# Workflow of the Management in Printing Production in Condition of Print on-Demand

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**Abstract**: Print-on-demand process of publications printing is defined as a process done in short period of time, while you wait. The on-demand print production process is closely related to management of resources in publishing, printing, storage and distribution of publications. The market analysis for printed publications suggests that employing high inputs for print, delivery, storage and distribution followed by a large number of copies delivered to the final consumer is ineffective. Implementation of Print-on-demand technology allows printing single book up to 200 copies. Correct use of digital printing and binding equipment effectively addresses the economics of this process as well. A process of storing the books is ignored as the number of printed copies is directly related to the number of orders. Publishing house owning the printed version of PDF publication chooses the file from the database and sends it to the printing company with the on-demand printer. This process is highly efficient for printing companies and also for bookstores as well. Bookstores should be no exception in being Print-on-demand printer owners.

**Keywords:** Management, Organizational structures, Future, Company, Team, Trend, Technology Print-on-demand, Storage and distribution

## 1. Introduction

Current markets are experiencing a rapid decline of the material form of printed products in favour of the digital media. Market slump caused an excess of production capabilities and therefore pressure on prices. Because of this market situation, even technologically advanced competitors fight for the contracts, which they would previously reject, especially if the contracts are unprofitable. Nowadays, producers aim to employ all available production capacities disregarding the costs.

## 2. Analysis of Current State of Print Medias

The number of journals sold is constantly decreasing. The forecasts assume that printed form of journals will slowly fade away until 2020. Daily news as an information sharing will not disappear, but it will transit into a digital form (Roman Sip, Appendix 1). This is based on the fact that today's reports are available on the Internet for minimal fees and the number of phone and tablet readers is increasing. This trend is irreversible. The reason behind decreasing number of readers of printed products is caused by a change in demography as well as new generation searching for information only in the context of the market offered technologies.

The research has confirmed that 35% of the population shifted from printed titles to digital media. New technologies have changed the habits of television viewers and their way of watching television. The free of charge access to information is growing rapidly. The availability of non-free information is stagnating, which is associated with a poor purchasing power of the population and unwillingness to pay for intellectual property.

The critical factors with which material form of information is faced is financial crises that contributed to the disappearance of printed titles, easy access to information on the internet, replacement of human labour with computer technologies while saving costs, stagnation of consumption and the overall decrease in investments into the media.

Considering the economic development and minimal investments, there is no growth forecast for media. The polygraph institute has never been a strong interest of investments, and therefore high profit generated was never a priority in this sector.

The largest amount of investments into digital media comes from commercials, such as advertisement of motor vehicles, banking services, telecommunications, pharmaceutical industry and electronics (NMS Market Research). Advertisers concentrate mainly on television, which has an upward trend, and least focus goes towards the press, which has a decreasing trend. Growing share of investments is directed towards the Internet.

The future of the polygraph industry, based on the current conditions, is going to evolve as following:

–   Majority of customers of printed publications are going to be seniors;
–   Print is going to remain as a part of multichannel communication;
–   Young generation is going to use smart devices such as smartphones and tablets to receive information;
–   Demand for low-cost publications and Print-on-demand technology will keep rising (Kavecký, 2015);
–   Customers' demand cost reductions and time-efficiency. This will create an opportunity for web-to-print.

Publishers will have to be more efficient in usage of modern technology applications. Newspapers are the first target, as they cannot compete with the Internet, which provides wider content and online reports. The printed copy of newspapers is heading towards the future, where the number of copies drops dramatically and leads to extinction. Printing industry agrees that price reductions will not cause an increase in demand of orders.

New opportunities for the publishing-printing complex are Print-on-demand, web-to-print, and e-commerce. Customers appreciate these services as they are practical and significantly save costs. A customer is not forced to visit the provider of such a service. An order can be created and submitted using the Internet, which follows the logistics services. Currently, this service is mainly used when ordering photo books, calendars or promotional materials. Classical offset printing mechanism still offers a consistent quality of order processing and is a major component of multi-channel communications. The older generation still prefers press as the primary means of communication. Soon enough, the publishing-printing complex will have to respond flexibly to the requirements of customers, which leads to investments into digital print technologies (Kavecký, F., 2015). The individual customer requirements, personification, and logistics will be the key areas. Publishers will have to step aside from mass production and a large volume of stocks and rather concentrate on buyers' requirements. The classical printing process has lost dominant position and without co-operation with the digital printing process, it cannot face future digital challenges.

Digital technologies are capable of printing full-colour publications of larger scale in single copies. Production processes are becoming automated; deadlines are shorter and logistics adapt to the requirements of the customer. These technological changes create a more competitive environment, process and quality controls and job cuts in publishing companies.

