

**Nyugat – Magyarországi Egyetem  
Sopron**

**Repertory of the thesis**

**Process and workflow management  
in the printing industry**

**Szentgyörgyvölgyi Rozália**

**Sopron**

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## **1. Introduction**

The demands of modern communication market to printing enterprises are continuously getting higher and higher. In the changed economic environment the printing companies have to subordinate their full-scale activities to the demands of the market, while facing a large number of challenges. As a consequence of rising competition, each enterprise has to make an effort to utilize their own resources at the optimum level, and to react to their clients' demands faster and in a more flexible way than earlier.

Market orientation has an effect on the processes within the organizations, too. Among the internal factors the processes are of primary importance as their optimization can reduce the number of unexploited opportunities.

Nowadays the transformation, digitization of printing processes can be witnessed. The influence of digital technology on processes, the striving for digitization is getting ever stronger. In connection with this, the possibility of control of manufacturing processes has come to the fore in the printing industry, too, which integrates planning, manufacturing and delivery to bring about information flow for the automation of the individual tasks requested to be realized. CIM, Computer Integrated Manufacturing – or networking, an expression now used in the printing industry – by connecting processes and equipment into a network realizes an integrated information flow, thus enabling us to improve the efficiency of processes.

Small and medium-sized national printing companies, by means of connecting processes and machines into a network, with the application of open file formats can keep pace with technical development and the competitors.

## **2. The aims and basic principle of the research**

The main aim of the doctoral thesis is to elaborate a complex analytical method for the realization of the integration of printing processes into a computer network to enable the national printing enterprises to gain a uniform and consistent basis to realize it. This way an approach gets elaborated, which can be made use of in practice and is, at the same time, well-grounded both theoretically and methodologically, enabling printing companies to deliberately develop and realize their activities connected to networking.

I wish to examine the characteristics of the printing process and workflow management in case of Hungarian printing enterprises empirically, by means of quantitative research methods.

A questionnaire survey was drawn up and conducted under my direction and with my collaboration, the results of which form the primary mass of data of the analyses.

An attempt was made to create a complex analytical method for networking in printing, with analysis of the technical-technological level of the enterprise being a part of it.

The applicability of the method in practice was examined by means of a qualitative, case study approach. In my analysis the networking complex analytical method was applied in a development project.

The relevant literature and knowledge concerning process and workflow management, as well as their application in printing and the development of manufacturing process and workflow management was surveyed based on books, magazine articles, conference lectures, dissertations etc. published both in Hungarian and in foreign languages.

### **3. The research model**

#### *Hypothesis 1.*

*Based on the analysis of the results of the survey „Workflow in the national printing industry 2006/2007” it can be proved that in the case of Hungarian printing houses surveyed, the integration of processes and machines into a network is hindered by non-compatible tools (machines, softwares) and the lack of up-to-date digital data formats.*

#### *Hypothesis 2.*

*By means of the determinant process characteristics of a printing enterprise a method suitable for the examination of a networking technical-technological level can be created.*

### *Hypothesis 3.*

*The integration of the processes and equipment of a printing enterprise into a network (networking) can be analyzed by means of organizational, technical-technological and financial demand elements.*

*With the help of the demand elements a complex networking analytical method can be outlined, by which the technical development level of the organization can also be studied.*

### *Hypothesis 4.*

*It can be assumed that in the course of the realization of the networking development project of a printing enterprise, the complex analytical method based on demand elements can be applied with good results.*

To determine the networking demand elements the data of the survey „Workflow characteristics in the national printing industry 2006/2007” were used as primary application, and also I studied resource literature and documents and collected information at interviews.

The aim of the examination is to analyze the effect of digital technology on processes and to analyze the networking demand elements of the examined Hungarian printing enterprises. The analysis serves to support hypotheses 1 and 2.

To analyze the technical-technological level of the printing enterprise also the results of the survey „Workflow characteristics in the national printing industry 2006/2007” were used.

The examination aims at the elaboration of a method to analyze the technical-technological level of networking. The elaborated method was tested in practice in the course of the examination „The technical-technological level of networking 2008/2009”. The analysis of the results serves to support hypothesis 3.

