

How Bytes Meet Coils: ICT and E-business in the Steel Industry

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Abstract: This paper presents findings about the use of ICT and e-business in the steel industry as well as related impacts and policy implications. The study was carried out in the framework of the Sectoral e-Business Watch, a service to the European Commission's DG Enterprise and Industry. In the framework of the study, managers from 449 steel firms in the EU and the US were interviewed and ten case studies were conducted. A core finding was that ICT are important along the industry's whole value chain. ICT are used to increase productivity, reduce costs, and improve customer relationships. Almost two thirds of the large steel companies reported that ICT has increased competition. ICT use in steel firms is similar to other manufacturing industries, which may contradict the industry's public image of being old-fashioned. However, current policy activities in the steel industry do not adequately reflect the importance of ICT.

1. Introduction

Of what use is e-business in the steel industry? Why should one study the use of modern technology in an apparently old-fashioned industry? This paper will show that e-business is highly relevant to the steel industry, and that the steel industry does not lag behind other industries in e-business applications. In fact, while the strategic importance of the steel producing industry for Europe has declined during the past decades, steel remains a very important production material.

This paper presents findings about the use of information and communication technology (ICT) as well as e-business applications in the steel industry, including related impacts and policy implications. [1] The study was conducted in the framework of the Sectoral e-Business Watch (SeBW) (<http://www.ebusiness-watch.org>), a service to the European Commission's Directorate General Enterprise and Industry. Since 2002, the e-Business Watch has been analysing ICT and e-business use in numerous different industries. All results can be downloaded from the project website, in the form of sector reports, annual reports, table reports with survey findings, and datasets in Excel files.

2. Objectives and Industry Background

The objective of this paper is to describe and analyse the state-of-play how steel companies use ICT for managing their business processes – internally and in exchanges with suppliers and customers. It identifies related opportunities and possible barriers for ICT adoption and digital integration, and it assesses the impact of ICT deployment for firms and for the industry as a whole. The analysis leads to implications for possible policy actions. The rationale for conducting the study was enhanced economic policy.

According to the most recent available data from Eurostat, the European steel industry comprised 9,459 enterprises and employed 776,800 people in 2004. The basic metals manufacturing sector to which the steel industry belongs is dominated by large

multinational enterprises, with 74% of its EU-27 value added created by enterprises with 250 or more employees. However, the majority of companies in the industry are small or medium-sized [2].

Since 2003 there has been an unprecedented upward cycle in the steel industry, caused by increased demand for steel particularly from China. A further trend is an ongoing process of consolidation of the steel industry, which may lead to further large-scale enterprises. Skills and employment issues are becoming more important since many employees will retire within a few years and hiring new skilled personnel may become difficult. Furthermore, environment issues, energy saving in particular, are becoming more important for the steel industry. In all these contexts, ICT and e-business may play a role.

3. Methodology

The primary data presented here were collected in a representative survey of steel enterprises in seven European Union (EU) Member States and the USA. EU Member States comprised the six largest countries – Germany, France, the United Kingdom, Italy, Spain and Poland as well as Sweden. The survey, referenced as e-Business Survey 2007 in the following, took place in August and September 2007. Decision makers in altogether 449 steel enterprises were interviewed. Interviews were carried out from August to October 2007, using computer-aided telephone interview (CATI) technology. In parallel, a survey with mainly the same questions was conducted in the chemicals and furniture industries.

Another principal part of the study was an econometric analysis of ICT and e-business impacts, based on SeBW survey data and secondary data from the EU KLEMS database. Ten case studies about ICT and e-business use in steel companies were also conducted. The study was guided by an advisory board of five representatives of European steel companies and industry associations as well as of steel experts from the European Commission.

The steel industry as defined for the study purpose covers large parts of division 24 in NACE Rev. 2, “manufacture of basic metals”. The steel-related parts of NACE 24 are 24.1 “manufacture of basic iron and steel and of ferro-alloys”, 24.2 “manufacture of tubes, pipes, hollow profiles and related fittings, of steel”, 24.3 “manufacture of other first processing of iron and steel”, 24.51 “casting of iron”, and 24.52 “casting of steel”.

