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MCP AND LOGISTICS – ADVANCED TOOLS FOR THE ULTIMATE SUPPLY CHAIN MANAGEMENT

Radmil Polenakovik[1], Tashko Rizov[2]

[1]Faculty for Mechanical Engineering, University "Ss. Cyril and Methodius" , Macedonia,

[2]ICL Group d.o.o, Macedonia

Abstract

Today's business knows no boundaries. It is in continuous pursuit of all kinds of opportunities that could be transformed into profit.

In recent years, effective logistics management and new industrial engineering techniques has been recognized as a key opportunity to improve both the profitability and competitive performance of the companies.

Macedonia is a small country with a population of 2 million and an economy that has never been able to support mass production. The key competitive advantage of Macedonia is its location on the crossroad of Corridor X and Corridor VIII and its low costing work force. This makes this Balkan country perfect for addressing European niche markets.

In these past several years Macedonian companies have undergone a lot of difficulties form privatization and market loss to splitting process of the relatively big state-owned companies into lots of small and weak entrepreneurial companies. After the process of restructuring and reinventing them selves these SMEs now are investing in new technologies and doing their best to win in the battle for competitiveness with similar companies from the neighboring countries and countries from the East.

After regaining the markets and partners from the past, Macedonian SMEs are struggling to keep their competitive advantage. The low cost working force is definitely an advantage but not the key factor on which strategies for competitiveness should be built. On the other hand, the geographical location of Macedonia and its closeness to the EU markets is that factor on which this country can develop its competitiveness strategies. This in the end means fully satisfying the niche markets in EU with fast market response and producing customized products.

In order to achieve all that Macedonian SMEs have to invest in new advanced technologies and engineering techniques but in the same time develop and implement all the supporting techniques that will enable them to reach that point. That means implementing business process reengineering, implementation of supply chain management solutions and advanced marketing and sales techniques. All here mentioned is only a part of what is needed in order to effectively implement the competitiveness strategies.

This text will present the experiences of the machine tool industry in Macedonia and the way towards achieving competitive advantage and the growth on the international markets. This text also

explains the tools and applications used in that process and the effects of their implementation.

1. INTRODUCTION

Companies are forced to address the ever lasting individualization of the customers needs. At the same time, cost management is still an imperative as a result of pressures by competitors on the global market. After all, creation of efficient companies that are focused on satisfying customers' needs is a priority to almost any top management in any industry. Mass customization, personalization and open innovation are the key business strategies that can help companies in addressing these issues.

The Mass Production of standardized goods was the source of America's economic strength for generations and became the model for successful industries. Today, that model is a major cause of the nation's declining competitiveness. Innovative companies are embracing a new paradigm of management – Mass Customization – that allows them to individually customize their goods and services at competitive prices or better. Companies like Procter&Gamble, Lego, Nike, Adidas, BMW, Levi Strauss and others have embraced such mass customization programs. At the same time, many newly formed companies that from the very begging started to work under the mass customization principals have failed in record time.

Macedonia as a small country with a population of 2 million had and has an economy that has never been able to support mass production in that scale and sense as in America or Germany. After the period of transition and adjustments this small Balkan country is now competing on the global market and trying to embrace the latest principals. The real dilemma here is if this country and its industries are able to jump directly to this new paradigm of management of mass customization.

Further along the spectrum is niche market customization. For instance, a company that makes shoes has only a few customers who want several dozen models in many colours all with specific logos. Exporters have to deal with many niche market products, usually a different set of products for each country or region exported; and even if the differences seem minor, the sheer variety of SKUs (stock keeping units) can have significant cost and flexibility implications. Almost all companies could benefit from expansion into niche markets if they could do it efficiently.

Only by implementation of advanced tools and application and continuous improvements in the logistics functions and activities such results can be achieved. Since in today globalization almost anything can be replicated, duplicated or re-invented very easily the key competitiveness should be build upon unique characteristics, such as the geographical location or in-place infrastructure.

2. CURRENT CONDITION IN MACHINE TOOL INDUSTRY IN MACEDONIA

The metal industry in Macedonia is on a high competitive level and it is growing and getting stronger attracting many domestic and foreign investments. The machine tool industry is the least developed industry segment from the metal industry. In keeping with other industry segments, it undergoes a period of growing and strengthening. Products from the machine tool industry are products with highest value added, compared to the products from the other segments of the metal industry.