Positive assumptions about the use of the press are:

–   General economic growth,
–   Classical offset printing provides high-quality output.
–   Press allows targeting of the older generation

Negative assumptions about the use of the press are:

–   Information and communication technology penetrated entire society,
–   Instant access to information via smartphones and tablets,
–   Powerful effects of using ICT (Information and Communication Technologies) in the upcoming generation.
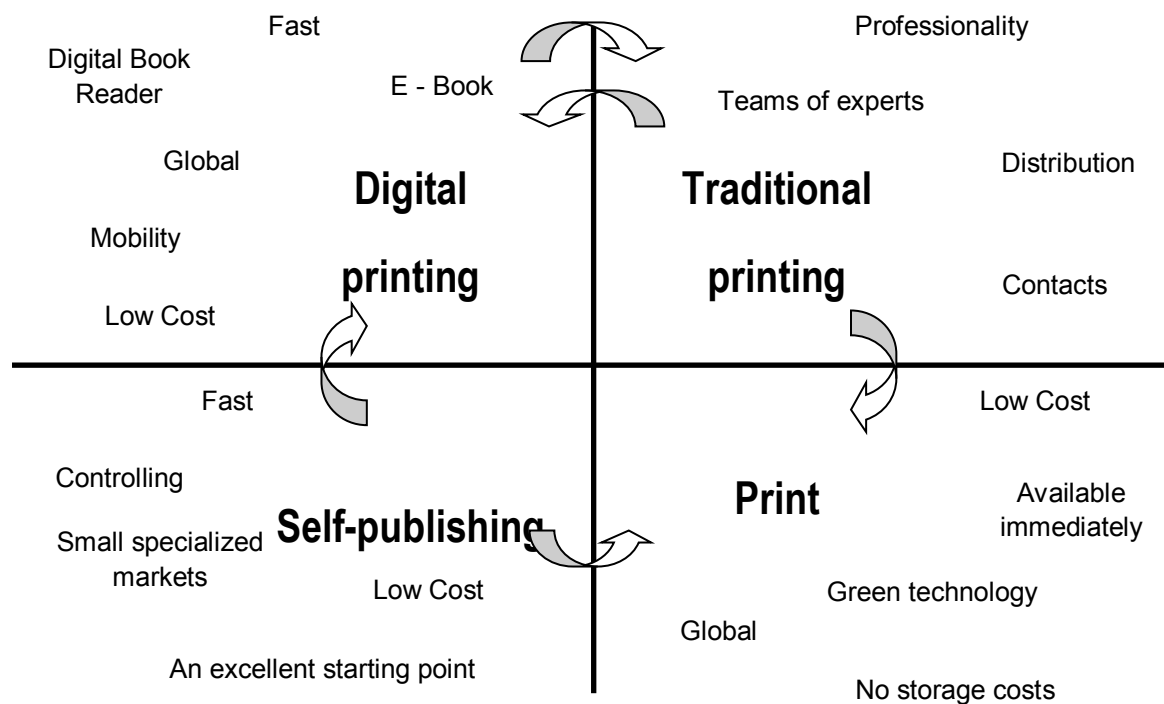
**Figure 1:** Comparison of printing offerings based on their strengths (The creative pen, 2009)

The effectiveness of the classical printing cannot reach the population as well as ICT. Based on this, printing is considered as a support instrument in multi-channel communications. The classic print is seen as a mean for customers who need to have a paper form of printing rather than digital. However, the effect of virtual media can be increased through the press. Area of digital printing can increase success within online marketing and provision of web-to-print services.

A phenomenon of available information, via Internet, opens the question of copyright ownership. The deficit of legal knowledge does not justify its free distribution over the Internet. The model of the workflow broken down into simpler works and ties describes a way of the delivery between all participants in the industry. This model usually describes the technology of the process. Workflow is a software-predefined system of programmed processes, which should do specific actions regarding the whole process. The software controls the actions of partial tasks and the process of reconciliation. The Workflow makes three essential parts:

– Rules that regulate processes,
– Transmission of information,
– Methods and instruments of measurement.

Dealer registers potential customer in the system. Basic registration could be extended by adding personal characteristics (the ability of communication and to honour code of ethics). The Cost Clerk suggests calculation of optimal price while communicating with the dealer so that he can consider customer requirements. Out of the potential price calculations, he chooses the right one for the customer and the order is passed to the technologist, which with regards to local technology suggests the process. The suggested technology does not have any impact on the final price. The output is a technological list by which the entire production is organized. The warehouseman gets the specification of the purchase and checks material availability. Orientation in MIS (Management Information System) is quick and easy. If the system is connected to barcode readers, it can quickly process intake and outtake of materials in the loading bay (Author's experience of working in the printing industry for 17 years).