4. Key Findings

4.1 Infrastructure, Skills, Investment

Steel business can apparently not be done without the internet any longer. Practically all companies in the sector are connected to the internet. However, the share of steel firms that said they have a broadband connection to the internet was 41% (34% weighted by employment) so that there is much scope for improving internet connections. As regards skills, only large companies reported to have experienced difficulties to find ICT practitioners (20%), which reflects their higher demand. As regards budgets, 69% (employment-weighted) said that they would keep the ICT budget at about the same level, and further 30% said they would increase the budget. These figures indicate a continued importance of ICT investment in the steel industry.

4.2 Electronic Procurement

Procurement is fundamentally important in the steel industry, as in most manufacturing industries, because upstream supply chains tend to be complex and fragmented. Firms representing 66% of the EU-7 steel industry’s employment were found to procure goods via the internet or other computer-mediated networks – see Figure 1. This is about the same as in the chemicals (70%) and the furniture (64%) industries. The casting sub-sector reported

the largest share of firms procuring online (75%). Large firms reported the largest share of online procurers (73%), followed by medium-sized (67%) and small firms (52%). While small firms lag behind, half of them practicing e-procurement can be considered quite a high share. However, in comparison with the US, EU-7 firms lag behind considerably: US steel firms representing 92% of employment reported to procure goods online.

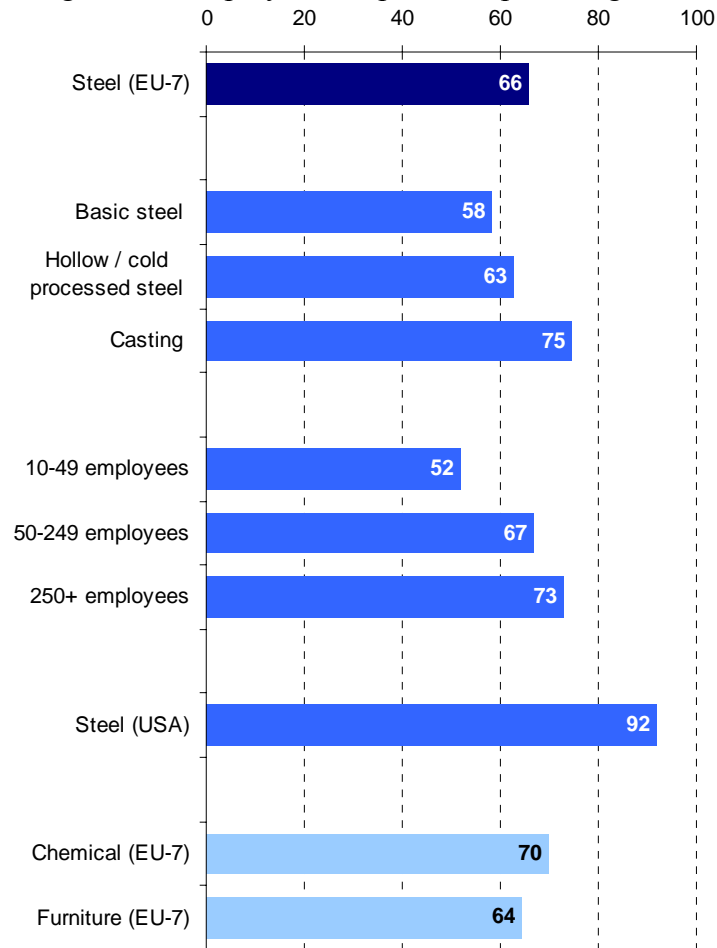


Figure 1: Companies Ordering Goods on the Internet or Via Other Computer-Mediated Networks (2007)
 Figures for Sector Totals and Countries are Weighted by Employment ("Firms Representing x% of Employment in the Sector / Country"), Figures for Size-Bands in % of Firms