In Republic of Macedonia in the machine tool industry, today exist 159 companies, which of 92% are companies with less then 70 employees or small and medium sized enterprises. The majority of them, around 90%, are working with sheet metal forming and injection molding. According to the data collected from the companies by the research done by MEVnet, Macedonian companies produce tools and dies for the domestic market - 10%, and 90% for export. They export in the Western Balkans (Bulgaria, Serbia, Montenegro, Croatia and Kosovo), in the EU (mostly in Germany, Slovenia and Italy), in Russia and a small part to countries of the Middle East.

Macedonian companies in this industry segment have satisfactory infrastructure with good production facilities and they are equipped with very good machines. They also employ the best constructors and machine operators in the region, which results with quality of the products. The raw materials used are mostly imported from the EU that contributes to the high quality of the products.

As Macedonia seeks to grow its economy and presence by becoming a member of international organizations, the Macedonian government and Macedonian companies are facing new requirements to participate in the global system. For instance, from January 1st, 2007, Macedonian companies are facing the challenge of providing electronic 48-hour Advanced Shipment Notification (ASN) for all exports into the EU. To execute this in practice ICT solutions and excessive use of

Internet must become everyday practice in Macedonian SMEs.

3. NET-CENTRIC SOLUTION FOR ULTIMATE SUPPLY CHAIN MANAGEMENT

Global competition is putting business pressure on all supply chains to reduce their costs while being more proactive. At the same time, the companies with their suppliers and clients are facing mountain pressure to co-ordinate and increase collaboration in their business activities and processes.

The today ICT solutions together with the opportunities of the Internet put in relation with the market requirements of faster responding and more agile companies stimulates finding new ways for optimization of logistics activities.

According to the market research Macedonian Machine Tool Industry needs to implement this kind of a solution in order to raise its competitiveness on both domestic and European markets.

In this paper we will present an electronic net-centric solution for trade facilitation which our research team came up with in collaboration with Inner Circle Logistics Inc. In order to facilitate trade and to ease the access of Macedonian companies to the foreign markets it is necessary to ease the flow of materials and information.

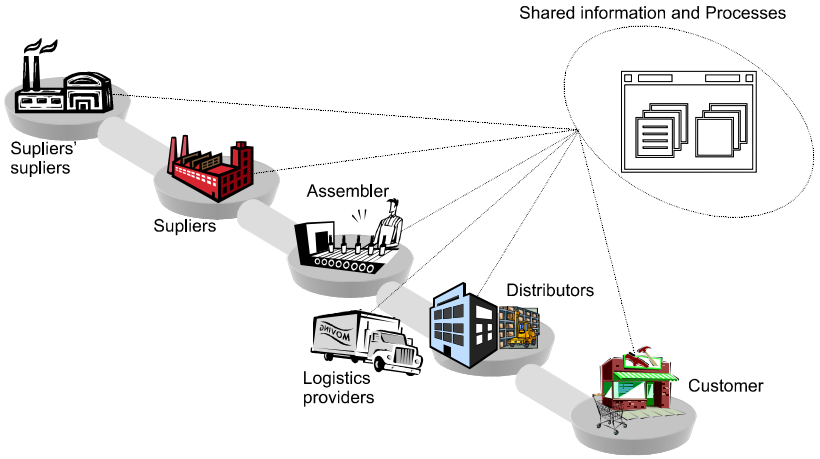

Fig. 1. Centralizing the flow of information in a Supply Chain.

Best way to do this, but in the same time to successfully manage with it, is the use of the concept of Supply Chain Management. There are several ways of implementation of Supply Chain Management solutions in companies but every single one of them demands lot of resources that Macedonian SMEs are not capable to provide. That is why it is important not to implement robust and expensive solutions in each company but instead to create an innovative solution that is going to be installed centrally with small client applications installed at different SMEs, members of the supply chain. It is an innovative approach for this kind of activities in this region.

In order to achieve this, it is necessary to build a strong and highly secure database together with creating a system for collection of the data and a tool for transforming these data into useful, desirable and profit-generating information (reports, charts and diagrams).

