

Conceptual Design of an E-Marketplace for Small and Medium Enterprises in the Turkish Machinery Industry

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Abstract

This paper reports on the results of a study carried out in the Turkish machinery industry. The purpose of the study was to identify the benefits the sector can seize from e-business and to develop a conceptual framework for potential e-business applications. We analysed the current state of e-business use in the machinery industry in order to understand the future requirements and application opportunities and to come up with a conceptual e-business design that would suit both the needs and the characteristics of the sector. The study included those companies, which are members of the Machine Manufacturers' Association (MMA) in Turkey. Information about the existing applications and future requirements was obtained from the results of a survey conducted among the member companies. Statistically adequate number of responses was obtained to make the results representative of the machine industry. Web sites of the member companies were also reviewed for further information gathering. Results indicated that most of the companies are Small and Medium Enterprises (SME) and it would be better for them to carry out certain operations through an e-market specifically designed for the sector. The proposed conceptual e-market design is based on the characteristics of the industry emerging from the survey.

Keywords E-Business Transformation, B2B, E-Marketplace Model, Small and Medium Enterprises, Machinery Industry.

1. INTRODUCTION

This paper reports on the results of a study carried out in the Turkish machinery industry [1]. The purpose of the study was to identify the benefits the sector can seize from e-business. For that purpose, a conceptual e-marketplace model was developed for potential applications in the Turkish machinery industry. Success of the applications depends on the extent with which the characteristics and future needs and expectations of the industry are reflected in the design of the model. Therefore first an analysis of the industry was performed followed by the interpretation of the findings and the design. The organisation of the paper is along the same lines: in the next section we provide an overview of the Turkish machinery industry. Following this we elaborate on the existing business characteristics of the industry. In Section 4, we present the conceptual e-business models developed. The next section is spared for comments and recommendations for the transition of the companies to e-business if the proposed models are adopted. In the last section, we present our conclusions and future work options for an extended study of the applications of the proposed models.

2. TURKISH MACHINERY INDUSTRY: AN OVERVIEW

Turkish manufacturing industry produces approximately 20% of the Gross National Product (GNP) in Turkey. This contribution to the economic value added has gradually increased over the years from 15% in the early 1970s to 19-20% in the early 1980s and remained in the range 20-23% over the 1986-1997 period (e.g., 23.1% in 1995). This value ranges between 32.0% for Ireland to 13.0% for Greece among the EU countries [2]. Machinery industry's share of the total value added in the manufacturing industry in Turkey has been 4.4% in 1995 and 4.6% in 1996. Its share is comparable with those of food industry (11.1%), textile (12.2%), and petroleum refineries (13.7%), which are the largest three industries in Turkey in terms of their economic value added [3].

The MMA has currently 163 members active in various sub-sectors of machinery industry. Designing a conceptual e-business model for such a diverse group of companies requires the identification of the underlying features of the current business practices and the assessment of the readiness of the companies to new applications. Therefore, a questionnaire consisting of 18 questions was sent to all member companies. With 63 companies answering, a response rate of 38.7% has been achieved. The following observations provide an idea about the profile of the companies responding:

18% of the companies employ less than or equal to 30 people. 18% of the companies employ between 31-50 persons. Employment with 51-100 persons is observed in 25% of the companies. Therefore 61% of the companies have a workforce below 100.

Total annual revenues of the companies are relatively small. Companies with total annual revenue less than or equal to \$3.2 million in the year 2000 constitute 58% of the responding companies. Similarly 19% of them have revenues in the range of \$3.2-8 million and 23% have revenues above \$8 million in the same year.

89% of the companies export to various countries. 44% of total exports are directed to EU countries. Exports to Middle East (19%), and non-EU European countries (11%) are the next relatively big shares to follow EU countries.

3. EXISTING BUSINESS CHARACTERISTICS OF THE INDUSTRY

Our study for possible e-business applications concentrated on the suppliers and customers, i.e. on both ends of the supply chain. Therefore we obtained detailed information about procurement and sales processes.

3.1 Procurement

The MMA companies use mostly two procurement channels: spot sourcing and systematic sourcing. Spot sourcing is the dominant channel for procurement: 38% of the companies do spot sourcing for more than 80% of their purchases (percent in monetary value). 44% of the companies use the same channel for the 40-79% of their procurements. For the remaining 18% of the companies, spot sourcing has only 40% share in total procurement.