Production management is performed via production schedule, where the **controller** operatively controls the flow of orders, their progress, machine status and cooperation through MIS. The system can be supplemented with a sensor monitoring the current state of individual machines. It is a collection of data from the system and provides automatic evaluation (currently executed a contract in the printing and binding machines, the speed of printing, folding, and

tolerance of stitching, production of book covers). The warehouseman expedites finished order according to the date and overlooks completion of production, output quality and prints out a delivery note and pallet labels. Through barcode scanner, he inserts data about a delivery of finished order into the MIS. Based on delivery notes accountant provides an **invoice**. The system generates the invoice in accordance with the customer given identification to MIS when price offering was made. As far as MIS software is connected with the accounting program of the printer, the order is recognized in the financial system.

# 3. Print-On-Demand

The on-demand print production process is closely related to management of resources in publishing, printing, storage and distribution of publications. The market analysis for printed publications suggests that employing high inputs for print, delivery, storage and distribution followed by a large number of copies delivered to the final consumer is ineffective (Tupec, L., 2014). The classical technology needs to provide:

- Editorial processing;
- Graphic design;
- Preparation of printing forms;
- Preparation of printing machines;
- Printing;
- Bookbinding.

In contrast, Print on Demand offers the convenience of success by printing the very first book placed on the shelves of the bookstore. The digitalization and archiving of the created files have brought the simplicity into all technological process. Using them, it is possible to print one piece of copyright in the editorial staff. Thanks to this technology the publishing house is able to respond operatively to market requirements. Publisher's coverage requirements are to meet some printed editions to the amount of customer orders. Thanks to this technology there is no need to print a large amount of high-risk publications and eventually cover storage capacities, where estimated horizon of sales projected to two years cannot be implemented. The high costs of the printing process and transport are reduced. The return is spread over the entire period of merchantability.
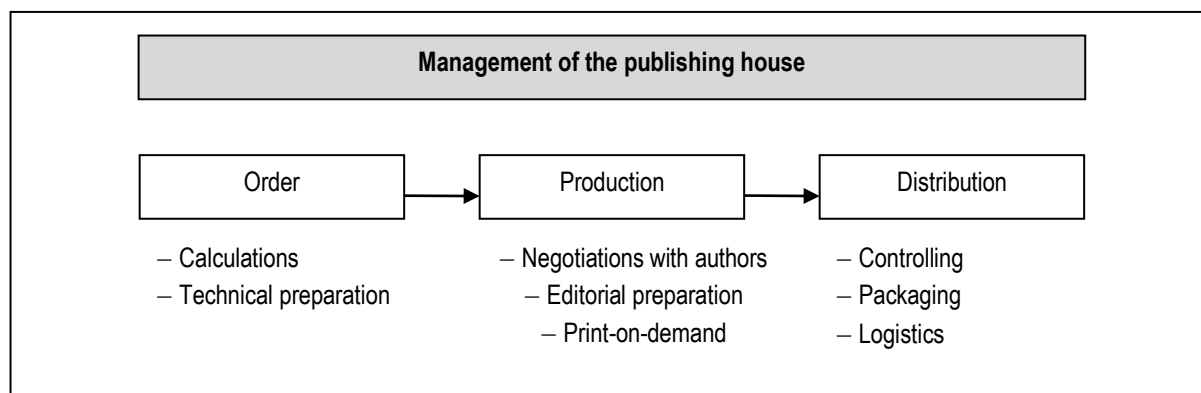


**Figure 2:** Logistical processes of publishers (Authors work)

The process of publishing books in the publishing house (Fig. 2) by Print-on-demand technology enables competitiveness to 200 specimens. (Harris, A., 2014) The correct use of digital printing and the bookbinding machine for the paperback is an effective solution for an economic part of the process. The storage of publications is in the end, as the number of printed pieces depends on the amount of orders. The publishing house owning the printing version of *pdf* of publications chooses a file from the database and delivers it for processing. The owner of the print-on-demand technology can be publishing house, but bookstore is not an exception.

The order lifecycle starts with Internet portal where the customer orders selected title. Afterward, the operator of the digital printing chooses selected book title from the database. Publication is printed, book-bended and ready for the distribution. This is followed by a personal pick up by the customer or by distribution through e-shop. Distribution channels ensure transport of the order right to the doors of the customer.

