# CONFLICT MANAGEMENT IN DIGITAL BUSINESS

## NEW STRATEGY AND APPROACH

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# Conflict Management in Digital Business: New Strategy and Approach

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emerald PUBLISHING

United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2022



**British Library Cataloguing in Publication Data**
A catalogue record for this book is available from the British Library

ISBN: 978-1-80262-774-9(Print)
ISBN: 978-1-80262-773-2 (Online)
ISBN: 978-1-80262-775-6 (Epub)

ISOQAR certified
Management System,
awarded to Emerald
for adherence to
Environmental
standard
ISO 14001:2004.

ISOQAR
REGISTERED
Certificate Number 1985
ISO 14001

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# Table of Contents

Chapter 1

# Digital Conflicts in Production and Planning

*Selva Staub*


## Abstract

The impact of rapidly developing technologies on digitalization of production and planning has affected all sectors in a short period. This impact has led to both positive and negative outcomes. While it is helping the decision-makers to make better and more productive choices, it also can create a cluster of information and data that can put an undue burden on processes. Today, we call this Industry 4.0, which is defined as the use of digital technologies, based on data processing, the end-to-end connection of value chains, and ensuring data fluidity. Industry 4.0 consists of technologies such as cyber-physical systems, internet of things, cloud computing, big data and analysis, autonomous vehicles, and augmented reality. With the digitalization of the entire production and planning processes, data-based applications are made; thus it is important to protect data in this context, pointing to the critical importance of cybersecurity. Companies are constantly working on taking the necessary cybersecurity measures to prevent exposure to any cyberattacks. One of the biggest steps toward the development of production and planning is undoubtedly the integration and adaptation of blockchain technology. The use of blockchain technologies has been a major breakthrough for the sector in order to effectively meet customer needs, ensure information security, reduce costs, and achieve rapid growth. With digital transformation, production and planning must comply with the principle of transparency. In this context, integrating blockchain technologies into the production and planning ecology for data security will provide companies with a serious competitive advantage.


*Keywords*: Production and planning; blockchain; data security; digitization; Industry 4.0; security

**Conflict Management in Digital Business, 1–23**

**doi:10.1108/978-1-80262-773-220221001**

## Digitization and Industry 4.0

Companies are looking for new ways to reduce their costs and increase their profitability due to increasing competition. Reducing costs alone does not provide a competitive advantage; new methods such as flexible production and increasing production quality should be developed. Today, innovative developments are experienced with Industry 4.0 technologies where all processes from production to sales to customer services are experiencing digitalization (Chen, Hu, & Shah, 2021). Processes in such operations are interconnected with many links of the entire chain. Industry 4.0 refers to the new industrial development that adds value to the product lifecycle and integrates digital technology (Fatorachian & Kazemi, 2021). It is a paradigm that integrates production processes with communication, information, and intelligence technologies (Adamik & Sikora-Fernandez, 2021). Industry 4.0 is the integration of physical systems with cyber systems, which provides the integration of production systems with technology (Adamik & Sikora-Fernandez, 2021). It is a flexible system based on human and machine cooperation, which is applied not only to production but also to the whole society.

With Industry 4.0, computers, sensors, and computer systems in integrated factories exchange information simultaneously and continuously. It is almost possible to produce without the need for people. With Industry 4.0, there are already great changes in production and planning such as personalized production, flexible production, new business models, and working style (Morgan, Halton, Qiao, & Breslin, 2021). When the entire capabilities are completely realized, it will not only affect the factories and their production and planning processes but also individuals and the whole society (Lee & Lim, 2021). In this case, the question emerges, which is true: that this much integration becomes a *nudge* or *sludge* on production and planning systems in the Industry 4.0 era.