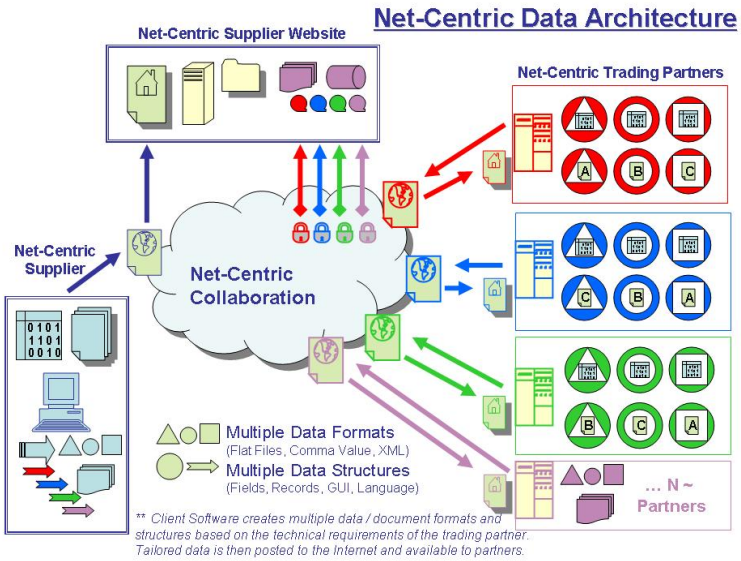

Fig. 2. Net-Centric Data Architecture.

For the time being and according to the market needs and available resources data is collected and stored for three issues:

- Inventory
- Order tracking
- Operations costs

Our team installed a client application (Scarborough Fair [SM]) that transforms data from the companies' data bases into the needed format (using drivers and xsd-files) and sends them via Internet to the data base located on a server locally. Using another tool (Side Show [SM]), companies are able to transform the collected data into custom made reports that are published on a web page with access controlled by username and password. In that way, companies have the opportunity to manage their supply chains and raise their competitiveness and profitability.

Customers that would like to have access to these reports can send a simple request directly from the Index web page. Usernames and passwords are assigned with the suitable level of access according to the sent request.

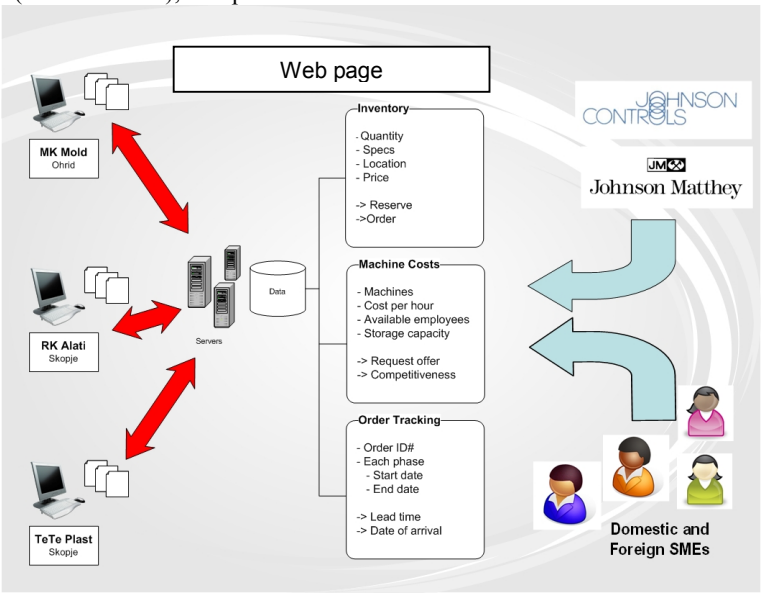

Fig. 3. Current situation with the implemented solution

With that, customers can gain access to these reports and have the ability to see the inventory of products of their interest, their quantity and location. Also, customers can use the data published on this webpage to evaluate suppliers, to place an order and afterwards track that order during each business process. This is crucial to companies that are working according the Just-In-Time production concepts and two such companies (Johnson Controls and Johnson Methy) started building their production facilities in Macedonia.

How this solution functions today is going to be displayed through the following several figures. A company that wants to do business with the members of the tool-and-die supply chain in Macedonia, or an actual member of the supply chain can approach the public website and identify by entering user name and password.