The connection between the publishing house, printer and distribution is done through Internet sales – e-shop. Customer provides orders, process sheets for the press operator, invoices, shipping labels for delivery through the web application and sales software is activated. The whole process is automatically collected by the economic software, and the variable number (number of the order) is assigned. The state of the entire process is under the control of the publishing house, which stores administration costs, process orders, production, and distribution. The system is controlled through the web application and offers a list of orders, payments, and manufacturing costs.
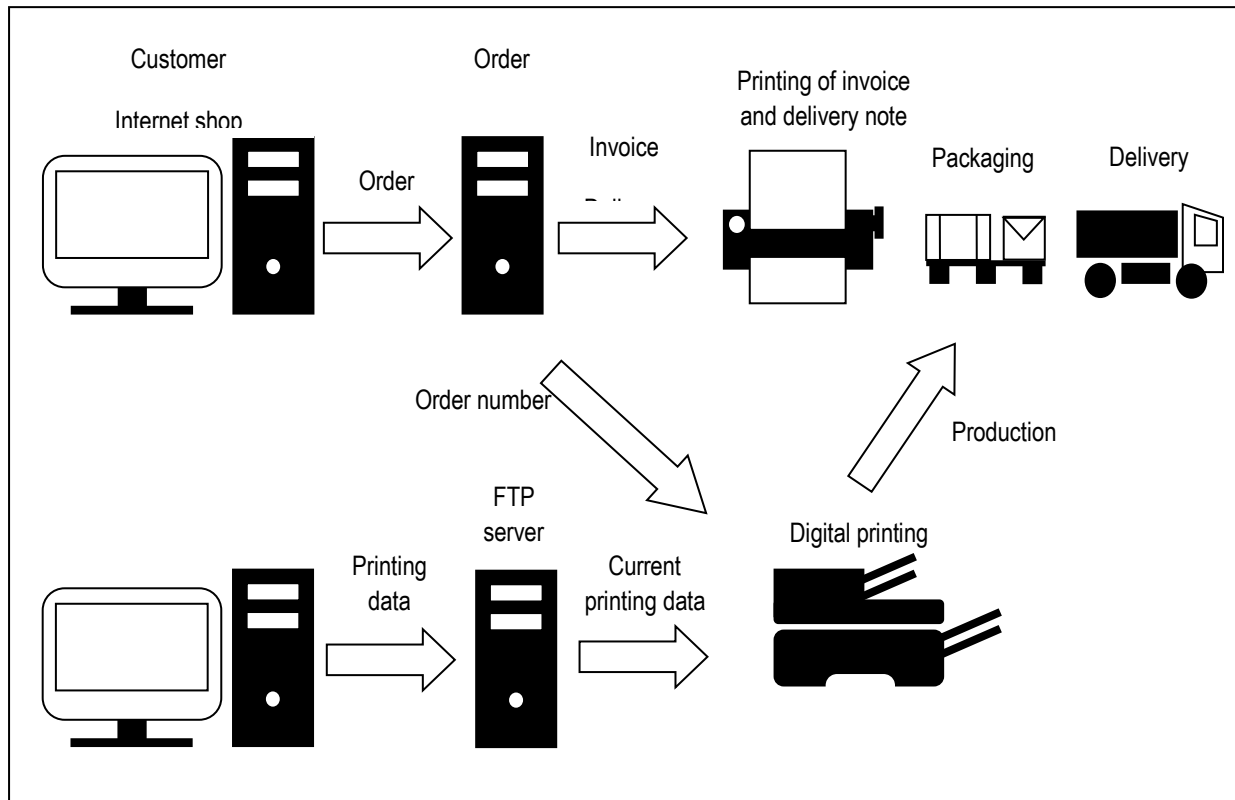


**Figure 3:** Lifecycle of publication ordered online using Print-on-demand process (Authors work)

This model is based on the operational capacity to satisfy market demand and provides the customer a copy on the day of the order if personally picked up and ensures that the distribution is no longer than two days. The client is known right at the start of the production process of the book. This way publishing house ensures low-cost full service of niche, academic, technical or encyclopedic literature, technical documentation and training materials.

Print-on-demand provides titles which commercial offset printing cannot print at the desired price range and in optimal time (Figure 3). Low costs of the process provide opportunities for publishing houses to introduce upcoming authors to the market, which title's marketability and sales are questionable. Following the positive response of the market, this pilot project can be printed using commercialized offset printing.

Without the introduction of printing on demand (Print-on-Demand) issuing educational books for e-shopping would not be possible. Inventory maintenance, warehouse space has become too expensive, while inventory turnaround is too small. Print on demand reduces costs and eliminates the need for space to store unsold copies.

# 4. Distribution in the Concept of Internet Sales

The impressive part of the polygraph industry is packaging and distribution of the goods. This part of the operations is directly related to bookbinding, but it is not part of it. The packaging of the goods in the printing industry ensures its protection during distribution. The wrong choice of packing materials can cause irreversible damage to the goods. Because of this, the packaging is resolved from the start of the ordering process. If printing house takes care of the transport of the orders, these orders are covered with the stretch film, which exhibits optimum protection. Subsequently,

the goods covered with the stretch film are placed on a pallet, where corners are protected with cardboard, and the whole pallet is once again strengthened with stretch foil (Kačeňák, I., 2011).