The share of companies fulfilling 80% or more of their procurement requirements by systematic sourcing is only 5%.

Nearly 90% of the suppliers of the companies are located in Turkey. Their share in total procurement is 81%. Remaining 11.3% of the suppliers are located outside Turkey. The value share of procurement from such suppliers is 19%.

3.2 Sales

Companies that achieve 80% or more of their sales through customer orders constitute 42% of the responding companies. When the rate is reduced to 60% or more, the percentage of companies achieving sales through this channel increases to 62%. Only 8% of the companies achieve 80% or more of their sales through their distributors.

Survey indicated that more than 56% of total annual cash flows of the companies as a whole is generated from four product groups. This shows that the machinery industry is focused on a limited number of product groups.

For 36% of the companies, sales of main product of the company constitute more than 70% of total sales.

When the most demanded two products are considered, it is seen that 56% of the companies achieve more than 90% of their total sales from these two products.

3.3 IT Infrastructure and Its Use

Companies' rate of answering IT infrastructure related questions was varied. Of the 39 companies 72% mentioned that they have at least one server. 87% of the 54 companies have their Intranet connected to Internet. 65% of the companies own 24 or less number of PCs.

Of the 62 companies answering the question as to what extent they use the Internet as a means of doing business with their suppliers and customers, 92% have a web page providing company information. Furthermore 66% of the companies display technical specifications of their products in an online catalogue on their web site. 76% of the companies use e-mail to communicate with their suppliers and customers. 19% of the companies give online services which cover most frequently asked questions, complaint handling, and more information on technical specifications and like. An interesting finding is that eight companies share information with their customers and six companies share information with their suppliers on inventory data, demand forecasts, and production plans.

Two of the important reasons for web and Internet existence emerged as being able to reach the international markets (94%) and PR (89%). The other reasons are knowledge management (33%) and to gain experience with the new media.

Companies consider the Internet as an important alternative medium for doing business (84% of 58 companies) and believe that it provides competitive advantage over those that do not use it (88% of 57 companies). 76% of the companies do not agree with the statement that e-business is not suitable for their industry. 64% of the companies do or plan to do part or total of their procurement through the Internet. Companies, which achieve or plan to achieve their sales on the Internet constitute 72% of the total number of companies answering the related question.

Analysis of the companies which see the Internet as a means of doing business showed that there is high degree of awareness about reduced costs (mainly postal and logistics costs), increased speed of communication and response to market dynamics. 64% of the companies rate either of these gains as the main incentive for doing business on the Internet. Reaching new markets is given first priority by 63% of the companies.

Among the obstacles faced by the companies for doing e-business, 31% of 58 companies stated the difficulty to establish and use the information infrastructure, 21% stated the cost of IT investment as the highest ranking obstacle.

4. CONCEPTUAL E-BUSINESS MODELS FOR MMA

Current analysis of the MMA member companies indicates that they are all SMEs and may not have the necessary infrastructure and qualified personnel to initiate and carry out e-business applications. Therefore an umbrella institution like the MMA may be very beneficial in guiding them through the transition process. Furthermore, today there are a number of domestically established e-business provider companies offering various opportunities to the SMEs.

Some e-business platforms in the markets work as industry focused vertical e-markets trading manufacturing inputs and providing exchange capabilities for sellers and buyers dealing with homogenous products in a particular industry. There are also horizontal e-markets, which are multi-industry and provide exchange capabilities for sellers and buyers in more than one industry. These horizontal e-markets in Turkey are SME focused and sometimes integrate a commercial bank, a software company, an IT infrastructure provider company, and a management consultancy company.

Based on this setting, we have developed some alternative models for the MMA and its member companies for the incorporation of e-market in their marketing/sales and procurement activities.

4.1 Marketing and Sales

Two alternative e-business models have been proposed for marketing and sales processes of the MMA member companies:

- The companies can subscribe to one or more of the existing horizontal e-marketplaces.
- A vertical e-marketplace can be organised by the MMA under an industry network, which we will refer to as the MMAnet from here on. In that case the MMAnet should get a commercial identity to be able to act as a service provider to its members.

