Examining the technological and business issues related to the development of an e-market

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Abstract: - Although to remain competitive firms need to adopt e-business or participate to e-markets, they need to consider various factors, such as the required effort and cost of implementation, which might affect their profitability. Similarly, third-party software organisations, aiming to develop e-markets to facilitate the communication between suppliers and their customers, they need to take into consideration not only technological, but also business issues that might affect their potential success or failure. By describing the development of an e-market, this paper discusses these issues and demonstrates that although web technologies provide numerous opportunities for the development of an e-market, they do not necessarily lead to its wide acceptance and use. By analysing the business issues implicated in an e-market’s development and use, this paper also aims to provide a list of factors that might affect its success.

Key-Words: E-markets, e-commerce, web technologies, AJAX

1 Introduction

As we enter the twenty-first century, the use of e-commerce promises new means for the creation of profit. Established or not, firms are creating new online businesses, while new ventures are exploiting the opportunities that the Internet provides. A proof of the extensive use of the internet for conducting business is the result of the research carried out by Featherstone and Ellis [1], who examined 1.300 domain names, from which 34.4% were categorized as small, medium or large business sites.

This wide use of the Internet drives most firms to adopt e-business, in order to remain competitive and attract more customers/consumers. However, the development of a web site is not on its own sufficient to increase a firm’s profitability and competitiveness. The decreased search costs and the wide availability of information and products through the Internet have made customers/consumers more demanding in terms of low prices, services and convenience. Therefore, companies need not only to improve the quality and price of their products, but also to provide more refined services, related to marketing, sales, product deliveries and post-sales activities.

Although through the use of the Internet users/consumers can easily search for better offers of services or products of their interest, they can rarely find all possible e-shops or offers – especially now that the number of e-shops grows rapidly. This makes e-markets extremely useful in contemporary e-business, as users can find the lowest price for a product with just a simple click.

E-markets do not only facilitate consumers, in the searching of products, but also smaller companies that do not have the resources, the expertise or the time to develop an advanced web application and provide equivalent services to consumers. The existence of e-markets may also benefit larger companies (even those having their own e-shop), since through their participation in e-markets, they can attract more consumers and strengthen their position in the market.

Even though e-markets may bring advantages to both consumers and companies, there are various
different factors, such as their design and the way that they match buyers and sellers/suppliers [2] that may affect their potential success or failure. Therefore, third-party software organisations, aiming to develop an e-market, need to consider not only technological, but also business issues that might affect their acceptance and profitability. By describing an example of an e-market application, this paper discusses these issues and shows that although technology may provide various different solutions for the development of an e-market, it cannot on its own lead to an e-market’s success.

2 Classification and impact of e-business models

During the last decade e-commerce has quickly evolved through a succession of business models. Timmers [3] classified the commercially operational business sites in eleven categories: e-shop, e-auction, e-procurement, e-mall, third party marketplace, virtual communities, value chain service provider, value chain integrator, collaboration platform, information brokerage and trust. However, Mahadevan [4] argued that the Internet economy has divided the overall market space into three broader structures: Portals, Market Makers, and Product/Service providers. A portal engages primarily in building a community of users seeking information about products and services. A market maker plays a similar role with that of a portal in building a community of buyers/customers and/or a community of suppliers of products and services. However, market makers differ from portals in that they provide, handle and facilitate the business transaction that takes place between the buyer and the supplier. Last but not least, the product/service providers are dealing directly with their customers when it ultimately comes to the business transaction [4]. These three structures incorporate various business models or different definitions. For example, a market maker is similar to an e-mall, a third party marketplace [3], an e-marketplace [5] or an e-market [6]. For reasons of clarity, in this paper, we define our application by using the term “e-market”.

E-markets have evolved and become important elements in the Internet-age economy. The main functionality of an electronic market is to match seller offerings with buyer preferences [5]. As Rappa [7] predicted: the web is likely to “reinvent tried-and-true models”. Consequently, we could argue that an e-market resembles to a mall, as we are familiar with from the physical world, which consists of a collection of physical stores that can potentially benefit from the mall’s reputation and popularity. An e-market does not only facilitate the exchange of information, goods, services and payments, but also provides an infrastructure that enables its efficient functioning [5].