## Nudge Versus Sludge

When Thaler and Sunstein (2009) wrote their book called *nudge*, they argued that by improving the environment in which people choose – what they call "choice architecture" – they can make wiser choices without restricting any options. Nudge theory was conceptualized in behavioral economics, political theory, and behavioral sciences, proposing positive reinforcement and indirect suggestions as ways to influence the behavior and decision-making of groups or individuals. The concept is a relatively subtle policy shift that encourages people to make decisions that are in their broad self-interest. It is not about penalizing people financially if they do not act in a certain way. It is about making it easier for them to make a certain decision. There are many examples of nudges such as smart defaults, inline product guidance, error message guidance, healthy user behavior, pattern recognition, alternative Positioning, and so on. Therefore, companies, where all these are being applied in production and planning, are also part of this equation. Thaller and Sunstein (2009, p. 91) argue that nudging is good because nudges can help individuals overcome natural human limitations to make better choices.

If nudges are small tweaks to make better productive decisions, can the converse be true – can nudges also be "sludge"? Cass R. Sunstein (2021) uses the term sludge to describe unnecessarily effortful processes, bureaucratic procedures, and other barriers to desirable outcomes. While nudges try to push people to make better decisions by making certain choices easier than others, sludges make a process more difficult with the goal of creating friction, which makes the consumer less likely to continue the process. Sunstein writes: "Eliminating sludge transforms people into rightsholders, as opposed to supplicants. Creating sludge does just the opposite."

Therefore, the question is now whether *nudging* or *sludging* causes digital conflicts in production and planning. Before discussing this question, it is important to look at the main components of digitalization in production and planning.

## Digitalization of Production and Planning

Digital production and planning is defined as production and planning as capabilities that are enabled on the web. Currently, many systems are hybrid, meaning production and planning processes use a mix of paper-based and computer-enabled processes. However, real digital production and planning management goes beyond the traditional hybrid system and uses the system integration and knowledge generation capabilities of key components.

Digital production and planning encompasses the process of electronically transmitting digital media from the beginning (content provider) to the end (user). Digital production and planning consists of systems that support the interaction between processes and regulate the activities of partners in the production and planning (hardware, software, communication network) (Phadnis & Joglekar, 2021).

There are three main elements behind the new process:

- Customers rate the company "below expectations" for distribution performance compared to its competitors,
- Company management can generate substantial profits by reducing the overheads associated with existing systems, and
- Quality management should focus on licensing policies.

The efficient use of information in all processes is very important from the perspective of production and planning applications (Yıldız, 2018). In that case, we need to look at what are the most commonly used technologies in this era (Industry 4.0) and need to discuss what information technologies are suitable for productive production and planning.

### *Industry 4.0*

The term *4.0* is used by industries and academia alike. It has become a ubiquitous term in both the applied and theoretical realms. With Fourth Industrial Revolution, machines and production systems started to manage processes by themselves. Industry 4.0 was initially thought of as a technological experiment. Now in competition in an ever-changing industrial environment, it became a necessity to maintain power and competition. Because of Industry 4.0, more computerization, more software processes, and the presence of smart systems in production and planning is expected.

### *Industry 4.0 Technologies in Production and Planning Management*

Industry 4.0 consists of many technologies. Most of them are in common use such as big data analysis, the internet of things, cloud computing, cyber-physical systems, augmented reality, autonomous vehicles, smart factories, three-dimensional (3D) printers, system integration, and simulation. However, some are waiting for the right time to integrate these technologies into production and planning processes. The commonly used ones are:

**Internet of Things**

Objects with a digital network and internet are in communication with their environment in social and physical context by gaining a virtual identity. Objects communicate with each other via the internet and manage the works themselves (Saravanan et al., 2021). With the internet of things, data are freely accessible, machines and cyber-physical systems can access worldwide databases, and thus all processes in production and planning can communicate with each other (Bilgin, 2021, p. 128). Most production in factories is beginning to be carried out by smart robots, and when there is a problem, the machines are automatically stopped by smart robots. With the use of smart factories and smart robots, the need for manpower is decreasing. Thus, as costs and expenses are decreasing, productivity and profit are increasing. More and more devices benefit from big data by connecting with each other. Most hardware is from Industry 3.0 (Duan & Da, 2021). This makes the communication limited to the hardware and the central control system, and real-time decision-making processes. Because of this outdated infrastructure, it is difficult for many companies to make the transition to an Industry 4.0 approach.