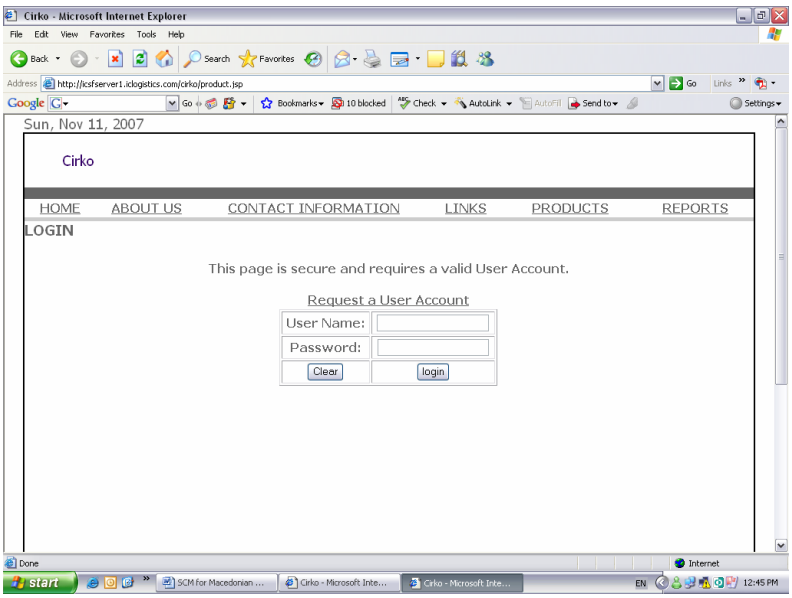

Fig. 4. Customers approaching the website and identifying with username and password, or sending a request for access.

After gaining access to the website, list of available products is displayed, or the actual inventory held in companies. This list shows the product name, code, location, availability, and price. For certain products additional information are available, such as product dimensions, shipping dimensions (height, weight, length, depth) and detail description of the selected product. Users now have the ability to reserve or place an order for required quantity of certain product. That reservation/order is sent directly to the SME's inbox.

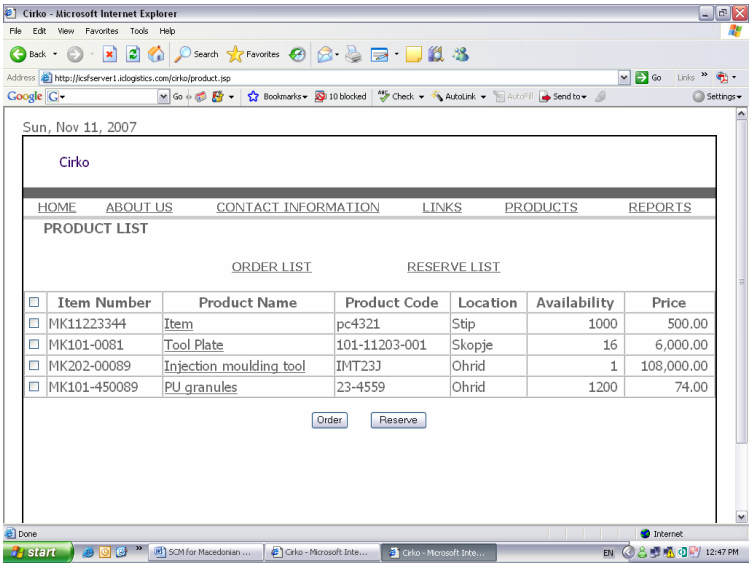

Fig. 5. A detailed view of each SME's inventory with specifications, quantity, location and price.

After a customer places an order this solution offers the ability to track that order by dates through the business processes or the production phases inside the SME. For this report, so far, data is entered manually by the SMEs. The plans are that this process is going to be automated by adding Automatic Identification and Data Capture Devices (AIDC) like RFID – Radio Frequency Identification technology. That is in alignment with Macedonian Customs development where RFID readers are going to be placed on major Macedonian border-crossing points enabling Macedonian Customs Administration to process data collected by RFID.