As a result, with the advent of electronic markets real opportunities for any-to-any (A2A) online transactions have opened up across space and over time [8]. Conducting business through e-markets offers benefits for both businesses and customers. On the one hand, businesses can minimize their costs by finding more suppliers, choosing the lowest prices and paying their bills electronically. They can also benefit from lower transaction costs, decreased errors and reduced lead-time, all of which lead to improved efficiency and lower costs of services and products [9], [10], [11]. Transactions can be completed regardless of the location, while buyers and sellers can be matched in a digital forum for pre-sale, sales transactions, and post-sale activities [12]. There is also the potential to manage inventory more efficiently, adjust to customer demand more quickly, get products to market faster, and cut down costs of paperwork. On the other hand, consumers can more easily compare prices and product offer details, search for lower shipping costs and benefit from the large amount of information available [11].

However, these consequences do not always benefit the firms involved in e-markets [13]. The low search costs and the ability to compare product prices or offers easily increase the competition between companies. More difficulties are faced by smaller stores where the cost of implementing an e-shop may have a considerable impact on their survivability, as the failure of such an endeavour could drive them out of business [14]. To diminish this risk, most companies decide to outsource their web-operations, which in turn may increase the opportunity for e-markets [3].

To better examine these issues and understand the commercial viability of an e-market we have developed an e-market application described in the following section.
3 Description of the software application

The e-market developed is called Hardware-Portal, as it focuses on promoting offers on electronic hardware. It intermediates between stores, which are the market’s customers, and consumers. Customers upload information regarding product offers to the market, which is then organized and presented to the consumers. A single product can be associated with several offers, if more than one store provides it. The e-market organizes these offers, making it easy for the consumer to search for certain products or find the best possible offer. Consumers can also create a user account that enables them to monitor price fluctuations of their favourite products.

The Hardware-Portal encapsulates the main features of an e-market, but differs in the two following aspects:

- The e-market keeps its own database of products, which contains detailed information for each entry. This allows to better organize products, as for example according to their different characteristics. However, it requires more storage space and administrative effort than a common e-market, since the e-markets administrators need to interfere either to update information regarding products or offers or to check customers’ input.

- The e-market provides a platform for customers (SMEs) that do not have e-shops, giving them the opportunity to promote their products through an easy-to-use content management interface. This feature facilitates customers that do not have e-stores to upload, manage and better promote their products and offers. Therefore, it can make this market competitive against others, as it broadens the spectrum of possible offers, helping users to find the offer that suits them the most.

These two features affected the system’s architectural design, which is presented in the following figure.

![Fig. 1: System architecture](image)

An additional feature of an e-market relates to the way that stores/customers update their product offers. The developed e-market deals with this issue by offering two possible ways:

- Manually, through an HTML form that allows customers to create a new product, or add an offer for an already existing (in the market’s database) product. This feature will be mostly used by clients without electronic shops.

- Automatically, through XML messages from the customer’s database. Companies that are already running e-shops will be able to utilize this feature, as it only requires the installation of a program on their database which updates the e-market each time an offer changes or a new one occurs.

The handling of products and offers is further facilitated through a dynamic user interface. Through the e-market’s web site customers can manage their product offers easily with AJAX controls, supporting inline editing of offer details. They can also add new products by using the “add new product” form, which enables them to find whether the product already exists in the e-market’s database or they need to add it. Additionally, customers can add or modify offers, on the spot, while being logged in and browsing the e-market’s site. By selecting an existing product, the form is automatically filled with the details, leaving only the price and product description to be filled by the customer (Fig. 2).
Besides facilitating customers in the management of their offers the dynamic user interface also facilitates consumers in the search, selection and order of products. Specifically, the Hardware-Portal encompasses the following features:

- Advanced product browsing capabilities through which users can browse offers sorted by manufacturer, product category, product attributes, e-shop etc.
- Effective search system that includes all the mentioned browsing conveniences into an auto-completing search field (Fig. 3)

The e-market also supports “shopping cart” and “favourites” features that facilitate users that wish to monitor product prices or purchase several products at once. The shopping cart separates the products that can be purchased from the e-market itself from the ones that the user has to order through the customer’s e-shop. In this way, a user can keep a list of all the products he wants to buy regardless of the site, where the actual purchase will take place (Fig. 4).