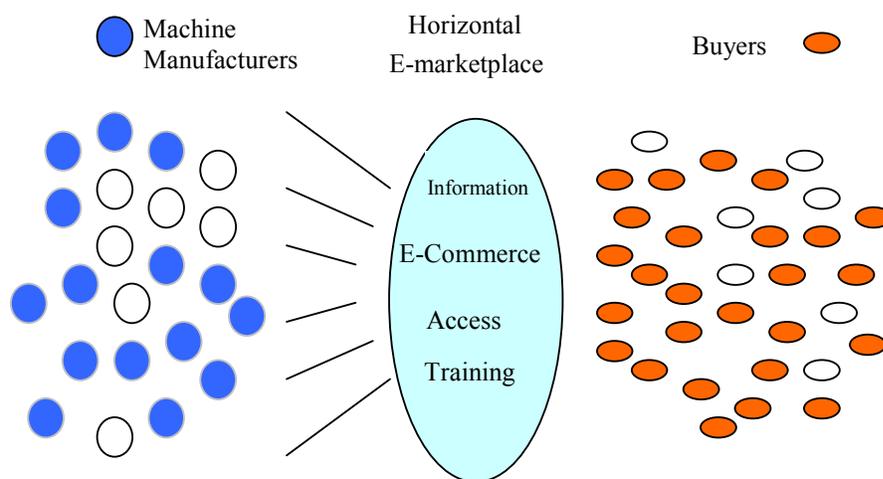


Figure 1. Horizontal e-marketplace model for MMAnet

Note that these two alternatives are not mutually exclusive. A manufacturing company may choose to subscribe to one or more of the existing e-market places as well as subscribing to the e-marketplace established by the MMAAnet. The choice of the first alternative by a company will mean operating in a multi-industry marketplace as shown in Figure 1. Since horizontal e-markets are not designed for a specific industry, they might be less attractive for potential customers.

With the second alternative model, which is displayed in Figure 2, companies will use a vertical e-marketplace specifically designed for the machinery industry. Although this industry specific e-marketplace will take place within an existing horizontal e-marketplace, buyers can directly reach this marketplace and easily find the products they are searching for. Furthermore both buyers and sellers can make use of sector specific services. Such services may consist of sector related news, information on new technologies, new markets, training packages and consultancy. Ordering and sales procedures may be designed according to the needs of the sector.

VerticalNet.Com sets an example for horizontal e-marketplaces, which joins many vertical e-marketplaces. One such vertical marketplace is Machinetools.com for machinery manufacturers. There exist similar horizontal e-market places established in Turkey, which can play the same role as VerticalNet.com.

A vertical e-marketplace run by the MMAAnet can be designed to reflect the accumulated knowledge about the features and issues specific to the sector. In addition to the services mentioned above and dissemination of demand information to the MMA members, the MMAAnet can provide the most common services such as support for web page and catalogue preparation and software leasing.

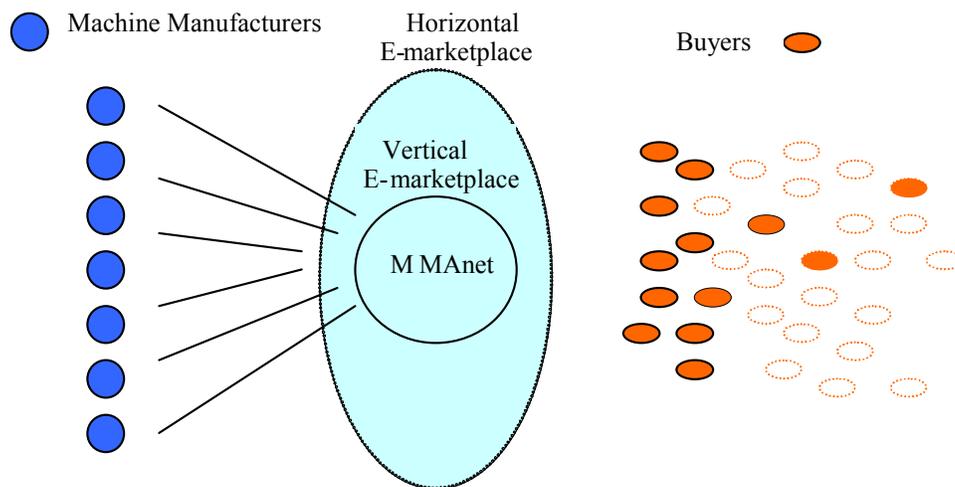


Figure 2. Vertical e-marketplace model for MMAAnet

4.2 Procurement

An e-business alternative for the MMA companies is to reach the existing vertical and horizontal e-marketplaces to meet their purchasing needs.