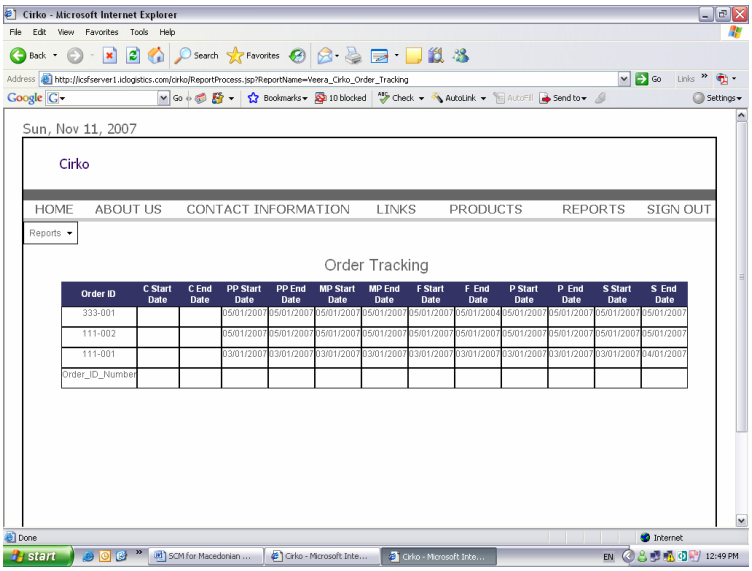

Fig. 6. Customers have the ability to track orders in real time.

This service is offered on contract basis. Each company that would like to use this service is contracted in a one-year-period. The contract fee covers installation and customization of all needed elements in the customer-company and managing the system. Additional resources on behalf of the company are one standard Personal Computer and an Internet connection.

The specialized software and applications needed for successful implementation of this service are

provided by Inner Circle Logistics (ICL) Inc. St. Louis - USA.

The benefit of this is standardization and digitalization of the input and output information in the key business processes in the companies. In that way, this kind of information can be shared between cooperating domestic and foreign companies. This will accelerate and simplify intra and inter-country flow of information, goods and services. The expected result is implementation of this SCM solution in companies from the machine tool industry and lowering the time-to-market up to 15%, to lower the inventory level held at companies up to 10% and to achieve order fulfillment up to 95%.

4. AREAS FOR FURTHER IMPROVEMENT

Making mistakes along the production process is too expensive. Finding the right setting at the early beginning is the biggest challenge that has to be overcome by companies. The successful solution on this issue is what makes a company more or less competitive.

The use of modern technology and advanced solutions is crucial for becoming and staying competitive in today markets. Although it seems simple, the process of implementation of new, or optimization of the existing processes requires specific know-how that is not always easy accessible for companies. Achieving satisfactory level of competitiveness and profitability is difficult for all companies in Macedonia but especially for small and medium sized enterprises (SMEs).

4.1. Networking

Since the majority of the companies are small and medium sized they are very vulnerable and week to stand alone. That is why it is necessary to join forces together in order to be competitive on foreign, bigger markets and to be able to quickly respond to the requirements of big companies that are present or coming on the domestic market. Networking is something that will provide all this to Macedonian SMEs.

Networking is also very important in order to answer the requirements of today's global markets. Since the production process of tools and dies, molds and castings is different than other production processes. In general most of the activities are project based, there is no mass production. So the production process is designed for each project. Since the companies are small and they do not in-house all type of equipment that might be needed for fulfilling a project task it is necessary to cooperate and share resources with other companies in the industry.

Networking is also needed in transfer of know-how for all the business processes in a SME in the machine tool industry. As mentioned previously, production process is in general project oriented so SMEs are facing unique problems and obstacles that sometimes need lot of resources to overcome them. Through networking, key competences and experiences could be transferred and it could be reached to all SMEs.

4.2. Use of ICT in business processes

In recent years, the use of ICT gives companies the key competitive advantage competing on domestic, but more importantly on the global market.

The competitive advantages that successful use of ICT provides are extremely important and very obvious for SMEs. That is why the use of this modern technology is more than recommended for SMEs in every industry. Also the level of their use is very important. So far, in Macedonia SMEs were able to use ICT only in one or two business processes. It were the processes were either the state or somebody else obligated them. Although they were able to see their competitors from the developed countries gaining the benefit of their use, they were not able to follow them in that process due to their financial weakness and the lack of know-how in the country.