Organisation of the company's warehouse is managed through software and system that organizes technological processes. Sales department takes care of pallet labels indicating the product, amount of printed copies in the package, the number of packages in a row, the number of rows and finally the total quantity of copies. Requirements of the customer could be the packaging of the goods into cartons from corrugated cardboard. For this purpose, there are standard sizes of boxes, for instance, ones supplied by the Slovak Post, or it is required from customer to enter specific parameters of packaging. The process of books production with Print-on-demand approach introduced changes to packaging and distribution of the publications.

Orders from the e-shop are processed locally on the publisher's server. Publisher prints books one by one, individually, depending on the orders. The total number of printed copies is directly linked to the market demand. Digitally stored data on the server about the print are automatically prepared for the Print on Demand requirements. Data about orders are automatically sent to the department for distribution and web interface aids customer with an overview of the current state of the order (date of shipment, the state of the packaging, distribution delivery by courier, invoice). A customer obtains an account on the server with variable symbol and has access to the publishing data saved on the server. Through the night these data are automatically processed and are ready for print. Ordered goods will be automatically provided with printed order information, invoices, delivery notes, coverslips and address label. Publishing educational books for e-shopping would not be possible without an introduction of printing-on-demand.

# 5. Global European Market and the Development of Logistics

Logistics following the European global market and e-commerce will go through changes. Logistics industry will adapt to consumer behaviour, based on the development of retail sales. Vision is that the retail stores will act as showrooms, where customers will be able to familiarize themselves with the goods. Shopping will increasingly move towards the Internet and will be conducted at the level of online purchase. Growing purchasing power of middle class will cause a higher volume of sales, increasing pressure on logistics services. Delivery of goods in the urban area will be addressed through the delivery boxes. Not only the sender and delivery service but also the receiver will have abilities to oversee the delivery of order - status of the order and location. The dynamics of competition among logistics companies will bring added value in terms of additional services, such as advice on the purchase and small repair service.

Multinational logistics companies play a major role in global trade as they carry out services at the international level. Their advantage is a multinational collaboration with international sales network. Local providers will be responsible for management of logistics services in the urban agglomeration. Their competitive advantage is knowledge of the local environment in the context of increasingly frequent traffic problems and location of the recipient.

The increased growth in volume of online shopping marketing will be related to:
– Transformation of the physical stores,
– Increase in orders over the Internet,
– Special requirements for logistics services,
– Delivery boxes,
– Operative control of the location of goods,
– Reducing the timeframe between order and delivery.

The future of logistics, together with a change in production technology, will play a key role in publishers' business process. Delivery of goods in 24 hours since the order was made, will become an industry standard. Over the coming years, these kinds of customer demands will cause a change in publishing technologies. Since this is about satisfying individual requirements of customers, control management of publishing will have to change as well.
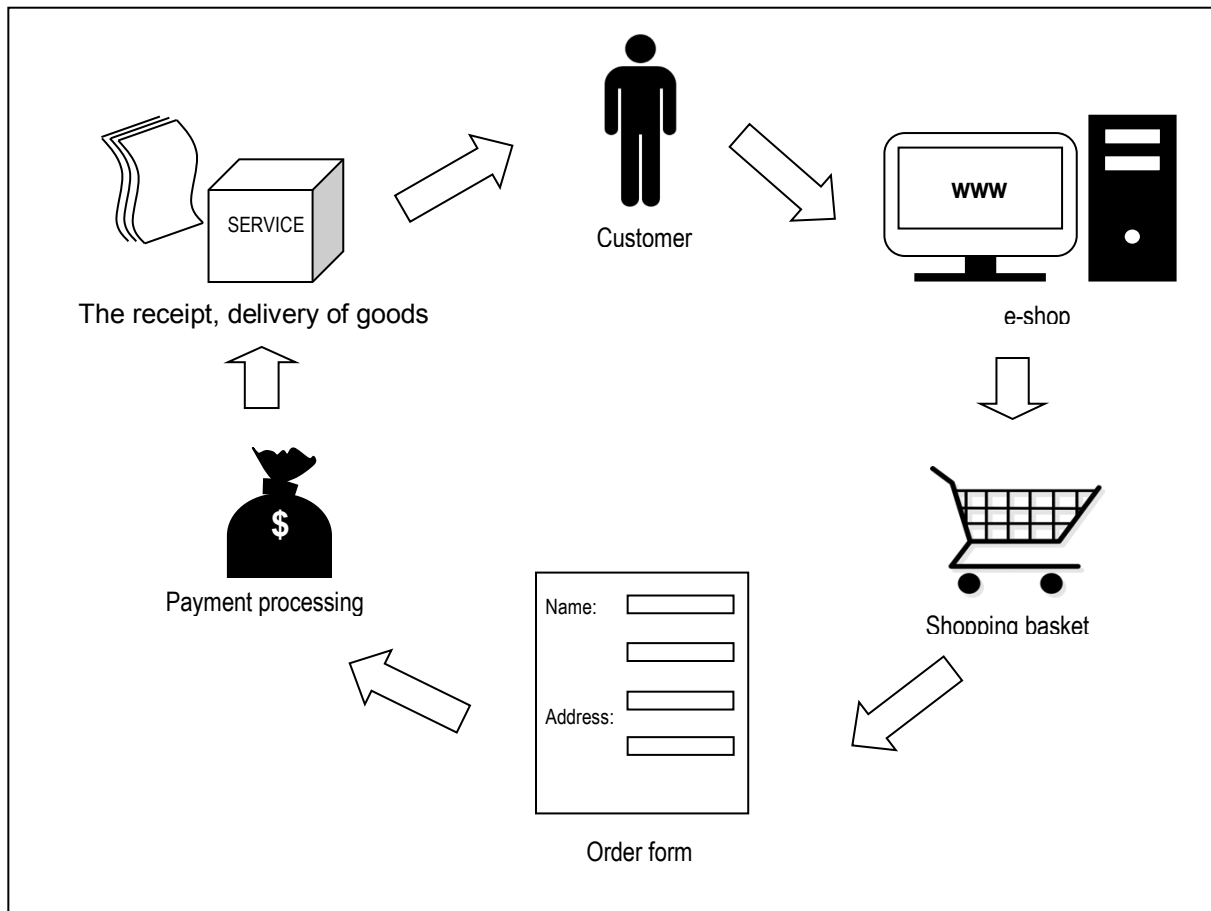
**Figure 4:** Lifecycle of purchase and distribution of goods throughout the Internet shopping (Authors work)