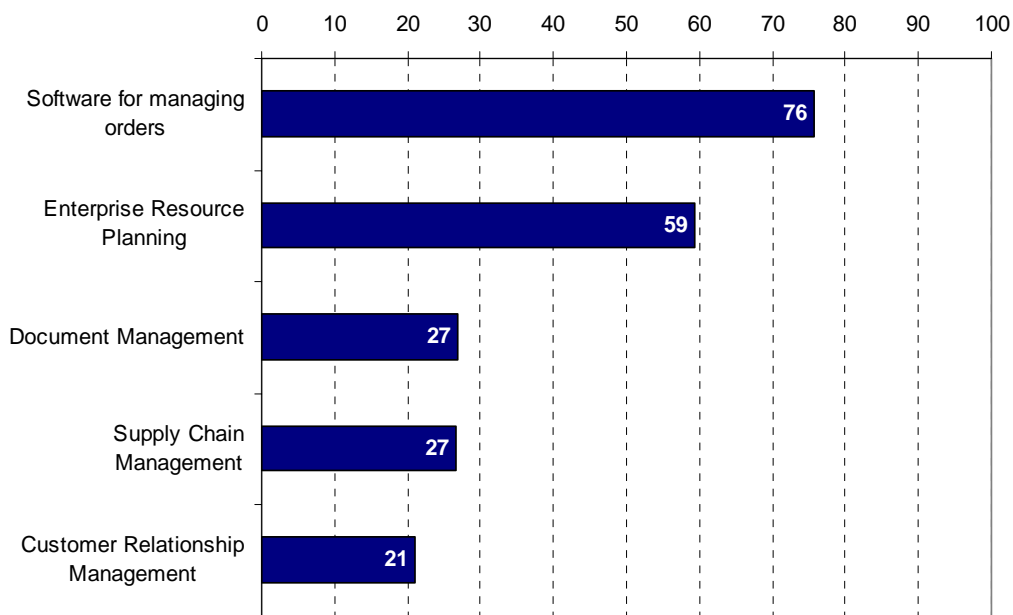
Electronic sourcing platforms can make procurement processes more efficient and reduce procurement costs. The case of ThyssenKrupp (<https://sourcing.thyssenkrupp.info>) shows that such platforms may not only be beneficial for the procuring company but also for the suppliers because their tendering procedures can become more streamlined, too. However, steel companies are likely to continue to procure raw materials in long-term offline relationships, due to an oligopolistic market structure in iron ore supply.

4.3 Internal e-Business Systems

Internal e-business systems can significantly enhance workflows and business processes and thus increase productivity and reduce costs in steel enterprises. While large companies may benefit from implementing comprehensive applications such as enterprise resource planning (ERP) systems, small companies may already benefit from simple software and basic ICT. The use of software for managing orders is quite prevalent: Firms representing 76% of the steel sector's employment said they use such software – see Figure 2. 59% reported to have an ERP system. For manufacturing companies, ERP systems are an important "hub" for much of their e-business activities with other companies. B2B data

exchanges as well as planning and controlling processes are largely based on functionalities provided by ERP systems. The use of internal systems for document management, supply chain management (both 27%), and customer relationship management (21%) was found to be not so widespread. Internal systems use in the steel industry was found to tend to be smaller than in the chemicals industry but larger than in the furniture industry.

Radio Frequency Identification (RFID) is also not prevalent. Steel firms representing 12% of employment reported to use RFID and 6% said they plan to do so. RFID appears to be a large-firm technology which can be explained by high investment costs. None of the small firms interviewed for the survey reported to use RFID and only 2% said they plan to introduce this technology. RFID use was reported to be much higher in the US: firms representing 26% of the US steel industry employment said they use RFID which is more than twice the EU-7 figure.