When the MMAAnet's involvement in procurement activities is considered, three alternative models can be proposed.

The first alternative for the MMA companies is to make their purchases via the MMAAnet. In this option, the MMAAnet can act as an intermediary between the existing e-marketplaces and the MMA companies. The MMAAnet can aggregate the demands of a large number of buyers to create the force of a large single buyer and negotiate with the

suppliers on the companies' behalf. Such a service will be useful in the procurement of both the MRO goods and major direct inputs. All the MMA companies will experience considerable cost savings.

If this model, which is shown in Figure 3, is implemented, the MMA net will provide the following services to its members:

- Search for appropriate marketplaces,
- Coordinate logistics operations,
- Automate purchasing operations,
- Provide appropriate software for automated operations,
- Provide training and consultancy.

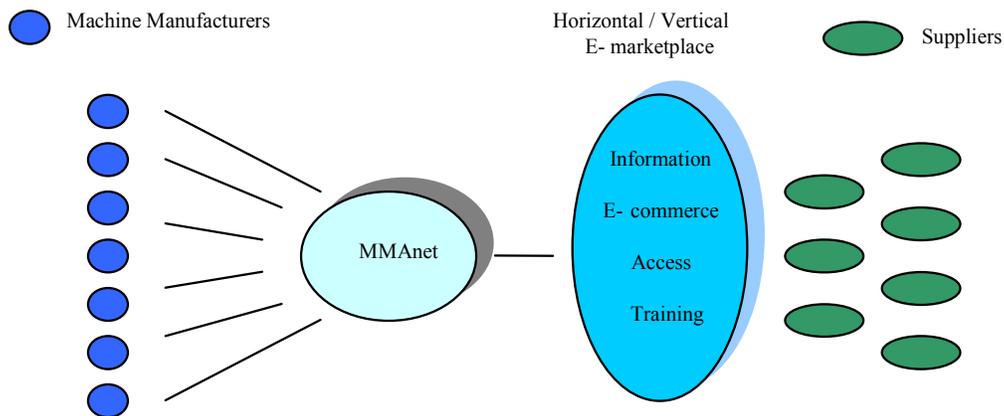


Figure 3: MMA net-external e-marketplaces model

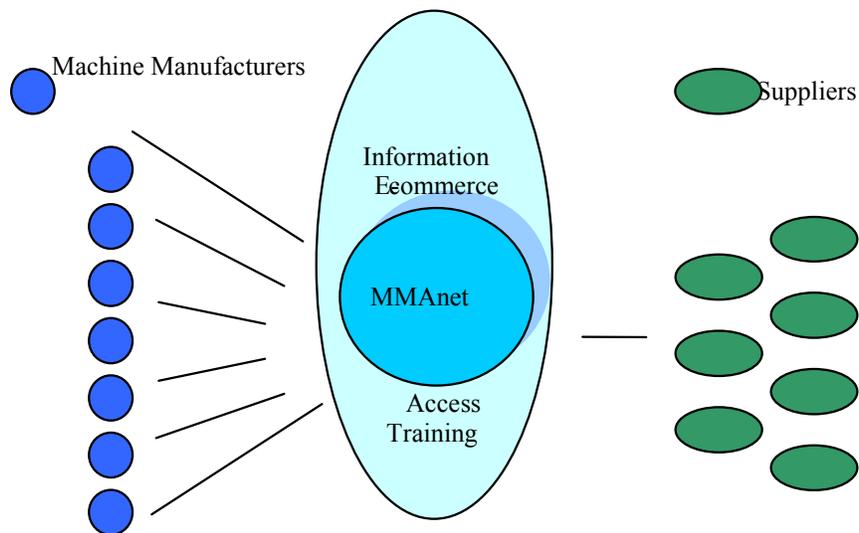


Figure 4: MMA net buyer-focused e-marketplace model

A second alternative for the MMA is to design its own buyer-focused e-marketplace as illustrated in Figure 4. In that case, the MMA net will again assume an aggregator role but this time reach its suppliers through its own e-marketplace. Implementation of this model requires a thorough analysis of the procurement needs of the sector and determination of which inputs and MRO goods are suitable for this model. The MMA should also develop an understanding of the related supplier markets.