Distribution logistics of the publishing house ensure a summary of logical strategies, which are related to the flow of goods to a customer. Strategy concentrates on efficient distribution of time, reduction of the costs and increase in quality. Wider goal is meeting customer requirements and overall satisfaction. The traditional meaning of logistics oriented on the transport, warehousing, procurement activities, materials management and handling of operations changes into customer service through external logistics processes. Information processes aimed to transfer information about work in progress and order status from the publishing house for the client are characteristic for these kinds of processes.

# 6. Online Store with Publications

The habit of purchasing through an online store has become a daily activity. The Internet offers tools to search for the products, display their information; customer order forms, secure payment, and displays product return policies. Shoppers have the opportunity via a web search engine to determine advanced search criteria and narrow down the products they are looking for. Companies have online catalogues as well. These features have more options such as 360 degrees view, thanks to which customers can familiarize themselves with the goods. The online store has a software database of goods and sales. Sales Administrator oversees the inventory levels, the cost of goods, and uses visualization program to generate sales statistics. These statistics help planning future strategy as they provide information about site's traffic, shopper's activity and habits. The agenda is adapted to control a simple portal to facilitate the work of the administrator. If the online shop implementation follows high standards, it can be connected to accounting software with a connection to logistics.

The crucial step is to optimize Internet sales with browser search algorithms. Using SEO settings, administrators can effectively influence the search engine results (How SEO helps šearch). However, seller needs to adjust keywords so that they reflect what potential customers are looking for. The range of goods offered via the Internet grows with a number of buyers. Online shopping was first implemented in the US. Internet sales boom came in the 21st century. Nowadays an Internet sale is becoming a superior competitor to traditional shopping. Customers have access to a wider choice of

goods, lower prices and fast time of delivery. All these options lead to an ever-increasing volume of sales on the website. Survey of customers discloses some further differences in online shopping:

– The quality of services and customer offered depends on the seller,
– A smaller range of goods in classical shops,
– Delivery is in many cases more comfortable than going to shops.

Despite these concerns, buyers prefer online store compared to traditional shop in the mall. Low quality of service, unhelpful staff and poor customer care are all contributing to negative customer experience, which is not often met when shopping through established e-shop. Other, by customers, negatively perceived aspects of classic shops are small price competitiveness and unequally distributed network of shopping centres.

Negative experiences with Internet sales occur in connection with promotional, discounts and small auction portal. Positive experiences generally are more favourable prices, delivery to the doors, convenience of purchase, along with wide range of offerings and time-efficiency. Low prices still a primary factor. The quality of Internet sales is improving, and the response from customers to the services offered is perceived positively, thereby increasing the loyalty of shoppers.

New technologies create new shopping behaviours among the customers. According to a survey (Roman Sip, Appendix 2) on Internet shopping, customers use a whole range of technologies such as laptops, smartphones, and tablets. These devices with Internet access provide immediate purchase. Purchasing behaviour of the population varies with the offerings. Travel, flight tickets, consumer goods, meals and healthy lifestyle belong to highest purchased offerings online. Traditional shops still have customers mainly interested in textiles, sporting goods, and food.

