EPS Final Report

Analysis of Linoprint distribution channels, development of marketing concepts and tools

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Abstract

The objective of this report is to analyze the effectiveness of current Linoprint distributors and potential new distributors, to analyze Linoprint's company strengths compared to its competitors in the digital printing market, to develop Microsoft Excel based marketing tools, and to propose marketing concepts to Linoprint by analyzing Linoprint's current marketing material and the package printing industry, which is the market that Linoprint is active in.

The results of the project are used to develop tools and recommendations to improve Linoprint's marketing and current company positioning, and to recommend strategies for Linoprint to consider as it enters the market.

"The company without a strategy is willing to try anything."

Michael E. Porter

Professor at the Institute for Strategy and Competitiveness

At Harvard University

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Intended Audience

The intended audience of this report is the employees of Linoprint of Kiel, Germany; the coordinators and supervisors of European Project Semester (EPS) 2010 in Kiel; current and future EPS students; and anyone else interested in digital printing, packaging, print for production, or just in time manufacturing.

Declaration of Authorship

We certify that the work presented in this thesis is original and the result of our own investigations, presented in our own words, unless acknowledged otherwise. We also certify that it has not been submitted for a degree, in parts or as a whole, at this or any other university.

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Methodology

This project was conducted from an external viewpoint, using our own sources, assessments, and ideas. We had an initial meeting with Linoprint, and regular meetings with a company insider, but no real contact with the regular staff of Linoprint. Some of our methods were based on standard Heidelberg or Linoprint methods, particularly in tools; others were based on standard methods, such as the decision matrices; and others were our own new ideas, such as the marketing concepts.

In addition, much of the terminology used in this report is used in the way that Linoprint uses it. Market segmentation is defined differently by every company in the print industry but, unless noted otherwise, this report follows Linoprint's ideas of market segmentation. Marketing concepts refer to marketing brochures, the website, and other marketing materials instead of concepts about how to enter a new market. TCO is based on Heidelberg's scheme.

It is also worth noting that in this report Linoprint is often referred to as a company, even though it is not a company in a legal sense, but simply a side project of Heidelberg with its own name.

We are aware that we can´t do a sophisticated analysis, just give some impressions, but we are sure that these ideas could be shared by a lot of people who come in contact with Linoprint in one way or another. Linoprint members will have differing opinions and may not agree with some of these findings, but we feel that it is important to take a look at Linoprint from an outsider's point of view to give some feedback. Sometimes not being an expert can have the advantages of allowing you to view things in a more simple way and without the anchoring of the professional point of view.

Preface

Heidelberger Druckmaschinen AG (HDM) has a very long and successful history in the analogue printing business. The company's main competence is in the sales, distribution, and service of complete sheet-fed-offset-printing machines.

As the world is becoming more and more dynamic and complex ("dynaxity"), Heidelberger Druckmaschinen has decided to look for other opportunities in emerging markets to serve new demands for flexibility and new requirements of the printing and packaging industries. Therefore the company is building up a new brand called Linoprint, a small start up in the digital package printing industry.

Linoprint is entering the package printing market, which is a new market for them, but their current strategy targets a very broad swath of this market and promotes the development of a wide variety of different printing products. This lack of focus is keeping them from becoming market leaders in any segment, and stretching their research and development budget by trying to develop products to target so many different market segments at the same time.

This report consists of an analysis of Linoprint's competitors in the package printing industry, an analysis of the effectiveness of Linoprint's distributors and recommendations for potential new distributors, the development of new marketing tools for Linoprint's sales department and distributors, and an analysis of Linoprint's marketing material with recommendations for improvements.

The analysis of competitors is used to explore whether or not it makes sense for Linoprint to target such a broad segment of the market, and to recommend segments most suitable for Linoprint to focus on based on its current product strengths and company positioning. Linoprint's position among its competitors, the analysis of distributors, and analyses of the printing industry & current marketing material such as Linoprint's website have been used to make recommendations to improve Linoprint's marketing effectiveness and company positioning. Finally, schemes developed by

Linoprint and Heidelberg for calculating ink consumption, pay back time, and profit and loss have been expanded into marketing tools for use by sales people and distributors.

Finally, research was done to understand the packaging industry including the market segmentation within the package industry and the printing needs of the industry, and a lot of time was spent understanding Linoprint in order to gain a basic understanding necessary for realizing the other aims of the project.

In summary, the aims of this project are to:

- **Understand the package printing industry and Linoprint's business model**
- **Analyze Linoprint's competitors and compare relative strength of Linoprint to its competitors**
- **Analyze Linoprint's current distributors and potential new distributors**
- **Develop new marketing tools**
- **Analyze Linoprint's marketing material and propose improvements**
- **Propose recommendations for Linoprint's future business and marketing strategies**

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Acknowledgements

Team Linoprint would like to thank everybody at the Fachhochschule Kiel who made EPS possible, the EPS supervisors especially Professor Schmidt who organized company visits for us and provided support during the project, and all of the professors who taught us during our month of "crash-course" classes to prepare us for the project. In addition, we would like to thank the international office for making our time abroad possible and going out of its way to help us whenever we needed it.

Team Linoprint would also like to convey a special thanks to Mr. Wolfgang Boppel, our company representative, for providing us with so much valuable information and supporting us so much throughout the project.

Finally, we would like to thank each other for being a fun and supportive team.

Chapter 1: Overview of Heidelberger Druckmaschinen, Linoprint, and Printing Methods

1.1 Introduction

The object of this project is to analyze the distributors, sales strategies and marketing tools of Linoprint. It is obvious that first we should start by describing what Linoprint is, what kind of company it is, and explain some data about its size, history and selling models. Explaining Linoprint requires us to also make reference to its mother company, Heidelberger Druckmaschinen AG (HDM). Both companies, Linoprint, and its owner, HDM, are in the printing business but with great differences in their respective kinds of technology and business models. In the following lines we will address all of these issues, which are basic to further understanding this project.

1.2 Non Digital Printing Methods

1.2.1 Offset Printing [1]

Offset printing is a commonly used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, and then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat image carrier (shown as the plate cylinder in Figure 1.1) on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a water-based film (called "fountain solution"), keeping the non-printing areas ink-free.

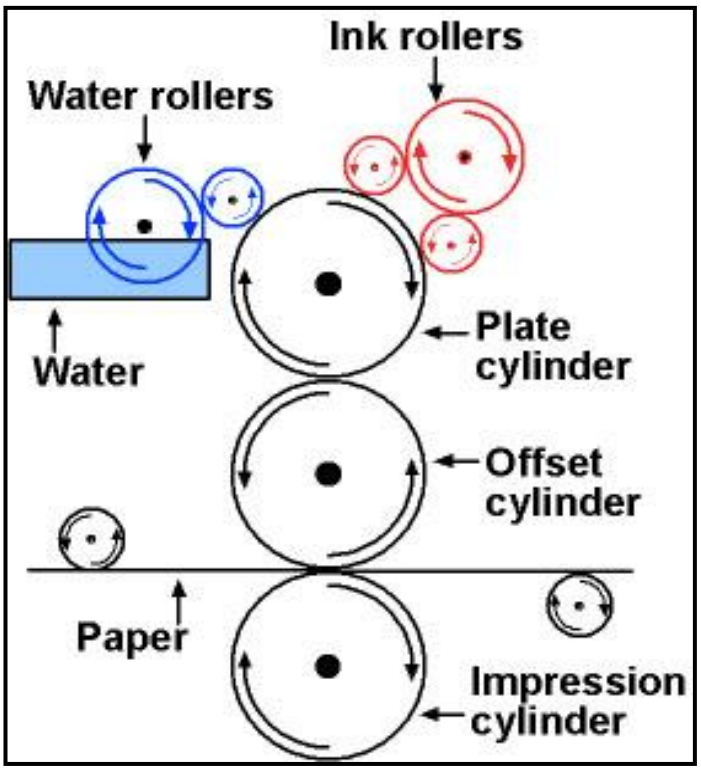


Figure 1.1 - Offset Schematic Representation [2]

Today, offset lithography is the dominant printing technology and is responsible for over half of all printing using printing plates. The quality of the prints made is consistently high, and the volume of prints created for their respective cost makes commercial offset lithography very efficient for businesses, especially when many prints must be created quickly.

Offset machines can reach gigantic sizes. For instance, Heidelberg's SM 74 best selling printing machine, which is shown in Figure 1.2, weighs 15 tons.

Figure 1.2 - Heidelberg's SM 74 [3]

Advantages of offset printing compared to other printing methods include:

- Consistent high image quality. Offset printing produces sharp and clean images and type more easily than letterpress printing because the rubber blanket conforms to the texture of the printing surface.
- Quick and easy production of printing plates.
- Longer printing plate life compared to direct litho presses because there is no direct contact between the plate and the printing surface. Properly developed plates running in conjunction with optimized inks and fountain solution may exceed run lengths of one million impressions.
- Offset printing is the cheapest method to produce high quality printing in long runs in commercial printing.

Disadvantages of offset printing compared to other printing methods include:

- Slightly inferior image quality compared to rotogravure or photogravure printing.
- Time and cost associated with producing plates and printing press setup. As a result, some printing jobs are now moving to digital printing machines.

1.2.2 Letterpress Printing [4]

Letterpress printing is a term for the relief printing of text and images using a press with a "type-high bed" printing press and movable type, in which a reversed, raised surface is inked and then pressed into a sheet of paper to obtain a positive right-reading image. It was the normal form of printing text in the west from its invention by Johannes Gutenberg in the mid-15th century until the 19th century, and remained in wide use for books and other uses until the second half of the 20th century.

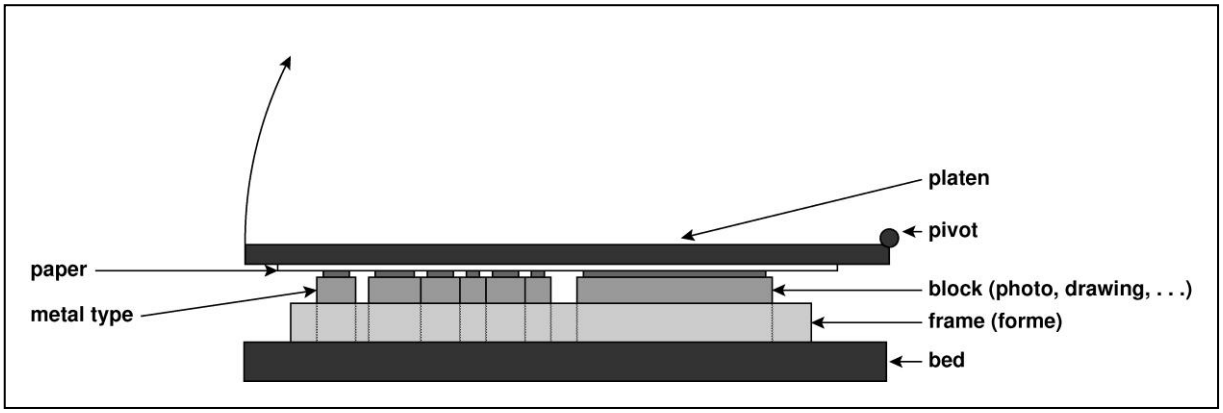


Figure 1.3 - Typical Parts in a Letterpress Machine [5]

1.2.3 Flexography [6]

Flexography (often abbreviated **flexo**) is a form of printing process which utilizes a flexible relief plate. It is basically an updated version of letterpress that can be used for printing on almost any type of substrate.

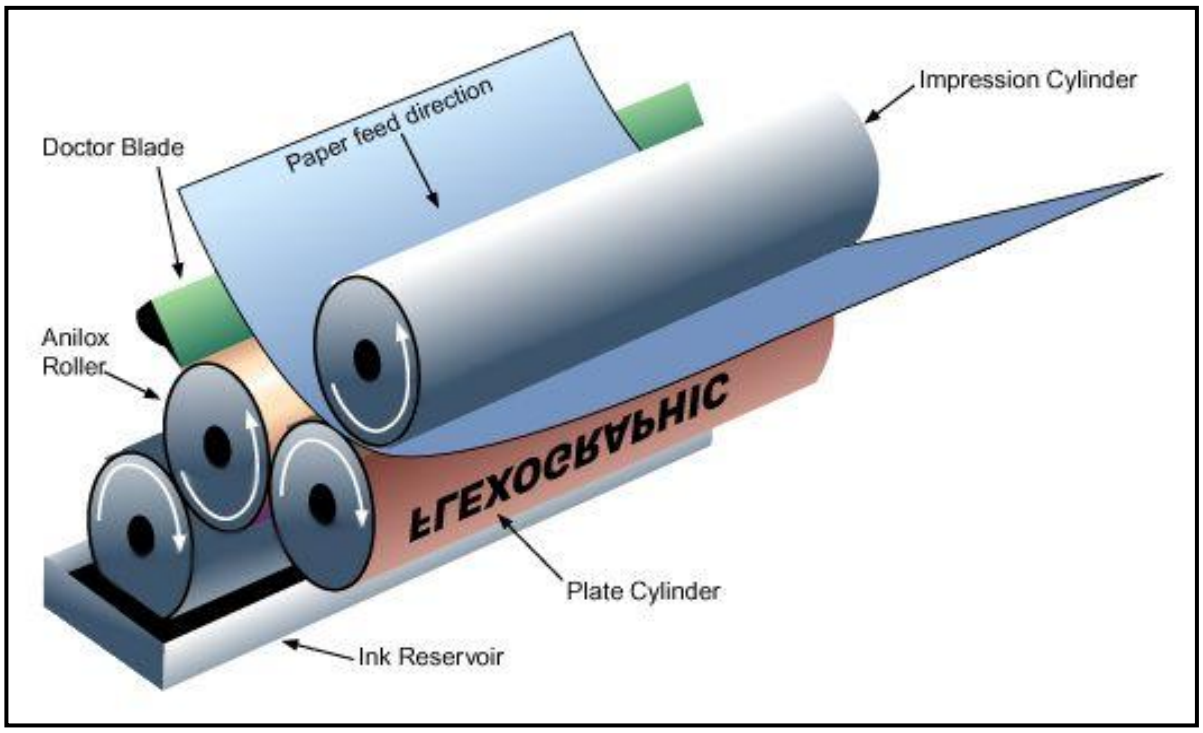


Figure 1.4 - Flexography Schematic Representation [6]

A flexographic print is made by creating a positive mirrored master of the required image as a 3D relief in a rubber or polymer material. The image areas are raised above the non image areas on the rubber or polymer plate.

Flexo has an advantage over lithography in that it can use a wider range of inks, water based rather than oil based inks, and is good at printing on a variety of different materials like plastic, foil, acetate film, brown paper, and other materials used in packaging.

Typical products printed using flexography include brown corrugated boxes, flexible packaging including retail and shopping bags, food and hygiene bags or sacks, milk and beverage cartons, and flexible plastics. Printing press speeds of up to 600 meters per minute are achievable now with modern technology.

1.2.4 Gravure [7]

Rotogravure (**roto** or **gravure** for short) is a type of printing process which involves engraving the image onto an image carrier. In gravure printing, the image is engraved

onto a copper cylinder because, like offset printing and flexography, it uses a rotary printing press. Rotary gravure presses are the fastest and widest presses in operation, printing everything from narrow labels to 4 m wide rolls of vinyl flooring.