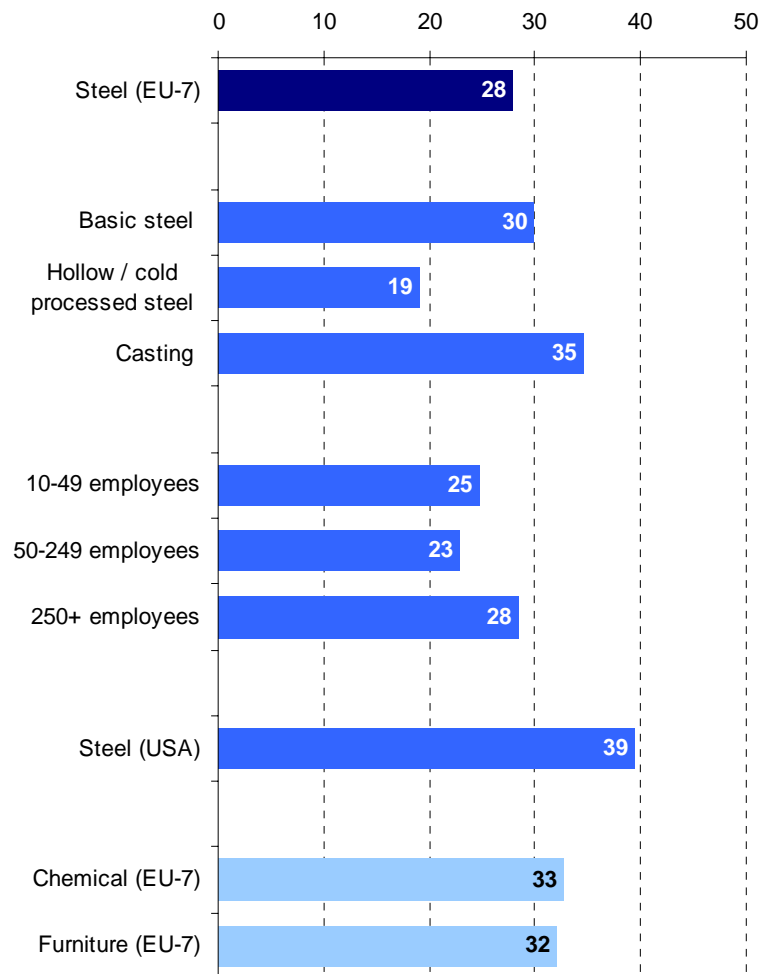


*Figure 2: Internal Systems Use in Steel Companies (in %)
 Figures are Weighted by Employment ("Firms Representing x% of Employment in the Sector").*

Case study evidence from the Śrem iron foundry, Poland, and Farwest Steel, US, indicate considerable productivity benefits from implementing an ERP system. However, the case studies also point to challenges of implementing e-business systems related to ICT acceptance among the workforce. There was a need for changing management practices and offering training.

4.4 Sales-Side e-Business

The steel industry is largely driven by requirements from customers, particularly from the large and powerful automobile industry. Thus the customer interfaces are vitally important. e-Business solutions may enhance communication with customers, including for example product specification, scheduling, and invoicing. Online platforms for data exchange with customers, such as the one at Corus Steel IJmuiden, Netherlands, may improve order processes, reducing orders processing costs and lead times. The case of Baosteel, China, also provides a related example: Workflows were reported to now require on average only 60% of the time spent before introducing digitised operations. However, steel firms representing only 26% of the industry's employment actually sell goods electronically, which is lower than in other industries. Steel products may not be well suited for e-sales due to their specificities.



*Figure 3: Companies Selling Goods on the Internet or Via Other Computer-Mediated Networks (2007)
 Figures for Sector Totals and Countries are Weighted by Employment ("Firms Representing x% of
 Employment in the Sector / Country"), Figures for Size-Bands in % of Firms*

Distribution and logistics of steel products to customers has long been neglected as an important issue in the sector. However, the steel distribution paradigm may now move from a product driven business model to a steel solution model. ICT can contribute to making distribution in the industry more effective. ArcelorMittal Gent, Belgium, provides an example of linking warehouses electronically, enhancing the overview of materials in stock and on transport, thus reducing storage costs and allowing faster invoicing.

4.5 ICT Standardisation May Help to Sophisticate e-Communication

The development of ICT standards in the steel industry may be important for sophisticating e-business communication in the industry and beyond. Eurofer, the European Federation of Iron and Steel Industries, supported the development of the European Steel Industry Exchange Language (ESIDEL) standard. ESIDEL version 1.0 was introduced in 2004; an upgraded version 1.1 was published at the end of 2005. In 2007 the further development of ESIDEL in Europe was stopped. Only 1% of the interviewed EU steel companies reported to use ESIDEL, while even 7% of the US steel firms stated to use it. ESIDEL version 1.1 was however adopted in Australia. At CMC Coil Steels, Australia, the standard was implemented successfully, while opportunities for improvement also emerged.