**Cloud Computing**

Cloud computing technologies ensure that all the data owned by the company are stored on a virtual server, that is, in the cloud, and that these data can be accessed when needed through internet-connected devices (Bilgin, 2021). Cloud computing provides the sharing of software and information in the basic source and provides the distribution of data and information from computers and other devices over the information network with cables (Lu & Xu, 2017). With this, while transferring data, large transactions are made, and at this point, cloud computing is being questioned. Cloud computing requires cooperation not only between devices but also between countries in data protection. The question here is who will be responsible for maintaining the security of these data. Therefore, data security in cloud computing from the perspective of the sensitivity of security issues should be emphasized.

**Cyber-Physical Systems**

These systems are the connection between the physical world and cyberspaces via the internet. These systems, supported by sensors, collect information in the physical world via the internet and provide interaction between objects (Colabianchi, Costantino, Di Gravio, Nonino, & Patriarca, 2021).

**Augmented Reality**

Augmented reality is the combination of real and virtual elements. It is a direct and indirect physical view of the environment and its contents in the physical world, enriched with computer-generated sound, image, and graphic data. Businesses can interact with information through this technology, and with the correct use of this information, they can easily access the necessary data about the real world (Xiong, Hsiang, He, Zhan, & Wu, 2021).

**Autonomous Robots**

These are defined as electromechanical devices that perform preprogrammed tasks. Intelligent robots can work under the control of an operator as well as through a computer program. Intelligent robots interact with machines, materials, and components, enabling flexible production and increasing productivity. Today, smart robots are mostly used in industrial environments (Lumer-Klabbers et al., 2021).

**Smart Factories**

Smart factories are environments in which all components (machines, robots, etc.) in the production system operate and interact autonomously. The most basic feature that distinguishes the smart factory from the traditional factory is that the human factor is disabled except in extraordinary situations (Sott et al., 2021). In addition, in these factories, the machines work within the framework of cybersecurity by communicating with each other, and production stops automatically when there is a problem.

**3D Printers**

They are machines that transform digital three-dimensional computer data into real objects. With these printers, it will be possible to print all mechanical parts except electronic parts and engines. Processes such as modeling, 3D printing, and surface improvement can be done with 3D printers. In addition, it can be used in many fields from genetics to information technologies and from health sciences to production. It will break new ground in production and innovations as it reduces production costs (Li et al., 2021). However, the lack of faulty condition data reduces the feasibility of supervised learning for fault detection or fault severity discrimination in new manufacturing technologies.

**System Integration**

This is the more harmonious operation of enterprises, units, and locations with the development of universal data integration networks within the enterprise. This concept refers to the interconnectedness of each business in the engineering, design, production and service functions, customers, suppliers, and distribution channel through system integration. With this concept, also called system integration, production will be more efficient, flexible, fast, and trouble free (Morgan et al., 2021).

**Simulation**

Simulation is a virtual model prepared using real-time data in three dimensions during the design phase of products, materials, and production processes. In short, it is the imitation of the operation of a real-world process or system in technical terms. It is a virtual model of systems or processes between objects such as machines, products, and people brought together to form a virtual reality of the physical world (Rojek, Macko, Mikołajewski, Sága, & Burczyński, 2021).

**Big Data and Data Analytics**

Big data refers to complex and unstructured data that are difficult to analyze and use with traditional applications. Today, the amount of data are quite large, and various applications are used to produce meaningful information. A large amount of data are obtained from sources such as mobile devices, the internet of things and radio frequency identification (RFID) tracking, sensor devices, and even social media in production and planning. The importance of utilizing big data in production and planning has increased considerably recently. With big data, customer habits are analyzed and it plays a role in gaining customers by creating personalized goods (Papadopoulos, Singh, Spanaki, Gunasekaran, & Dubey, 2021). Big data provides a competitive advantage by making future predictions by analyzing historical and current datasets of the demands of the customers.

**Blockchain**

Blockchain is a technology that enables the transfer of virtual assets to digital environments by mutual agreement of the parties. Blockchain technology ensures that the necessary rules and laws are determined in the network infrastructure to be established with smart contracts and that these are transparently accessible to all users. The smart contract between two trading partners is the real-time sharing and recording of activities where goods are bought, sold, and delivered. With the use of blockchain technology in production and planning, activities will be carried out faster and time will be saved (Pal, Tiwari, & Haldar, 2021). With the use of blockchain technology in production and planning, data will be verified through many channels and transparency will be increased. Under operations management, blockchain is being applied to production planning, production control, and quality control, offering the benefits of visibility, aggregation, validity, and automation.

### *Information Technologies in Production and Planning Management*

Information is critical to the overall performance of the production and planning. Because decisions are made based on these tools used to gain information awareness, analysis of this information and acting on this increases the performance of the production and planning processes (Özdemir & Doğan, 2010, p. 22).

#### Electronic Data Interchange

High degrees of integration occur when production and planning members act automatically in coordination with respect to some parts of production. EDI is important because it facilitates the frequent and automatic transfer of information necessary for high levels of integration and coordination within production and planning. Coordination plays an integral part in the integration of production and planning. More specifically, EDI is a catalyzing factor and the first step in achieving integrated production and planning (Özdemir & Doğan, 2010, p. 22).

#### Internet

The Internet enables businesses to effectively manage their own production and planning by developing stronger relationships with business partners and ultimately adding value to products and services sold to end customers. It is possible to perform faster and more accurate transactions by using web-based electronic data exchange, electronic fund transfers, advanced SCM, and renewed models (Peng, Thompson, & Zhang, 2021).

#### Enterprise Resource Planning

In line with the strategic goals and objectives of the business, it can be defined as a system that establishes appropriate communication between all functions of the entire business in order to meet the demands of the customers in the most appropriate way. Enterprise resource planning (ERP) is based on the communication and information sharing of all units in the enterprises (Anguelov, 2021).

#### Radio Frequency Identification

Radio frequency identification (RFID) allows readers to collect information wirelessly from electronically tagged files. RFID, which includes software, network, and database components, ensures that the infrastructure of the information is transferred to the company. The systems contain special applications.

While some use passive, low-cost tags in short reading sequences, most information tags in the network applications are access control, file tracking, race timing, supply chain management, smart labels, and more (Kgobe & Ozor, 2021).

**Planning Software**

With the focus on shifting outward in production and planning, other types of software support systems are also needed. One of them is the planning (SCM/SCP) software technology that has just begun to be adopted. The SCM/SCP package program uses information from ERP to provide analytical decision support in addition to information visibility. While ERP systems show the company what is happening, SCM systems help the company decide what to do (Doumbia, Awudu, Yakubu, & Ganideh, 2021).

## Impact of Industry 4.0 in Production and Planning

Industry 4.0 transformed production and planning systems into *intelligent* production and planning systems, based largely on the cyber-physical interactions of connected elements. Application of Industry 4.0 technologies, production status, energy consumption, material flow, and customer orders also provide real-time monitoring and control of important production parameters such as data of suppliers and suppliers themselves (Li & Huang, 2021; Below Fig. 1 shows the new innovation and their relationship from the supply chain and logistics trends perspective.).

There is a transformation from the traditional understanding of production with the internet of things – from advanced sensors, cloud technologies, artificial intelligence, advanced robotic technologies, 3D and 4D printing, which emerged in the new industrial revolution, to smart factories where high technology is used with automation based on inter-machine communication. The basis of Industry 4.0 is the production of high value-added products and services by using real-time data, depending on the communication of all machines and systems with each other in production (Pivoto et al., 2021) (Fig. 2).

Pivito et al. (2021) looked at the 5C architecture based on automation processes models, and its role in the data acquisition model for industrial devices. This architecture consists of five levels. Smart connection is the integration of the physical devices connected in a communication network. Data to information conversion is the monitoring data on devices to apply to the physical world. Cybernetic use of information is for device virtualization. Cognition functions of monitoring and prognostics are for failure prediction and maintenance optimization. Configuration transmission from the virtual to the physical world is making machines self-adjusting and self-adaptive. Industry 4.0 targets autonomous operations, mass product customization, collaborative manufacturing, and end-to-end digital integration (Brettel, Friederichsen, Keller, & Rosenberg, 2014). When there is this level of digital integration in the Industry 4.0 era, concerns regarding systems turn to the technique of focusing on security concerns within a reference architecture model using certain concepts and structuring rules (Lin et al., 2015).