Despite many positives of online shopping, malls remain an alternative and still have something to offer. Shoppers can observe goods in real life and quickly view all other goods displayed. Europeans still prefer one place for shopping and spending their free time. Therefore, most of the goods still get to the consumer via the classic sales. Loyalty cards and promotions force customers to shop at specific stores.

# 7. Future Technical Solutions

Questions regarding future of the press are uncertain. Classic offset and digital printing are fully exploited known technologies. Smartphones and tablets are relatively new devices on the market, and their potential is still not fully used. The optimistic outlook is that these devices will create a new market for print. There is an existing overlap between personal and work technologies, which creates pressure on automating processes in the business and logistics solutions. Other options and provisions for streamlining and innovation is an area of communication. In connection with an increase in sales volume and an emphasis on automated online processing, it is necessary to innovate the business model of the entire publishing-printing complex. This is a fundamental change that monitors a level of satisfaction of customers Figure 4. Information technologies play a decisive role in this process.
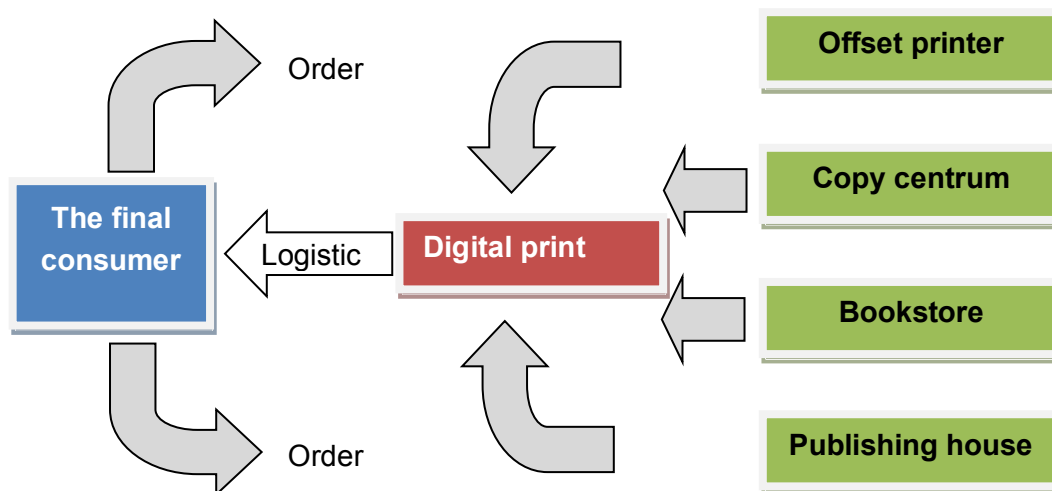


**Figure 5:** Information transfer in publishing-printing complex (Roman Sip)

The finding (Roman Sip, Appendix 3) is unfavourable for the publishing-printing complex. Consumer choices are straightforward. The strategy to obtain the information has a negative impact on one entire sector. The Internet has become the default place for information, finding information for free. The non-periodical digital news is most at risk. Electronic publication platform is threatened because of ignoring licensing terms that only decrease in aging population.

Publishing-printing complex is aware that the transition to digital printing and subsequently to electronic publishing is happening right now. Customers will place emphasis on speed and print quality of low volume of publications, as well as the time of their delivery. Requirements will increasingly move towards:

–        Immediate delivery date on request with the possibility of providing additional services;
–        Efficient delivery of publications for a limited term through e-commerce.

Successful completion of electronic order must be finalized by the delivery of goods to the end customer. Only then the terms of web-to-print e-business system will be filled. To satisfy requirements of publishing-printing complex, e-commerce must provide following:

–        Fast goods delivery, provision of an accelerated process of delivery.
–        Implementation of production without warehouse with the intention to immediately ship supplies.
–        Organisation of goods delivery.

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In this sense, the future of newspapers is not considered. Newspapers in a tangible form are not priority information medium anymore. They are considered possible support tool, while the Internet is the place of instant information availability. Unilaterally oriented printing companies will face existential problems in the future. The volume of paper consumed in newspaper printers in the past decade decreases year on year. Hence the conclusion for printing companies is negative unless they refocused to digital technologies.