4 Technological issues

There are many different technologies that could be used for the development of an e-market. Besides programming languages, such as PHP or ASP there are also content management systems (CMS), such as Joomla or Drupal, that facilitate and speed up the development of a web application. In this project, we selected PHP, which is a more traditional programming language, giving us more flexibility in the development of the application and allowing us to better control changes and easily handle the creation and parsing of XML messages. MySQL was the database system (RDBMS) that was used, as it easily integrates with the PHP scripting language. Finally, the AJAX technique was extensively used, in order to enhance the usability of the application.

A vast majority of web applications is using the AJAX technology, as it enriches the functionality of web pages. It is imperative for an e-market to utilize such a technology in order to have an efficient and user-friendly interface for customers that are interested in easily uploading and managing their products. However, the use of this technology raises some issues, mainly due to heavy client side scripting. Firstly, the source code is shattered between multiple PHP files casting any debugging and code maintenance process difficult. Secondly, using “back” button and bookmarking might not be possible due to the fact that in AJAX
interaction the page URL remains unchanged. Furthermore, AJAX raises compatibility issues in browsers as JavaScript can be implemented differently on different browsers. Another issue is that search engines are not able to index an application that is entirely developed in AJAX scripting language as they do not index the JavaScript content present in web pages. Last but not least, the AJAX technology suffers from security issues as the JavaScript code is available not least, the AJAX technology suffers from security issues as the JavaScript code is available.

As mentioned above, an automated way to update business plan should be taken into consideration during the initial increase the e-market maintenance costs, and alternatively, the AJAX technology suffers from security issues as the JavaScript code is available. As mentioned in the previous section, the efficiency of the e-market can be boosted if product information is retained in a centralised database with one record for each product. In this way, offer information can be better matched with specific products rendering a better organized e-market. This facilitates searching and identifying the best offer, since all offers for a specific product will be grouped together, giving users the opportunity to search offers using additional criteria, such as finding the store that is closest to the customer’s residence. Additionally, keeping a centralised database can speed up uploading offers, as customers will be able to add offers by just pricing already existing products.

However, there are certain downsides to such a choice because an e-market’s database can never be updated with all possible products. Keeping up with all the new products requires constant updates and administrative effort. In reality, when a product is not found in our database, it is assumed to be a new one. Nevertheless, there is likely to exist an alternative name for the same product, causing a mismatch and resulting to a double entry in our database. For that reason, every new product created, either automatically by an XML update or manually by a customer that updates his offers, will have to be checked by the e-market administrator. While this feature enhances the overall quality and functionality of the e-market, it increases the administrative costs in order to reassure the uniqueness of every product. Additionally, keeping detailed descriptions for every product will result in the need for large storage space, especially if our e-market covers a wide range of products. This will increase the e-market maintenance costs, and should be taken into consideration during the initial business plan.

As mentioned above, an automated way to update the product offers in the marketplace is through XML messages from the database of the corresponding e-shop. While this option does not require any effort (for data entry) on behalf of the customer and reduces the administrative workload, it is questionable whether it will be embraced by the majority of customers, mainly due to security concerns. Installing an XML client application on the database of each e-shop, raises doubts concerning its vulnerability on external attacks. Therefore, such an application will need to comply with high security requirements.

However, in the case that an e-shop can export its database in a certain format (anything from XML to Access files), a conversion to the XML message form that the market uses will allow the incoming messages to be automatically processed. This could be handled by a software application developed for this purpose. Of course, this means that the e-market will have to modify its software every time that a new file format needs to be handled. This conversion can range from matching XML tags to the corresponding ones in our database to converting entirely different file types. Depending on the complexity of the conversion, this feature adds administrative load to the market maintenance, thus extra costs. These costs could be balanced by offering lower membership fees to the customers that are willing to adapt their database export to our XML schema.