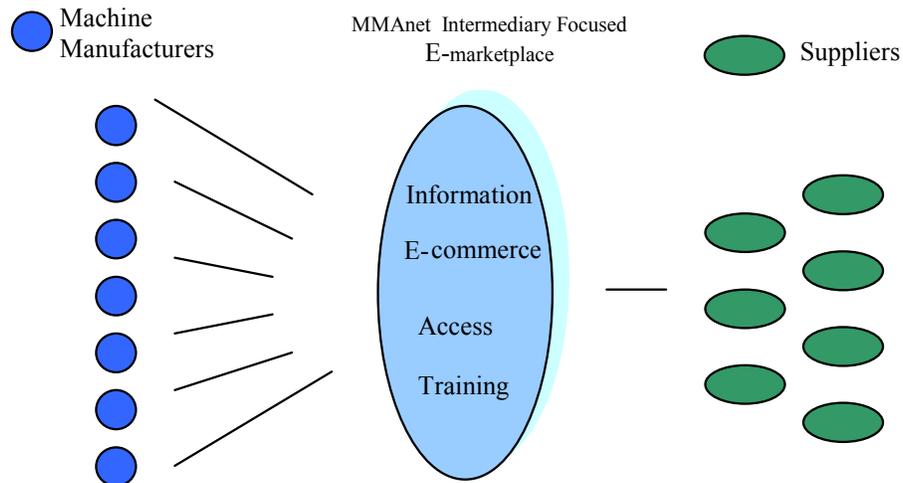


Figure 5: MMA net intermediary-focused e-marketplace model

A third alternative model for the MMA is to establish a marketplace, which will directly bring together the buyers (the MMA members) and the suppliers. The MMA net will act as an intermediary, providing trust and quality service for trading partners. Since the MMA net's role of demand aggregation is not involved in this model, the members will not experience savings from consolidation of demands. With this model, two major sources of revenue for the MMA net's marketplace would be a subscription/membership fee for the MMA companies and transaction based predetermined charges from the suppliers. The proposed model is illustrated in Figure 5.

For the MMA companies, round and flat iron and steel products constitute nearly 80% of total direct inputs purchased. There is an ongoing initiative by a private company to establish a vertical e-marketplace for the Turkish iron and steel industry. When in operation this marketplace may become major suppliers' marketplace for the machinery industry.

5. TRANSITION TO E-BUSINESS

The restructuring needs of the companies for e-business transformation will depend upon the complexity of the business processes and the companies' readiness and commitment. Some of the activities of the proposed models are relatively easier to implement but will need prior work. Therefore, a gradual transition with continuous improvement is recommended. In general, companies should go through the following stages for e-business transformation:

5.1 Marketing / sales

Companies can start by preparing the company product catalogues. Since e-catalogues are going to form the first link to worldwide customers, presenting right information and compliance with the international product coding standards is critical to success. Maintaining the web page and the catalogue is the next stage. Having established an external contact point with the world via company web page, the next stage is finding the appropriate e-marketplaces for subscription. Carrying the ordering and sales activities to the online environment should follow. The last stage will involve implementation of online payment procedures.

5.2 Procurement

E-business transformation of procurement activities should naturally start with the analysis of the procurement needs of the MMA member companies.

This can be followed by the choice of the common MRO goods and other input materials, which are suitable for demand consolidation. It is also necessary to analyse the procurement processes of the companies for switching to automation.

In parallel with the analysis of the MMA member companies, suppliers' markets must be analysed, and appropriate e-marketplaces must be determined. Though its implementation will take place at a later stage, options for implementing e-transactions must also be determined.

