

A HOLISTIC VIEW OF TECHNOLOGY AND MANAGEMENT DEVELOPMENT TOWARDS SUSTAINABLE BUSINESSES

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ABSTRACT

In the future we will be faced with changes and challenges in all the different spheres of our lives. Our times are characterized by two main features: the increasing networking between different social, political, economic, technical and ecological systems and, at the same time, the growing complexity of the systems involved and their dynamic interactions. Triggered by fundamental innovations in microelectronics, modern information and communication technology has revolutionized our working lives. High-speed, efficient and low-cost communication and the associated vastly increased availability of information have accelerated the process of market globalization and consequently intensified competition and increased the pressure on companies to improve productivity. Technological change has led to changes in the industrial value chain and to the conditions under which innovation takes place: time and knowledge are increasingly becoming decisive factors. Consequently, corporate structures and management methods have to change. The paper makes a contribution with a systematic overview of visions for future business systems.

Keywords: development, technology, management, sustainable business

1. INTRODUCTION

Society is made up of organizations, groups and individuals. Organizations have responsibility for the general well-being of society beyond short-term economic self-interest. At the level of the individual, this means devising jobs and work patterns which allow individuals to contribute their talents without undue stress. At a group level, it means recognizing and dealing honestly with employee representatives. This principle also extends beyond the boundaries of the organization.

Climate change and finite resources are beginning to affect every organisation – big or small, public, private or non-profit and irrespective of its geographic location or type of business [1].

Being sustainable means combining a holistic approach with sustainability. Holism is a requirement which has to be redefined every day. It means shaping the present in the knowledge of traditions, with courage for new ideas and responsibility for the future. The term sustainability has to be augmented by political, structural, economic and social dimensions. Only if sustainability is defined in this way it can support the growth of economies – especially in a view of the current economic situation [2].

2. DEVELOPMENT TRENDS

Trends, currents and fashions abound in today's world [3]. We are going to focus here, above all, on those trends that are relevant from a business viewpoint – trends affecting society, politics, economics, the environment, technology, customers and competitors, as listed in Table 1.

Table 1. Selection of major observed trends.

Society	<p>Continued strong growth in the world's population Demographic change – more older people Increasing terrorism in a wide variety of forms / an increasing need for security Life-long learning Flexibility with regard to working hours and leisure time and in society as a whole Fewer jobs for low-skilled workers Increasing mobility (with slower growth than before)</p>
Politics	<p>Increasing liberalization and deregulation Decreasing importance of borders and distances Decreasing influence of local politics Reinterpretation of intellectual property Improved resolution of international conflicts</p>
Economy	<p>Increasing productivity, increasing automation Growth in service industries Increasing globalization, greater capital mobility More frequent relocation of businesses, depending on conditions for business Virtualization of companies Knowledge as the most important resource New business models through electronic and mobile business Continued reduction in the length of product life cycles</p>
Environment	<p>Increasing environmental awareness Sustainability/regulation of all intermediate and end products Increasing importance of recycling – new laws and regulations Sparing use of resources Alternative raw materials and energies, renewable energies Environmental disasters and new illnesses with widespread effects</p>
Customers	<p>Individualization of lifestyles Increased expectations as regards quality and service Standardized, process-based buyer-vendor relationships Increased efficiency as a result of intelligent solutions Well-informed customers Outsourcing / partnering Rapidly growing importance of electronic, mobile and real-time business</p>
Competitors	<p>Reduced costs / increased productivity Lower barriers to entry in new fields of business as a result of electronic media New competitors from other industries Shorter life cycles of products and services Intensive price wars for market share Growing importance of brand and image</p>

3. CHANGES IN THE OBSERVED FIELDS

3.1. Materials

Materials and resources have shaped cultural history as no other technology has. New material technology paves the way for progress in other technological areas. Some examples here are new liquid crystals for organic light-emitting diodes, ceramics for innovative coatings in power plant construction, new glasses for the optical industry, new metals and polymers for applications in medical technologies and materials for the realization of innovative concepts in chip technologies. New materials also offer a high potential for sustainable development, such as the use of renewable resources and replacement of environmentally harmful substances. In the future all materials including waste will have to be recyclable [2].

3.2. Energy

The EU wants to obtain one fifth of its energy from renewable sources by 2020. This 20 percent target is realistic for the final energy generation of electricity, heat and bio fuel. 700 million tonnes of carbon dioxide could be avoided each year in this way [2].

A central question is how such a development can be achieved at low social costs, high innovation dynamics and in accordance with the demands of liberalized power market. Studies show that the application of technology-specific support instruments combined with long-term price guarantees results in both high growth at comparably low social costs and sustainable innovation dynamics in renewable electricity technologies. The priority integration of renewable energies reduces the demand for conventional power.

3.3. Environment

It is evident for the people that the higher their standard of living, the more critical the situation becomes for the environment. We have to do everything within our power to protect the environment and conserve resources. This includes examining every stage of a product's life cycle with a view to conserving resources and promoting sustainability and then adapting it (Fig. 1) [3].

There are many sides to sustainable product design. Miniaturization saves materials. Modular designs allow faulty parts to be replaced subsequently. Appropriate design creates durable and long-lasting products. The individual components of a product must be easy to replace, dismantle and separate and increasingly easy to recycle.