5 Business issues

A major concern for a newly established e-market is to acquire a minimum set of business clients in order to be competitive against already existing e-markets. For this to be achieved, the e-market might need to offer free services for a specific amount of time to attract the first clients. This is very important because one of the main objectives of an e-market is to include as many offers as possible, in order to achieve the lowest possible price. In contrast, not hosting enough product offers will not attract shoppers to the e-market, thus discouraging businesses to participate in it.

Additionally, the existence of many e-markets in most industries leads to a fragmentation of the liquidity as the profit is often shared to more than one e-market [6]. Due to the existence of many e-markets the order flow to a single e-market sometimes never surpasses the critical mass. This may risk the viability of the e-market and condemn it to exit the market [6].

Including offers from businesses without e-shops will clearly make the e-market more competitive.
against others. But will the stores subscribe to such a feature? While it is certain that many stores that do not use e-shops are interested to promote their products through the Internet, using the e-market as the only way to do this might not meet up with their needs. Companies that already promote their products through e-shops, have already hired staff to handle the task of managing information regarding products and stock, such as adding new products, updating offer prices and so on. Submitting offers to an e-market will be easy to handle because they are already doing so for their own e-shop (they will probably utilize the XML feature). On the contrary, businesses without e-shops will possibly have to hire new personnel in order to keep their offers updated, especially if they are intending to promote all the products sold in their physical store. Nevertheless, the cost of this expansion is lower than the cost of developing their own e-shop. This cost is further reduced if stores decide to just promote their most competitive offers (a product with a low price, a very rare product etc). Taking into consideration that only competitive offers stand out in a marketplace, clients might find no point in uploading all their products.

Customers can use the e-market’s database information to easily add offers on already existing products, without having to fill out product details (if the database is as complete and up-to-date as possible, then clients will rarely need to add new products). Furthermore, being under an e-market umbrella may help businesses evade search engine, domain name, hardware and SSL certificate costs. Of course, providing such conveniences can be expensive for an e-market. A scaled pricing for services might balance the costs of running such a feature. The pricing could depend on the number of offers uploaded (as it might lead to a need for storage space expansion), advertising privileges or operational conveniences (for example site statistics).

An issue that arises when working with businesses that do not own e-shops is that they will not probably support shipping of their products. The e-market could offer such services to these customers, by either managing its own courier service or by collaborating with an existing courier company. A popular e-market handles many more orders in a fixed time than the average e-shop. In this way, an e-market can offer lower costs due to profitable price arrangements with courier companies (the courier costs for each order are lower in courier price packages that include large number of orders).

Undoubtedly, there are vast possibilities in the way that e-markets will evolve. The e-market that was developed for this project expands the e-market business model by including offers from businesses without e-shops. This expanded business model is much more demanding than the previous one, allowing many improvements to enrich the site functionality.

Additionally, the clientele of the e-market could be further expanded with non-entrepreneurial customers adding offers for (probably) used products. As it becomes obvious, the contemporary e-market model marches towards the e-auction, allowing every single member (entrepreneur or not) to promote offers. This tendency is also boosted by the users’ preference for e-auctions.

6 Conclusions

This paper showed that although e-markets can provide many benefits both to companies and consumers they are not always successful. Third-party software organisations aiming to develop e-markets to facilitate the transaction between buyers and sellers need to take into consideration various different factors that might affect their profitability. Although web technologies provide them many opportunities for the development of e-market applications, software companies need to examine them carefully before selecting the ones that better satisfy their needs. More effort needs to be put on the design of the system’s architecture, where decisions regarding the manual or automated update of products and offers, as well as the development or lack of a centralised database will considerably affect the functionality and impact of the e-market.

As this paper showed decisions taken at the technological level cannot on their own lead to an e-market’s success. A major concern for newly established e-markets is to attract as many customers as possible and this can be mainly accomplished through the provision of cheap and innovative services. To expand their market base they could consider providing services to customers without e-shops. They could also consider offering shipping services or expanding their business to also include e-auctions. Therefore, the success of e-markets hinges largely on business and managerial
issues, even if it is enabled by the use of specific technologies.

References:


