APPLICATION OF MODERN INFORMATION TECHNOLOGY IN LOGISTICS

VYUŽITÍ MODERNÍCH INFORMAČNÍCH TECHNOLOGIÍ V LOGISTICE

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Abstract:

The application of modern information technology in logistics was the topic of the first international scientific conference at the College of Logistics in Přerov. The papers proved the wide range of applicability of IT technology in logistics processes and the presented ones confirmed the ability of logistics to take "on the fly" the most modern means of the computing and communication resources so as to guarantee a constant increase in the quality of logistics services.

Keywords:

logistics, information and communication technologies, information systems, mobile technology, microelectronics, RFID, NFC, telematics, WMS, TMS, cloud.

1. INTRODUCTION

The importance of the application of information technology in logistics has been growing. Logistics firms have to deliver more complex services. The firms are under pressure of the quality and speed of information flow requirements. Provided logistical services being extras recently are already average nowadays.

New information technologies are expected to bring greater benefits. Components of computer and communication technologies are becoming cheaper, a large variety of software tools appear at the market, there is a very rapid development of mobile platforms and a variety of other means.

For customers and partners of logistics companies there are web portals that allow data acquisition and tracking of shipments by the customer. There are complete systems for motion detection of transport equipment, measuring its basic parameters and the possibility of its visualization and retrospective reconstruction.
The deployment of smartphones and tablets deserves special attention. There are some possibilities of mobile applications for encryption in logistics processes. The possibility of monitoring of smart phones using GPS and thus to obtain detailed information about a position and perform direct communication with the device and a lot of other activities are available.

The application of information technology in logistics is very diverse as it comes out of the above mentioned.

We will briefly quote at least the most important findings presented at the conference.

2. INFORMATION SYSTEMS IN LOGISTICS.

Management of companies in current modern environment is under constant pressure of continues change and the need to make quick and qualified decisions. To handle the required management work asks for a range of tools and methods, the most important of which is the good information system (IS).

Information systems for logistics are at the forefront of our concerns. They are directed to production, logistics or distribution companies that are looking for simpler, faster and flawless ways of logistics activities. They are unique not only for internal logistics, but for the entire supply chain from suppliers to customers. They should be particularly flexible, built in a modular architecture; they should be open to the environment, especially in a situation where it is necessary to constantly create links to new customers and partners.

Nowadays firms acquire new information system (IS) primarily to reduce costs both the labour one and overheads. Therefore there is the stronger requirement for new IS to possess the optimization methods and the maximum of activities should be automated.

It is often difficult to estimate whether the proposed changes in the processes will lead to the expected effects. One of the ways how to reduce the risk of incorrect decisions is the use of advanced simulation tools based on the principles of discrete simulation. Optimization is especially useful in the area of collection and distribution of shipments, handling and movement of mechanization tools in warehouses and container terminals, or movements in the workplace.

Modern information systems for logistics should already have an integrated data warehouse, which brings a new dimension for work with data from the operational systems and looking at them. Data warehouses allow you to create dynamic reports and analysis. They are designed primarily for trade, marketing, controlling and management of these companies and their subsequent use for operational and strategic decision making.

Some small and medium-sized businesses with the aim of saving for the development and implementation of its information system take advantage of using a new phenomenon - cloud services (SaaS - software as a service). This solution ultimately may not be the cheapest, but the users of cloud services have less trouble in the final stage, they do not have to worry about functionality, IT infrastructure, updates, and others. They only pay for the lease of software services.

Mobile terminals (Wi-Fi) for wireless data collection and processing are an integral part of corporate systems. On-line solutions, where the terminal may share information with the desktop applications in real-time using the technology of bar codes or RFID technology, dominate in stock nowadays. The introduction of the mobile terminal brings a number of benefits, above all the reduction in the error rate of the services provided.

The smartphones represent new options for mobile data collection. On the market there are cheap smart phones that are capable of meeting the various phases of logistics processes.
and they can replace expensive specialized equipment, which do not have the ability to communicate with servers and information systems of the companies in real time. The big advantage is the easy development of software and its adaptation to the changing needs of logistics companies.

Integration of mobile devices into the corporate environment has its drawbacks and limitations. The key to successful commercial deployment of smartphones is not to introduce them across all the activities. After the careful evaluation of the benefits and losses for a given activity the mobile equipment are deployed only where they will be real benefit for a company asset. Now we notice some elements of information technology in detail.

3. PRESSURE ON THE MINIATURIZATION OF MICROELECTRONIC COMPONENTS

Increasing system integration in microelectronics is the key to the realization of advanced products and at the same time it is the source of necessary innovation. Constant pressure on the further miniaturization of microelectronic components is exerted. Interdisciplinary microelectronics passes into microsystems, which include the so-called MEMS (Micro-Electro-Mechanical Systems), MOEMS (Micro-Opto-and Electro-Mechanical Systems). Intelligent microsystems (Smart Microsystems), micro-optics and micro-mechanics appear. Currently, some of the mentioned technologies, but most in the near future, will find applications in various sphere of modern logistics processes.

In digital technology, we are often interested in computing performance which the given assembly is able to provide. Computing performance depends on many factors, such as clock (processor) frequency, bus width, quality and capacity of memory and others.

The original four-bit bus was quickly replaced by eight and then by sixteen bit bus. Currently, all of the “Smart” phones use the bus width of 32 bits.