For the practical application of the complex networking analytical method for printing enterprises the results of the case study „Networking project” were used. The aim of the examination is to determine the applicability of the complex networking analytical method in the course of a development project. The analysis serves to support hypothesis 4.

Whereas the central model of my research work is to introduce the complex networking analytical method for printing enterprises.

#### **4. The research methodology**

##### *Questionnaire surveys*

In the centre of my research work was the survey of descriptive character, the questionnaire-type examination. In the course of the survey „Workflow characteristics in the national printing industry 2006/2007” a questionnaire survey was conducted and the effect of the application of digital technology on printing processes was studied.

The participants of the survey answered a total of 54 questions in 12 sets of questions (work preparation, arrival of digital files or originals,

prepress, workflow system, colour treatment, control of digital files and under- and overfilling, proofmaking, print mould making/Ct Plate, after the print preparation has finished: manufacturing process based on digital data, digital printing, digital handling of data and operational system, general data).

The questionnaire survey went on for one and a half years starting in May 2006 and was conducted locally, on the spot. In the course of the survey the data of 65 printing enterprises got into the database and became the basis of the research work. The questionnaires of the empirical survey were evaluated with the help of Microsoft Office Excel 2003 software. In the course of the quantitative analyses variance analysis was also carried out where the Excel statistical analysis programme was used.

### *Company interviews*

The analytical method of networking technical-technological level elaborated in the course of the research work serves to illustrate the technical-technological development of a printing enterprise. As a part of the present research, during the survey „Networking technical-technological level 2008/2009” interviews were conducted at companies. This way a survey of the manufacturing processes and machines of enterprises – from the point of view of their possible integration into a computer network – was carried out. At the interviews performed at the survey, the participants answered a total of 44 questions in 9 sets of questions (calling for bids and estimate, costing and accounting,

electronic work bag, materials management, electronic manufacture planning, recording manufacturing data, prepress, printing, binding).

The interviews went on for one year starting in May 2008. In the course of the survey the data of 26 printing companies got into the database. After processing the data the networking profile – which characterizes three dimensions of the technical-technological level (real, wished to achieve, possible) – of six enterprises was represented in a network diagram.

The evaluation and representation of the survey data was carried out by means of Microsoft Office Excel 2003 software.

### *Qualitative analyses*

To approach and systematize the demand elements, which serve as the basis of networking complex analytical method, I studied the technical literature, documents, examined the results of the survey „Workflow in the national printing industry 2006/2007”, analyzing in detail the answers given to the relevant questions of the questionnaire, and also made interviews of qualitative character with the Hungarian and foreign experts of the manufacturing companies.

The networking complex analytical method was examined in practice by the case study „Networking project”. In the different phases of the project surveys were completed and networking profiles were analyzed. For the technical-technological analysis the SWOT analysis was applied. In the course of financial analysis savings were determined and on the basis of the data the starting investment costs of a non-network printing company were estimated.

## 5. Phrasing of the theses

As a result of the dissertation, a uniform solution was provided for printing process optimization being a part of process management by means of a networking analytical method. A complex analytical method to integrate the processes and machines of printing enterprises into a computer network was created, which consists of an examination based on a complex – made up of organizational, technical, technological and financial demand elements – system of demands and the application of a measurement method used for the representation and analysis of the technical-technological level of networking.

### *Thesis 1.*

*At the examined printing enterprises the integration of processes and machines into a network is hindered by non-compatible tools (machines, softwares) and the lack of up-to-date digital data formats.*

### *Thesis 2.*

*Properties and findings that can be regarded as new were opened up in connection with the optimization of printing processes integrated into a computer network by means of the systematized and characterized, coherent and uniform networking system of demands.*

*The integration of printing processes and equipment into a network (networking) can be successfully analyzed by means of organizational, technical-technological and financial demand elements.*

*Thesis 3.*

*As a result of my thesis a method to analyze the technical-technological level of networking in printing was created, by means of which the technical level of networking can be recorded and analyzed, the changes in the course of the building-up of the manufacture integrated into a computer network can be followed perceptibly.*

*Thesis 4.*

*During the realization of the networking development project of a printing enterprise the complex analytical method based on demand elements can be successfully applied.*

## **6. The exploitation of the results in practice**

The results of the research carry novelties both for practical and theoretical experts. In terms of theory the research presents the multi-coloured technical literature of process and workflow management. In connection with the topic several principles are clarified, which are not used in a uniform way in printing technical literature either, mostly as a result of not enough circumspection during translation from English.