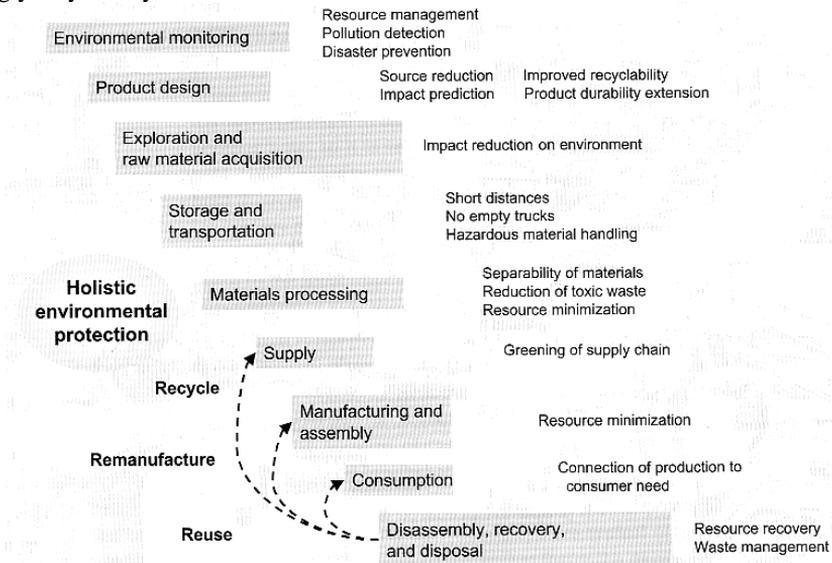


Figure 1. Environment-conscious product life cycle [3].

3.4. Technology

Technology has been one of the main engines of economic development since the industrial revolution [4,5]. Globalization, growing demand for services, new security concepts, and new organizational models – the working world in industry is rapidly changing. Researchers investigated the impact of three highly differentiated technologies on industrial work of the future: Biotechnology, Nanotechnology and Ambient Intelligence. The key areas of technology that will have most influence on developments in the 21st century are shown in Fig. 2.

Technology has to be managed by managers and customers, not simply designed by engineers. The managerial perspective on technology has been so far missing [4]. Two predictions have proven accurate and will become even more acute in the future. Thus the shortage of expert staff – in particular trained engineers, scientists and economists – will become even more critical as a result of the identified trends. Those less qualified will find it increasingly difficult to find work even in the manufacturing industries.

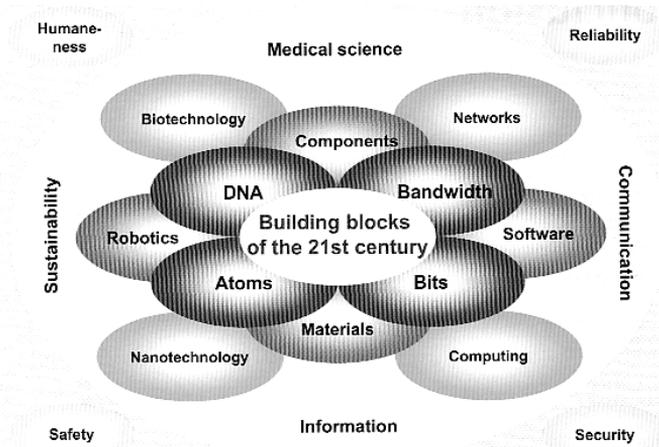


Figure 2. Building blocks of the 21st century [3].

3.5. Organization of business processes

Productivity, flexibility and quality are essential competitive factors, closely related to the way business processes are organized within the company. Organizational innovations are therefore increasingly regarded as the key to successful process management [2]. Manufacturers will bear increased responsibility for how their products are used. We are already familiar with extended warranty periods, product liability and manufacturers' obligation to take products back, and, as time goes on, environmental issues and recyclability will increasingly have to be taken into account as well. The role of the manufacturer over the entire product life cycle is changing, and manufacturers' overall responsibilities for their products are increasing significantly [3].

In recent years, many companies have experienced significant market changes which have and which will affect their business fundamentally and irreversibly. Development from e-business to e-value-chains, e-companies, e-markets and finally e-world is expected. Open 24 hours a day, 365 days a year, real time business with savings in time and money.

4. CONCLUSION

We live in a time of global changes. The great challenge facing us today and in the future is best described as continuous renewal driven by innovations [3].

As a result of the explosive growth in the networking of both people and machines, the speed of progress will increase further. Huge numbers of sensors (cameras, measuring devices and so on) and actuators (robots, machines) will be connected up to the Internet, our global nervous system. It will thus become an artificial system running parallel to reality and analogously to a biological system.

Companies that do not invest in process e-volution, productivity or paradigm-free innovations will soon be closing their doors for the last time. Only those companies that properly face up to all three challenges will be among the winners in the future, creating new value, new jobs, and new prosperity for the mankind [3].

Reducing the dependency of our society on raw materials and energy consumption through increased material efficiency and innovative, resource-efficient product ideas are promising concepts. The world prepares itself for the next economy – the sustainable economy!

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