In the production of microprocessors and memories the main players are Intel, AMD, Samsung, Global Foundries and others. With the development of processors for mobile devices around 2000 Intel abandoned the strategy of ever-increasing clock frequency, and began to develop the now widespread multicore processors with lower power consumption.

DDR4 SDRAM (Double Data Rate Synchronous Dynamic 4 Random Access Memory) is the direct successors of currently used type of operational memory DDR3. The architecture of DDR4 modules allows easier communication with the PCI bus.

At the same memory modules are equipped with multiple pins (DIMM - 284 and SO-DIMM - 256), the width of which is only 0.85 mm. Reduction of the structure make it possible to use higher frequencies and lower power requirements.

Among the first representative we include 4 Giga bits SAMSUNG chips, which are used for production of 16 GB and 32 GB DDR4 modules. At present however, the technology firms focused on a successor of DDR4 memory, which will be marked as GDDR5 and GDDR5 + (GDDR6).

The current development trend of semiconductor devices is estimated to be about ten years. From past experience of the semiconductor industry results that the new technologies have never released their hidden strength immediately. This happens only when the individual devices have low production cost and they are provably incorporated into the functional system, which can be connected with the outside world.
4. THE IMPORTANCE OF MOBILE TECHNOLOGIES

Wireless transmission of information in the area of mobile devices is the fundamental technology. The general definition of a mobile device describes it as a portable device. In the context of communications technologies, the mobility is understood as the ability to communicate with other devices without wires.

Currently in logistics process in order to identify and track objects, the RFID (Radio-Frequency Identification) are deployed and also its modification to transfer information over short distances - NFC (Near Field Communication) gains ground.

It is known that RFID versus bar codes has many advantages. The most important advantages include providing significantly greater reading distance than it was with bar codes (up to tens of meters), and this distance does not require the clear line of sight. RFID technology can read several tags simultaneously. In contrast, the processing of goods identifiable by bar code means reading one by one.

A very important feature is that it allows writing or rewriting data stored on the RFID tag that can be encapsulated into any physical box. Tag may take forms such as stickers, plastic cards, buttons, key chains and the like. The physical form of a tag is very variable, tags can be placed in a durable housing that can withstand the most adverse conditions such as high temperature, radiation, chemically hazardous, dusty, or otherwise contaminated environment.

The difficult imitation and counterfeiting is another added value of RFID tag. While it is easy to print an exact copy of bar code, with RFID tags, the situation is somewhat more difficult to copy. RFID tag in itself can contain several levels of protection whose breaking requires specific knowledge and equipment.

NFC is an extension of RFID technology, while its main advantage is the current trend in implementation of NFC to common mobile devices. In general it can be said that NFC is a technology that has evolved from the original RFID with which it is backwards compatible and also share part of the technical specifications. The main difference compared to the NFC to RFID is usage only a single frequency of 13.56 MHz. RFID standards also specify extra bandwidth 134 kHz, 2.45 MHz and 960MHz. RFID technology is designed primarily for the purpose of identification, as a replacement for bar codes, while the NFC focuses in the field of application for the transfer of any data.

Very often RFID readers they are replaced by smartphones. This is partly due to reduced purchase price and, secondly, there is no need of another device. The actual load of information is done by the phone itself using the built-in camera. The smart phone is closely linked to the information system of logistics centre, and allows more effective processes, such as the tracing of important consignments or distribution planning. Information about the product and its history can be retrieved in the mobile phone from so called smart tag which is NFC tags equipped with a digital display unit. Using a NFC mobile phone equipped with application for programming smart tag it is possible only by „touch“ to transfer the necessary information about the shipment into the smart tag.

5. OTHER OPTIONS OF IT TECHNOLOGY IN LOGISTICS

By connecting information and telecommunication technologies with transport engineering and with the support of other related disciplines the field of telematics has successfully been developing. It acts as a tool for optimization of transport systems allowing an increase fluency and safety of transport, shortening travel time, reduce fuel consumption, simplify traffic management, etc. The most modern application of information and
communications technology from the enterprise information system, internet, mobile systems, switching to applications based on wireless communication, and finally to the current deployment of intelligent phones - smartphones have been used.

Many transportation logistics company in connection with the use of modern information technology have been implementing so called Transportation Management System - TMS. As a rule, the system helps with the calculation of prices of individual shipments, tracking the movement of vehicles, vehicle crossings optimization, graphic transportation planning or checking the status of individual shipments and consignments on the dispatcher desk. This includes the integration of spatial information directly into the information system, and optimization of routes using advanced mathematical algorithms.

The modern information technology also support so called Warehouse Management System - WMS. These systems enable automated management of warehouse operations across all warehouse processes. The core of the system is the software completed with special hardware such as mobile terminals, wireless network printers, RFID automatic identification technology, and voice preparation and so on. They cover on-line warehouse management, they use optimization algorithms for loading and shipping, they register all processes in real time. The main benefit of WMS is the higher overall throughput and the acceleration of logistics processes.

5. CONCLUSION

This paper confirms the wide spectrum of utilization of IT in logistics. The explicit enumeration of potential use of IT technologies at different levels of the logistics chain shows that there is a direct relation between the level of deployed IT technology and the quality of the logistics process. Therefore, from the perspective of logistics the tracking of the further development of information and communication technologies is vital.

BIBLIOGRAPHY:

