be successfully implemented through the HCI concepts discussed, coupled with the impact of recommender system. In this paper, the challenges faced by the rural artisans were mentioned and the corresponding solution of enhancing user interactivity in e-commerce was studied and put forth. We Women in Engineering aspire to make this world a much better place for the Women Artisans through this initiative that is committed to the cause of the rural poor providing the binding force required to strengthen and realise their entrepreneurial dreams.

10. FUTURE SCOPE

This e-commerce website being a non-profit initiative from our end focusses on high returns to the Indian artisans. In a view to increase the literacy rate and to provide a fair opportunity for children in rural areas, we intend to support their education and secure their future by channelizing a fixed part of the profit towards their education.

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