4.6 *Drivers and Barriers of ICT and e-Business Adoption*

Companies that stated that they conduct some or none of their business processes as e-businesses were further asked why they do not use e-business more intensively. Two reasons were found to be crucial. The circumstance that “suppliers or customers are not prepared for e-business” appeared to be the most important reason. 64% of the companies agreed to this statement. However, considering the great variety of internal systems, one could argue that many firms blame customers and suppliers while their own efforts are not considerable either. Secondly, size matters: 47% of the steel firms (representing 12% of the industry’s employment) said that their company is too small to benefit from e-business.

As regards drivers to use e-business, 22% of the steel firms in the sample reported to have experienced pressure from customers to introduce particular applications. The share of firms reporting such pressure increases by size class; 45% of the large steel firms reported such pressure. Only a tiny share of firms reported pressure from suppliers.

4.7 *Overall Differences Between Size Classes, Industries, and Countries*

In order to highlight differences between size classes, industries and countries, averages of selected indicators in four domains were calculated: ICT infrastructure, e-procurement, internal systems, e-sales. The following differences were found:

- The steel industry is no laggard – but lacking innovation activity: ICT endowment and e-business use in the European steel industry was found to be broadly in line with other manufacturing industries; on average in between chemicals and furniture which were also included in the survey. This may be in contrast to an image of an old-fashioned industry that may be present in the general public. However, the e-Business Survey 2007 also found that the steel industry is indeed lagging behind other industries in innovative activities. This applies to general product innovation, to process innovation of both general and ICT-related nature, and to organisational innovation.
- SMEs lag behind large firms: In all ICT and e-business domains, small steel firms lag behind medium-sized ones, and medium-sized ones in turn lag behind large firms. The differences between SMEs and large firms are smallest for e-sales indicators and largest for internal systems. The differences for internal systems may reflect SME’s limited ability and necessity to invest in comprehensive back-office systems. For e-procurement and ICT infrastructure, the differences are similar.
- EU steel firms lag behind US: EU-7 steel firms lag behind their US counterparts in all domains of ICT and e-business. The differences between the EU and the US were found to be smallest for internal systems and largest for e-procurement indicators. For ICT infrastructure and e-sales indicators, the differences are similar. The data indicate a clear lead of US steel firms over EU-7 steel firms in terms of ICT and e-business. This may potentially contribute to competitive disadvantages of the EU steel industry.

5. Outlook to Further Possible Developments

In the e-Business Survey 2007, the companies were asked about expected future impacts of ICT on seven selected business functions. The interviewees could state high, medium, low or no impact on the functions. For all business functions, more than 50% of the interviewees stated high or medium impact, indicating that ICT will generally be very important for the steel industry in the future. The highest level of combined high and medium impact was attributed to administration and accounting (86%). A very high share of interviewees (of firms representing 75% of employment) also expected considerable impacts on management and controlling. This confirms the exceptional importance of ICT and e-business for back-office data collection and processing. The second largest impact was expected for logistics (80%) which may indicate that steel companies have switched to

attribute crucially high importance on distribution issues. Steel firms representing 72% of the industry's employment expect high or medium future impacts of ICT on production. The values for expected impacts on customer-related functions, namely customer service (66%) and marketing (55%), were relatively low. This indicates that ICT and e-business may continue to play a relatively minor role on the sales side, except logistics. Finally, interviewees from firms representing 58% of the industry's employment expected high or medium future impacts on research and development.

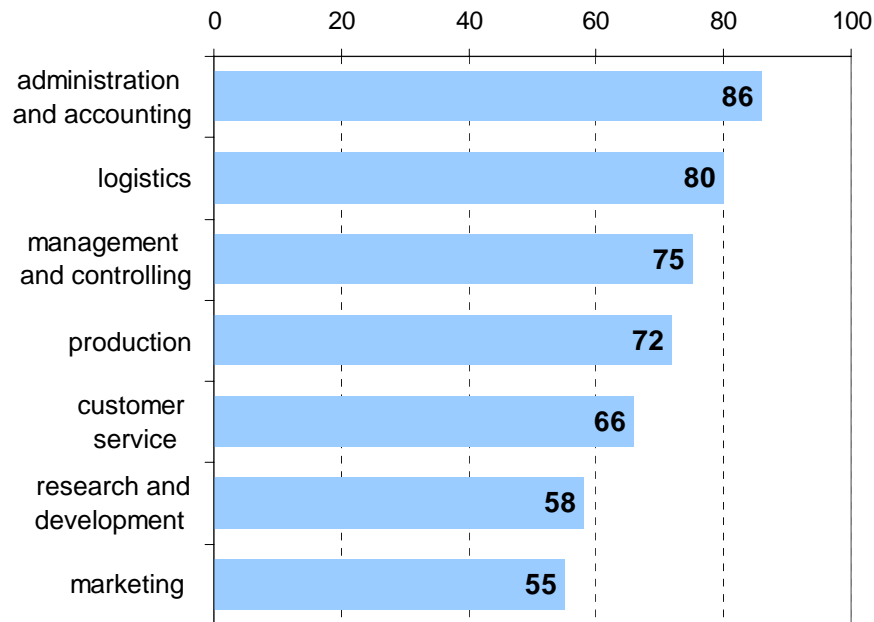


Figure 4: Steel Firms Expecting that ICT Will Have a High or Medium Impact on ... in the Future in %
 Figures are Weighted by Employment ("Firms Representing x% of Employment in the Sector / Country").

For all business functions, the expected future impacts of ICT were found to be largest for large companies and smallest for small companies. This indicates that SMEs may continue to lag behind large firms in ICT and e-business applications. The levels of expected impact in EU-7 companies were also found to be much higher than in the US. This may be surprising, but it may be explained by the fact that the US steel firms are already far advanced in e-business so that future impacts may be minor. Finally, the levels of expected future ICT impact in the steel industry were found to be higher than in the chemicals and furniture industries. This applies to all indicators except customer service and marketing, further indicating the relatively low importance steel managers attribute to ICT for the sales side.

6. Conclusions and Policy Implications

Current steel industry policy appears to not adequately reflect the importance of ICT and e-business for the steel industry. Neither the European Commission's mid-term review of industrial policy of July 2007 [3] nor the Communication on competitiveness in the metals industries of February 2008 [4] refer explicitly to ICT, and a steel-industry specific initiative named European Steel Technology Platform (ESTEP) [5] currently does not have a focus on ICT and e-business issues. It may however be important for enhancing the industry's competitiveness to promote competent ICT and e-business use. Several political activities may be suggested:

- Fostering value chains and e-business use: Public organisations may support activities to foster value chain development through ICT in the steel industry. While the European Commission should have a focus on cross-border activities, Member States may

promote national or regional activities. In recent years, several EU Member States have launched initiatives to facilitate e-business exchanges within specific industry supply chains. [6] A key objective in most of these initiatives is to enhance SME participation because they are at risk to be eliminated from the supply chain.

- Supporting ICT skills development: The steel industry has the image of a declining industry and may thus face difficulties to attract skilled employees, also in the field of ICT. The steel firms themselves, their industry associations as well as public policy could become more active in this respect. First of all they can promote awareness about and uptake of e-business skills in steel companies. Furthermore they can support e-learning solutions and enhance co-operation activities with universities to support e-skills development.
- Promoting ICT standards: The EC could play a more active role towards standardisation of e-communication processes in the steel industry. The EC could promote the positive Australian experience and the idea of further ESIDEL development among European steel enterprises as well as their customers and suppliers. The EC could also initiate and co-fund European projects to implement this standard. These could focus on SMEs because they tend to be reluctant to adopt standards due to the related investment costs.
- Promoting ICT use for saving energy: ICT and e-business may be used to better protect the natural environment and, in particular, to save energy. Policy makers may promote findings from a related study conducted by the e-Business Watch.

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