6. SUGGESTIONS AND MMA'S ROLE IN E-BUSINESS TRANSITION

We believe that the MMA member companies will go through a gradual transformation to e-business. When this transformation, aided by the MMAAnet, is complete, our proposed model will ultimately take the form as shown in Figure 6. This model assumes a sectoral vertical e-marketplace run by the MMAAnet for marketing and sales, and the MMAAnet intermediated e-marketplace for procurement.

The MMA's role, via the MMAAnet, during the transition period will be different at each stage of transformation. For gradual transition of companies to e-business the MMAAnet can start with providing training activities to its members. The MMAAnet can help its members by presenting management software leasing options. The MMAAnet can promote the standardisation of software use for easy exchange of data and compatible reporting. Further contributions of the MMAAnet in the e-business transformation of the companies will be in the areas of marketing and sales, and procurement.

6.1 Marketing and sales

We believe that the best model for marketing and sales activities of the MMA companies is the second model, where they are represented in a sector specific vertical e-marketplace run by the MMAAnet under an existing horizontal e-marketplace. In this case, the choice of the most appropriate horizontal e-marketplace will be determined by what services are offered.

The MMAAnet should play an active role in setting the standards for online catalogue preparation and its maintenance and should co-ordinate the flow of information vital for the operation of the e-marketplace.

6.2 Procurement

For the first stage of transformation, we propose the model where companies can individually reach the existing e-marketplaces. The role of the MMA net in this stage will be to present information about existing e-marketplaces and provide training to its members.

The second stage of transformation may involve the model with the consolidation of demands of large number of buyers by the MMA net. In this stage, it will be the duty of the MMA net to negotiate with the suppliers on behalf of the companies under the MMA net.

The last stage of the transformation will be the implementation of the conceptual e-marketplace, which was given in Figure 5. Before the implementation, the MMA net must determine its suppliers and accomplish the automated purchasing systems.

Timing and duration of these stages constitute a strategic decision for the MMA administration.

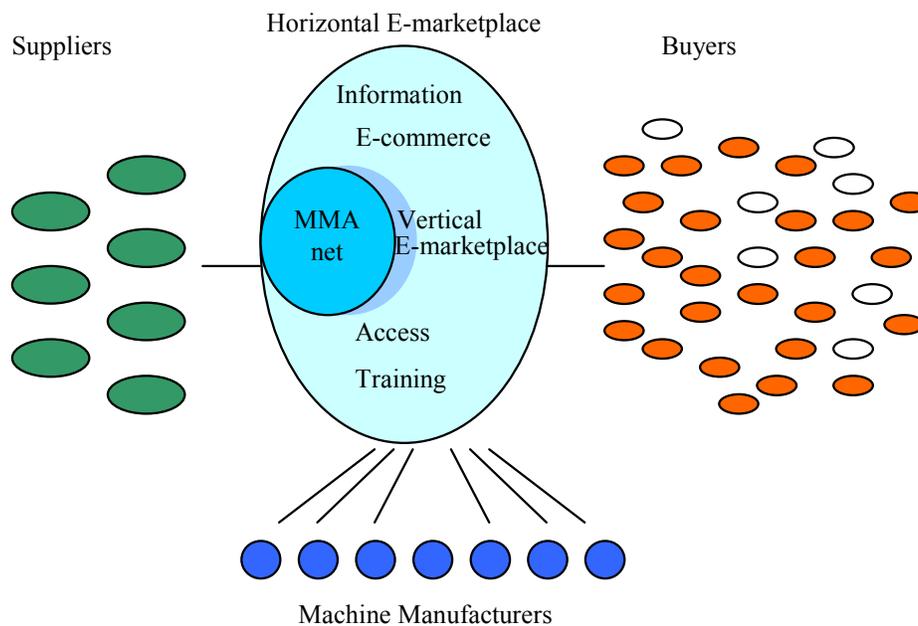


Figure 6. E-marketplace model for MMA

7. CONCLUSION AND FUTURE WORK

This paper has summarised the findings of a study performed for the Turkish machinery industry with the scope of identifying e-business options and presented a set of conceptual models designed for marketing and sales, and procurement operations of the related companies. The models and recommendations have been well received by the MMA administration and member companies. When the MMA starts with the implementation phase, the project team may be involved in a before and after analysis of costs and sales and in the development of meaningful metrics for assessing the level of success of the transformation to e-business.

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