Foreign investors and donor organizations (USAID, GTZ, SINTEF) that are present in Macedonia recognized this and did their best in overcoming it. Several Projects that were realized in past few years made ICT closer to Macedonian SMEs. They closed the gap that was present for a quite long time.

4.3. Logistics operations

In order to facilitate trade and to ease the access of Macedonian companies to the foreign markets it is necessary to ease the flow of materials and information.

The flow of materials and information, the transport of raw materials and finished goods is up to 40% of the lead time which makes our companies less competitive to the outside markets.

The reason for the existence of the supply chains is that there are very few companies that can produce end products for end-customers from raw materials on their own, without the assistance of other organizations. The company that produces the raw material is often not the same company that sells the end products to the end-customer. In order to provide end products to the end-customers, a network of actors is involved in activities (as purchasing, transforming and distribution) to produce products and/or services. All of these actors add value to the end product. The series of companies that interact to produce end products, and to contribute to the value of end products, is what will be called a supply chain.

Supply Chain performance will be a key indicator of overall corporate success in the upcoming period and core advantage when entering foreign markets and compete with low cost countries.

Consequently, the competition is no longer between companies but between supply chains. The goal of the entire supply chain becomes the common objective of each company. Cost and service improvements that were not achievable by individual companies will now be attained by cooperating companies.

Macedonia is centrally located in the Balkans and has the required infrastructure to become a regional centre for trade facilitation and Supply Chain competency. According to the analysis done by CIRKO MES, experts from the Non-Governmental Organizations and experts from the Macedonian government the creation of a Supply Chain center is feasible and sustainable based on the following findings:

- There are push and pull factors that create real demand for electronic supply chain, logistics and trade facilitation solutions amongst Macedonian SMEs.
- The freight forwarders form a buffer for many SMEs by providing cross border trade services that shelter most from the complexity of integrated supply chain optimization and net-centric data and document management.
- The initial penetration for electronic supply chain, logistics and trade facilitation tools is at the cluster level, with freight forwarders and with selected early adopters. With time and education, the early adopters will help diffuse technology out and down the supply chain as a result of the push and pull factors.
- The implementation of electronic supply chain solutions will confer measurable benefits on Macedonian industries, including opening up new opportunities for Macedonian manufacturers to move up the value chain and create made in Macedonia products.

4.4. "Co-opetition"

In deciding how to conduct a business in an increasingly complex world, it now seems an oversimplification to limit one's analysis to the competitive environment. Furthermore, the reliance on competitive analyses implies the existence of purely adversarial relationships between the players in a given industry. In reality, there may be cooperative relationships within a competitive industry without resorting to unfair or non-competitive monopolistic practices. In fact, cooperation and competition often exist concurrently between the same two players. This is based on the premise that business is not necessarily a zero sum game where each situation is win-lose. There can actually be scenarios in which win-win is achieved by cooperation and others in which lose-lose occurs without it. In fact, without cooperation often times there exists a lose-lose-lose situation because not only do the competitors end up losing out on a potential market, but the market gets underserved because consumers lose out on a potentially useful product or service.

In highly segmented industries with strong network effects, such as the information technology industry, cooperation and competition, or Co-opetition, may be the only way to conduct business. Because of strong network effects it is often difficult in the information technology industry to get new products off the ground. In addition, the market demands more and more interoperability and this requires technical standards. However, the establishment of technical standards by competitive market forces in and of themselves is usually a rocky road. Frequently, it leads many incipient companies down the road to bankruptcy and established companies down the road of product abandonment before their contributions can get any wind in their sails. Many years of fruitless, cutthroat competition in which no clear winner emerges inhibits the overall health of the market, in terms of company profitability and in terms of interoperability and high customer investments which often become stranded once a clear winner does emerge. New strategies are needed to avoid this undesirable situation. Co-opetition, which has its theoretical foundations in game theory, does just that.

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CORRESPONDENCE

Radmil Polenakovik

Faculty for Mechanical Engineering,
University “Ss. Cyril and Methodius”

Skopje, Macedonia

radepole@mf.edu.mk

Tashko Rizov

2ICL Group d.o.o

Karpos II bb Str

Skopje, Macedonia

tashko@iclgroup.biz