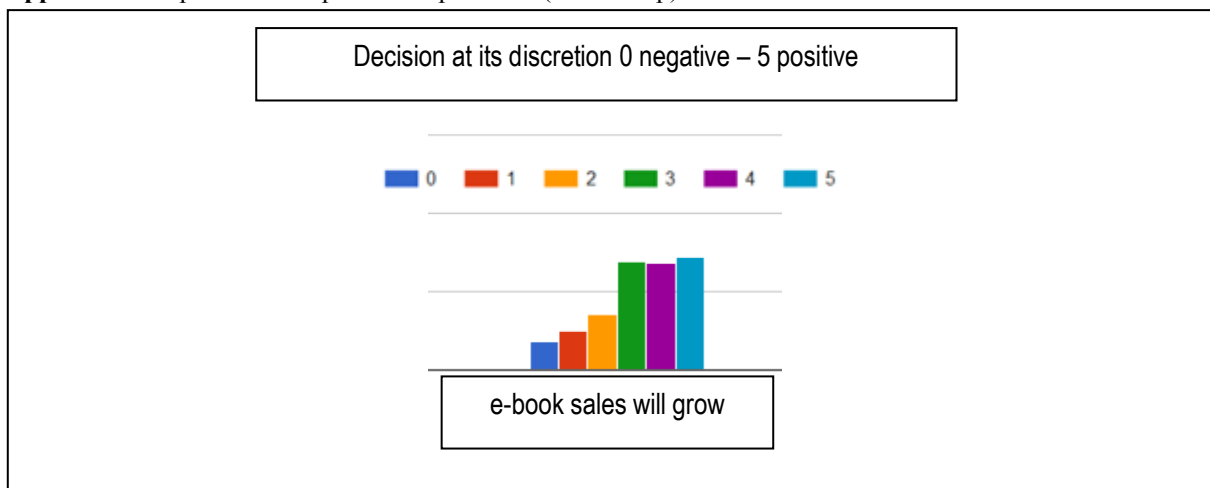The young generation uses all forms of technology to gather information and communicate, starting with the fulfilment of individual requirements, from production to delivery. Publishers should build their programs on a technology platform to attract future generations. Research has shown that warehouses and physical stores are on the decline as a focus is on operational performance of real customer requirements.

**Figure 6:** Alternative processes of publishing (Authors work)

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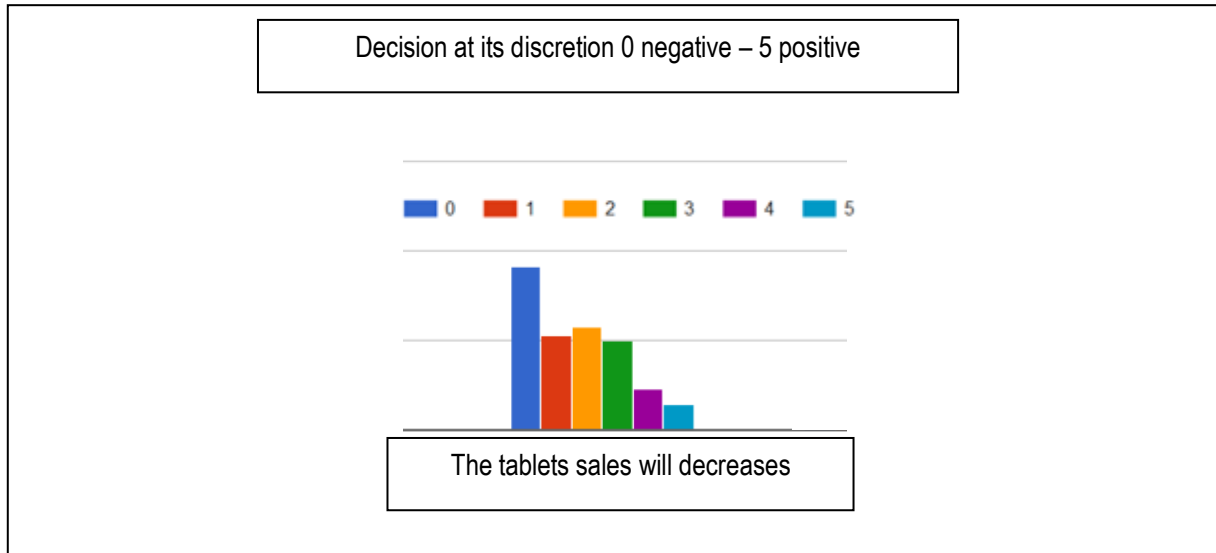
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# Appendix

**Appendix 1:** Population Sample 434 respondents (Roman Sip)



Decision at its discretion 0 negative – 5 positive

■ 0   ■ 1   ■ 2   ■ 3   ■ 4   ■ 5

e-book sales will grow

**Appendix 2:** Population Sample 434 respondents (Roman Sip)



Decision at its discretion 0 negative – 5 positive

The tablets sales will decreases

**Appendix 3:** Population Sample 434 respondents (Roman Sip)



Decision at its discretion 0 negative – 5 positive

Printed books terminated