While carrying out the doctoral research it was important to work out results that can be utilized also in practice. The empiric workflow survey, the result of which constituted the starting point of my studies, forms a notion about the technical-technological development of the enterprises of the national printing industry, how far they have got in the development of processes, in the application of digital technology and how consciously they deal with the optimization of processes.

The complex analytical method of the integration of printing processes into a network can be a tool of process development practices, by means of network demand elements forming its basis the technical realization process of networking can be analyzed and further tasks can be determined. Whereas with the help of the analytical method of technical-technological level the building-up process of network-integrated manufacturing can be followed perceptibly and analyzed. Based on the method, enterprises are provided an aid to prepare the networking project already in the planning phase. The networking complex analytical method can be used by every national printing company simply and successfully. This means about 500-600 active small, medium-sized and large enterprises.

The theoretical and practical results of my research work can be made use of during teaching and have been and are being put to use. E.g. in the elaboration of the curriculum of the course „Applied digital technologies” and its teaching. The results have been and are published so they are accessible to the Hungarian and foreign professional public.

## 7. Publications

### Magazine article in English

1. **Szentgyörgyvölgyi, R.:** Effect of the Digital technology to the Print Production Processes.

*Acta Polytechnica Hungarica, (ISBN 1785-8860), Budapest Tech, Vol. 5. No. 3., 2008.*

### Conference lectures

1. **Szentgyörgyvölgyi, R. - Szűts I.:** Networking a nyomdaiparban

*BMF konferencia 2009, Budapest Jövőbe mutató technológiák a környezetvédelemben és a könnyűiparban, Budapest, 2009. november 12.*

2. **Szentgyörgyvölgyi, R.:** Application JDF in small and medium sized print media companies.

*4th GRID Symposium, Novi Sad, 18th-19th November 2008.*

3. **Szentgyörgyvölgyi, R.:** Digitális nyomdai termelési folyamatok integrálása.

*Tavaszi szél doktorandusz konferencia, Zrínyi Miklós nemzetvédelmi Egyetem, Budapest, 2007. május 17-20.*

4. **Szentgyörgyvölgyi, R.:** Effect of the Digital Technology to the Print Production Processes.

*Budapest Tech - Conference 2007. New Aspects in the Innovation of a Traditional Industry, Budapest, November 19th. 2007.*

5. **Szentgyörgyvölgyi, R.:** Process and workflow management in graphic arts industry.  
*3rd GRID Symposium, Novi Sad, November 17th-18th 2006.*
6. **Szentgyörgyvölgyi, R.:** The Hungarian Printing Industry in content of extending of European Union.  
*Open University Conference, DRUPA 2004, Düsseldorf, 2004. május 24.*

### Conference publications

1. **Szentgyörgyvölgyi, R.-Szűts, I.:** Networking a nyomdaiparban  
*BMF konferencia 2009, Budapest Jövőbe mutató technológiák a környezetvédelemben és a könnyűiparban, Budapest, 2009. november 12.*
2. **Szentgyörgyvölgyi, R.:** Application JDF in small and medium sized print media companies.  
*4th GRID Symposium, Novi Sad, 18th-19th November 2008. pp. 255-261. (ISBN 978-86-7892-145-2)*
3. **Szentgyörgyvölgyi, R.:** Effect of the Digital Technology to the Print Production Processes.  
*Budapest Tech - Conference 2007. New Aspects in the Innovation of a Traditional Industry. Budapest, 2007. november 19. pp. 171-180 (ISBN 978-963-7154-66-9)*

4. **Szentgyörgyvölgyi, R.:** Digitális nyomdai termelési folyamatok integrálása.  
*Tavaszi szél doktorandusz konferencia, Zrínyi Miklós Nemzetvédelmi Egyetem, Budapest, 2007. május 17-20. pp. 85. (ISBN 978-963-87569-1-6)*
5. **Szentgyörgyvölgyi, R.:** Process and workflow management in graphic arts industry.  
*3rd GRID Symposium, Novi Sad, November 2006. pp. 36-43. (ISBN 86-7892-009-2)*

### **Professional lectures**

1. **Szentgyörgyvölgyi, R.:** A nyomdaipar XXI. század első évtizedében.  
*3P Műanyagipari, Csomagolástechnikai és Nyomdaipari Klaszter, Nyomdaipari cégek és szolgáltatók találkozója. 2009. május 22.*
2. **Szentgyörgyvölgyi, R.:** Ofszetnyomógépeken alkalmazott korszerű vezérlő/szabályozó berendezések.  
*Debreceni Egyetem, Agrár Tudományok Centruma Mérnöki Kar, Gépészmérnöki Tanszék. Nyomtatási technológia tantárgy, 2007/2008 tanév, 2. szemeszter 8. előadás.*
3. **Szentgyörgyvölgyi, R.:** Nyomógépek automata berendezései.  
*Debreceni Egyetem, Agrár Tudományok Centruma Mérnöki Kar, Gépészmérnöki Tanszék. Nyomdaipari gépek tantárgy, 2006/2007 tanév, 1. szemeszter 5. előadás.*

## Professional publications indirectly connected to the research work

1. **Szentgyörgyvölgyi, R.:** Nyomdaipari technológiai ismeretek I.  
*BMF RKK 6019 jegyzet, Budapest, 2008*
2. **Szentgyörgyvölgyi, R.** - Endrédy, I.: Elektrofotográfiai és direct imaging technológiával, OCE digitális nyomógépeken készített nyomatok összehasonlító vizsgálata.  
*Tudomány és innováció a jövő szolgálatában – workshop – KSZGYSZ-BMF Budapest, 2008. november 7. (ISBN 978-963-7154-79-9)*
3. Endrédy, I. / **Szentgyörgyvölgyi, R.:** Evaluation of prints produced of the XEROX iGen3 digital press with respect to the ISO 12647-2 standards. V: BOLANCA, Zdenec (ur.). Proceedigs, Zagreb: Faculty of Graphic Arts, University of Zagreb; Senj: Ogranak matice hrvatske Senj; Ljubljana: Pulp and paper Institute,  
*11th International Conference on printing, design and graphic communications, Blaž Baromic, Split, croatia, September 24th – 26th, 2008. pp. 62-66. (ISBN 987-953-96020-9-1)*
4. Endrédy, I. / **Szentgyörgyvölgyi, R.:** Test of papers for digital printing.  
*IN-TECH-ED 05' konferencia, Budapest, 2005. szeptember 8-9. (ISBN 963-9397-06-7)*
5. **Szentgyörgyvölgyi, R.:** The Hungarian Printing Industry in content of extending of European Union. *Open University Conference, DRUPA 2004, Düsseldorf, 2004. május 24.*

6. Endrédy, I. / **Szentgyörgyvölgyi R.:** Digitális nyomóforma-készítés.  
*BMF RKK, Tudományos napok, 2003. november 18.*
7. **Szentgyörgyvölgyi, R.:** A flexnyomtatás dinamikusan fejlődik.  
*Nyomdavidág, PrintConsult Kft, 2003/5.*
8. Endrédy, I. / **Szentgyörgyvölgyi, R.:** Könnyűipari ágazatok az Európai Unióban és Magyarországon: Nyomdaipar. *Magyar Kereskedelmi és Iparkamara kiadványa, 2002. (ISBN 963-9008-57-5)*
9. Endrédy, I. / **Szentgyörgyvölgyi, R.:** A nyomdaiparban bekövetkezett szakmai és strukturális változások az EU csatlakozás küszöbén. *BMF RKK Tudományos napok, 2002. november 17.*