

# The Introduction of Electronic Business Curricula into Engineering Education System

Hsiaoping Yeh <sup>1</sup>, Chieh-Yu Lin <sup>2</sup>

<sup>1</sup>*Department of Business Administration, Chang Jung University, Tainan, Taiwan, R.O.C, <http://www.cju.edu.tw>  
Tel: (+886)6-278-123 ext.323, Fax: (+886)6-2780680, [hpyeh@mail.cju.edu.tw](mailto:hpyeh@mail.cju.edu.tw)*

<sup>2</sup>*Department of International Business, Chang Jung University, Taiwan, R.O.C, <http://www.cju.edu.tw>  
Tel: (+886)6-278-123 ext.334, Fax: (+886)6-2780111, [jylin@mail.cju.edu.tw](mailto:jylin@mail.cju.edu.tw)*

**Abstract:** Due to the recent rapid advances in information and communication technologies, the application of Internet grows quickly. Internet becomes a powerful medium of communication, education, entertainment, commerce, and so on. It becomes an important tool for many industries to run their corporations. A new business model, called eBusiness, is engaged. E-Business implies that business transactions are held by a computer-mediated network. Those transactions include production, customers, and the internal/external business processes. Internet provides a two-way communication channel to let enterprises fulfill the whole or part of traditional business activities. More and more industries and enterprises begin to develop their e-Business systems to keep their competence in the 21st century. This paper introduces an educational project, Manufacturing Business Integration (MBI), currently held in Taiwan. The goal of this project is to unite efforts of government, school professionals, and school facilities to train students with interdisciplinary talents.

**Keywords:** e-business, manufacturing business integration (MBI), curriculum, interdisciplinary degree

## 1. Introduction

Due to the recent rapid advances in information and communication technologies, the application of Internet grows quickly. Internet becomes a powerful medium of communication, education, entertainment, commerce, and so on. It becomes an important tool for many industries to run their corporations. A new business model, called e-Business, is engaged. E-Business implies that business transactions are held by a computer-mediated network. Those transactions include production, customers, and internal/external business processes. Internet provides a two-way communication channel to let enterprises fulfill the whole or part of traditional business activities. More and more industries and enterprises begin to develop their e-Business systems to keep their competence in the 21st century. According to the OECD's estimation, the amount held on e-Business is currently 26 billion US dollars and it will keep growing to reach 330 billion US dollars in 2001 and even 1,000 billion in 2003.

With the rapid growing on e-Business, Taiwan's education system places more and more emphasis on the curricula of e-Business. In order to educate engineering students to become an engineer who are suitable for the current and right track. The engineering education system should provide some courses of e-Business. In Taiwan, Science & Technology Advisory Office, Ministry of Education, recently proposes an educational improvement project concerning the integration of manufacturing automation and business electronization. One of the major subjects of this project is to establish an interdisciplinary education system which integrates engineering and business. This paper discusses the current development of this project as well as the strategy for introducing electronic business curricula into engineering education system.

## 2. Manufacturing Business Integration (MBI) project

Taiwan's industries have faced many critical challenges such as the importance for the environmental protection concept, rising on employee wage, lack of the low-level labors and competence from other countries. To compete with such internal and external changing environment, Taiwan's government proposed an 8-year project, named Plan for ROC Production Automation, in order to promote Taiwan's industries since 1982. Due to the remarkable success, the second plan, named Plan for ROC Industry Automation, followed from 1990 to 2000. The latter plan includes manufacturing automation, business automation, agriculture automation, and architecture automation.

However, Taiwan's government concerns that the upgrading on each single industry will not be enough for the rapid change of this economic environment. In the information superhighway era, all industries ought to be aware

of the issues of the variation of consumer needs, the short life cycle of products, the supply chains among different industries, and the quick response concept. Hence, to coordinate with the development strategies for the national economic, our education system should emphasize on how to train students who would be able to possess the talent of both engineering and business fields.

In 1999, the Science & Technology Advisory Office, Ministry of Education, Taiwan established a project, named Manufacturing Business Integration Human Recourses Training Plan. The purpose of this project is to educate college and university students to acknowledge the manufacturing and business subjects by uniting the school professionals, teaching materials, and facilities. In addition, it would combine all efforts from government, industries, and schools to fulfill the project goals.

The following sections will introduce some important concepts of this project.

### 2.1 Definition

Manufacturing Business Integration (hereafter MBI) means that in the whole product supply chain, manufacturing industries should strengthen the concepts of being the innovating- and service-oriented industries. Their adopted strategies will aim at how to share information, standardize and systemize processes, rationalize and speed up services by automation and information technology. The main goal is the promises of catching the correct customer needs and rapidly delivering their products to the customers. By developing Internet technology (ex. e-Procurement, e-Business), not only manufacturing industries will achieve this goal but also improve their production efficiency, reduce the procurement cost, increase the logistic effectiveness, quickly response the customer's variation needs and enhance the international competence.

In partice, MBI includes six components: information, manufacturing information, finance, logistic, business and environment as shown in figure 1. According to this structure, MBI project will lead Taiwan to a new e-Business epoch.

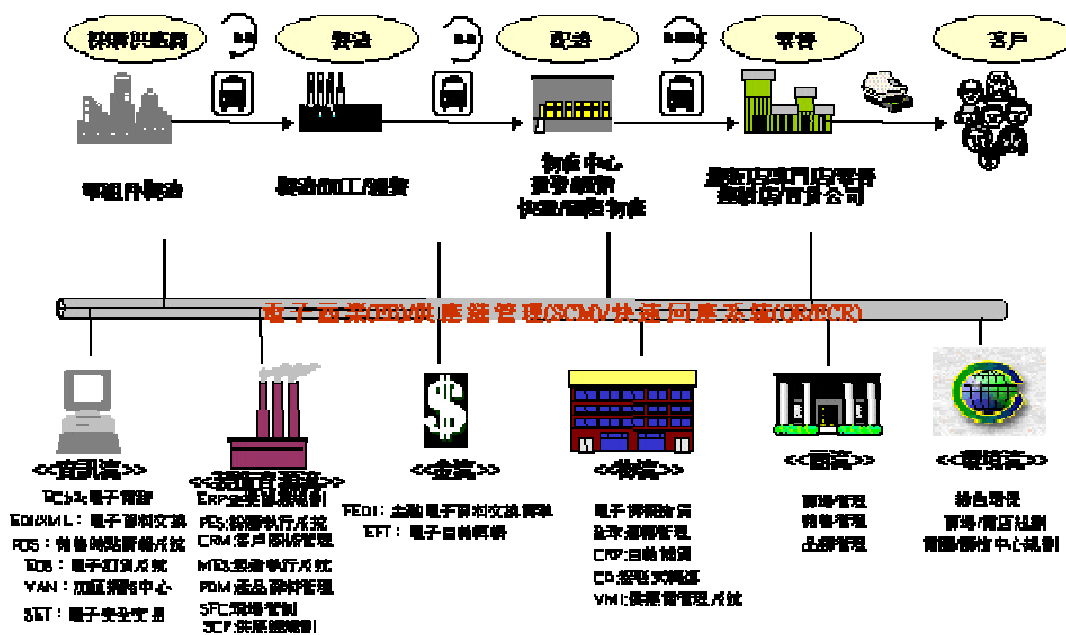


Figure 1. Scope of Manufacturing Business Integration (resource: <http://edumfg.ie.nthu.edu.tw/edumfg/>)

### 2.2 Six components of MBI

#### 2.2.1 Information

Information is a breakthrough in this century. Internet and information technology (IT) make enterprises more challenging and make integration between manufacturers and businesses feasible as well. With transaction information flowing through networks, suppliers, manufacturers, retailers, and even customers can easily and conveniently getting and exchanging needed information from anytime and anywhere. Enterprises can also

exchange transaction data by Electronic Data Interchange (EDI) to allow integrating organizations and enterprises resources and speeding up the information handling time/costs.

### *2.2.2 Manufacturing information*

Speaking of manufacturing, automation is always coming in mind. However, due to the automation techniques are keep weeding through the olds and bringing forth the news, the definition of automation is changing too. The original definition of manufacturing automation means that products are made by machines. The new means broadly include the whole processes from ordering raw materials to customers possess products. Hence, automation becomes the concept to systemize and synthesize various technologies (ex. machines, electrical equipments, communication, and computers) to manufacture products.

The concept of manufacturing information is that while MBI, all manufacturing information transfers via Internet, specially, the information from the whole supply chain such as manufacturing, logistics. Enterprise Resource Planning (ERP), Manufacturing Executive System (MES), Procurement Executive System (PES), Product Data Management (PDM), Customer Relationship Management (CRM) and Supply Chain Management (SCM) are all the important subjects in MBI.

### *2.2.3 Finance*

In finance system, it will reduce the risk, errors, and even costs as well as enhance the transaction convenience if vendors and retailers directly make payments and transactions through networks. Finance Electronic Data Interchange (FEDI) and Electronic Finance Transfers (EDT) are the important techniques.

### *2.2.4 Logistics*

The main purpose of logistics is to deliver good quality merchandises and services in the right time to the right place to those who need at low charges. Product distribution means all relative activities of handling products include delivering, storing, picking and packaging. Nowadays distribution becomes an important issue because if industry can control the product distribution well, it will serve customers better. Information involved in this circulation also plays an important role in this post-PC era. Therefore, distribution revolution and logistic revolution are the hottest terms in Taiwan markets. A good logistic technique should incorporate the information, communication, supplying, procurement, producing, and delivering issues. In shorts, how to make promises to let customers receive the goods rapidly is the requirement for logistics in MBI. Electronic Label Picking (ELP), EIQ analyses, Cross Docking (CD), and vendor management system (VMS) are the modern logistic techniques.

### *2.2.5 Business*

In MBI, business plays a leading role in terms of incorporation. It incorporates the external factors (include merchandises, customers, procurement, distribution, storing) and internal business functions (include personnel, finance, accounting, and marketing) all in a information management system. In addition, the transactions dealing with customers, discounts, contracts, sales, and marketing strategies are all relative in this component. Hence, displaying store management, sales management, item management and mall management are the main concepts.

### *2.2.6 Environment*

Environment in MBI includes business environment and needs for protecting environment. The former includes how to establish high-quality store, or mall selling environment and the latter includes green environment protection.

## *2.3 Manufacturing automation and electronization*

Information is the leading role in the 21<sup>st</sup> century as well as single industry or single type of automation technology will not survive or handling problems by itself. The concept of incorporation is the key rule for the current changeable economic situation. Manufacturing industries will head to the way of combining both automation and electronization. Manufacturing industries will not only establish machines to facilitate producing goods and managing factories but also construct their management information system (MIS). That is to let a manufacturing company become an e-Factory. Those MIS's functions can help decision makers make the right decision and judgment in a short time like Enterprise Recourse Planning (ERP) and Advanced Planning and Scheduling (APS) or can communicate between suppliers and customers such as Product Data Management (PDM), Procurement Executive System (PES), Customer Relationship Management (CRM) and Supply Chain Management (SCM). All these systems will let all involvers in this product cycle instantly share information via networks.

Therefore, as shown in figure 2, many e-Business ideas are included within the structure of manufacturing automation and electronization. In automation aspect, product design, AS/RS, product manufacturing will be all integrated and planned by a system. One the other hand, manufacturing electronization will run like e-Business.

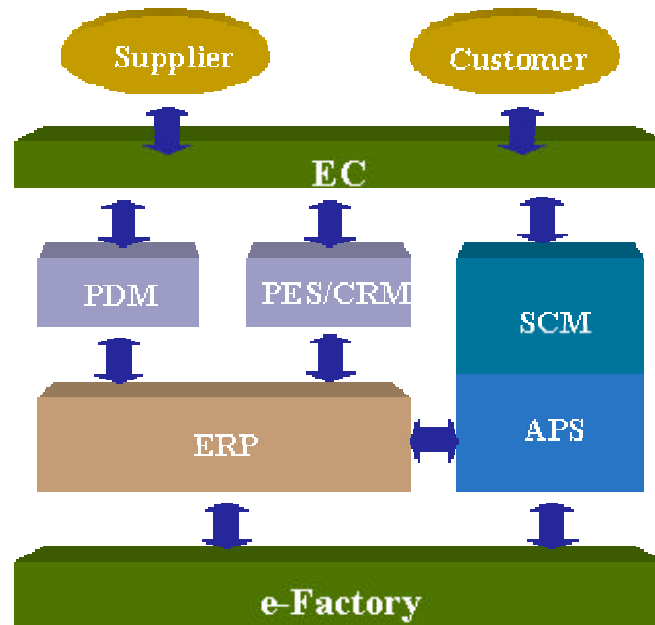


Figure 2. The structure of manufacturing automation and electronization (resource: <http://edumfg.ie.nthu.edu.tw/edumfg/>)

### 3. Business curricula in engineering education system

To achieve the MBI goal in the engineering education system, this paper proposes curricula would optionally include all information systems and management concepts that contain information, manufacturing information, logistics, business, finance, and environment six MBI components. Supply Chain Management (SCM), Quick Response (QR) and Electronic Data Interchange (EDI) should place through knowledge this education system. Besides, engineering students would have the training of “Business Automation Planning”, “Corporation Policy”, “Management Data Processing Techniques”, and “Retailer and Distribution Management” courses.

Now education system attaches importance to interdisciplinary study. Interdisciplinary degree is encouraged to expand the engineering students with majors of both engineering and business subjects.

### 4. Conclusions

Internet technology makes corporation transactions quick, efficient, and inexpensive. Since the commencement of World Wide Web (WWW) in 1994, business transactions, manufacturing activities and even education systems meet an anomalous breakthrough. Manufacturing industries ought to emphasize on the concept of industry internationalization, product customization, need variation, and response expressing.

Engineering education system will not always offer course how to optimize industry recourses, increase production capacity. The new trend should shift to the concepts of environmental protection, corporation minimization, and service quality. Therefore, merging business conception and models into the engineering education system in order to let engineering students have both trains of both manufacturing automation and manufacturing information electronization is the right track for the current information technology epoch.