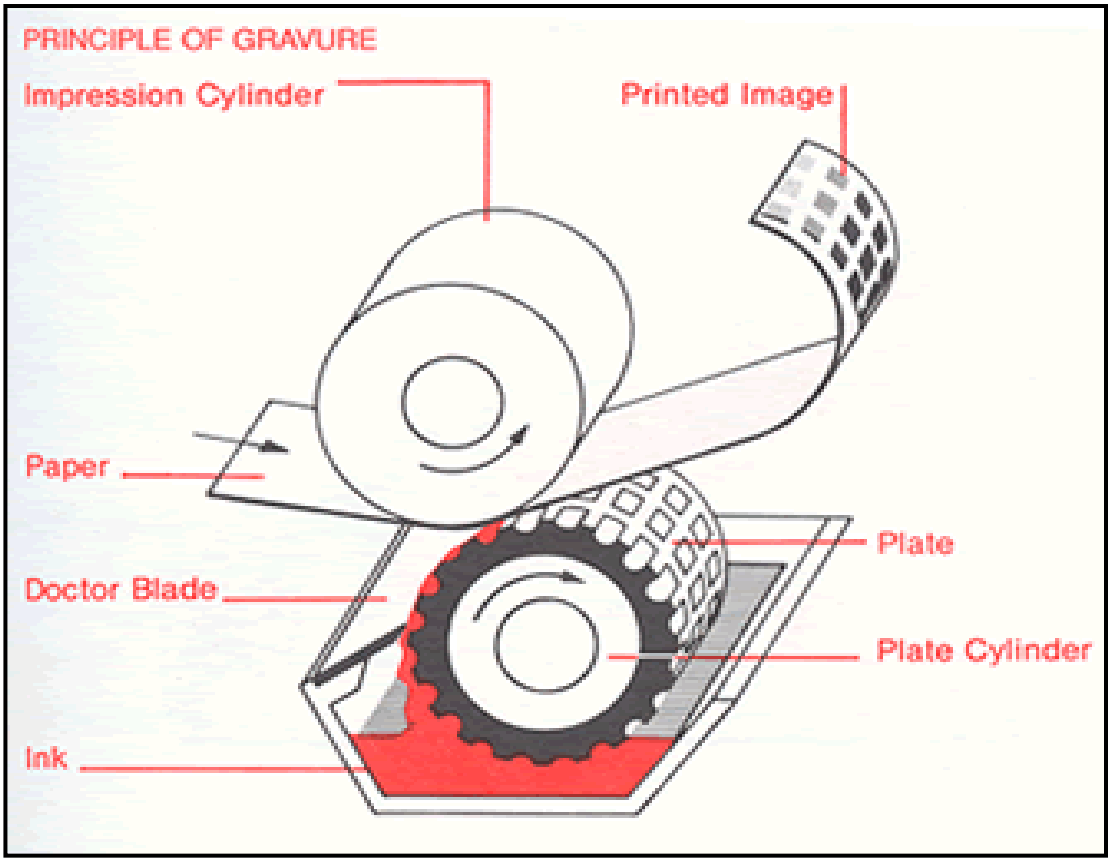


Figure 1.5 - Rotogravure Schematic Representation [8]

A rotogravure printing press has one printing unit for each color, which are typically CMYK (Cyan, Magenta, Yellow and Key, with Key being an alternative term for black ink). The number of units varies depending on what colors are required to produce the final image. There are five basic components in each color unit: an engraved cylinder (whose circumference can change according to the layout of the job), an ink fountain, a doctor blade, an impression roller, and a dryer.

Gravure is widely used for long-run magazine printing, mail order catalogs, consumer packaging, and newspaper ad inserts in excess of 1 million copies. Gravure's major quality shortcoming is that all images, including type and "solids," are actually printed as dots, and the screen pattern of these dots is readily visible to the naked eye.

1.2.5 Screen Printing [9]

Screen printing is one of the earliest methods of printing. It involves the passing of ink or any other printing medium through a mesh or 'screen' that has been stretched on a frame, and to which a stencil has been applied. The stencil openings determine the image that will thus be imprinted.

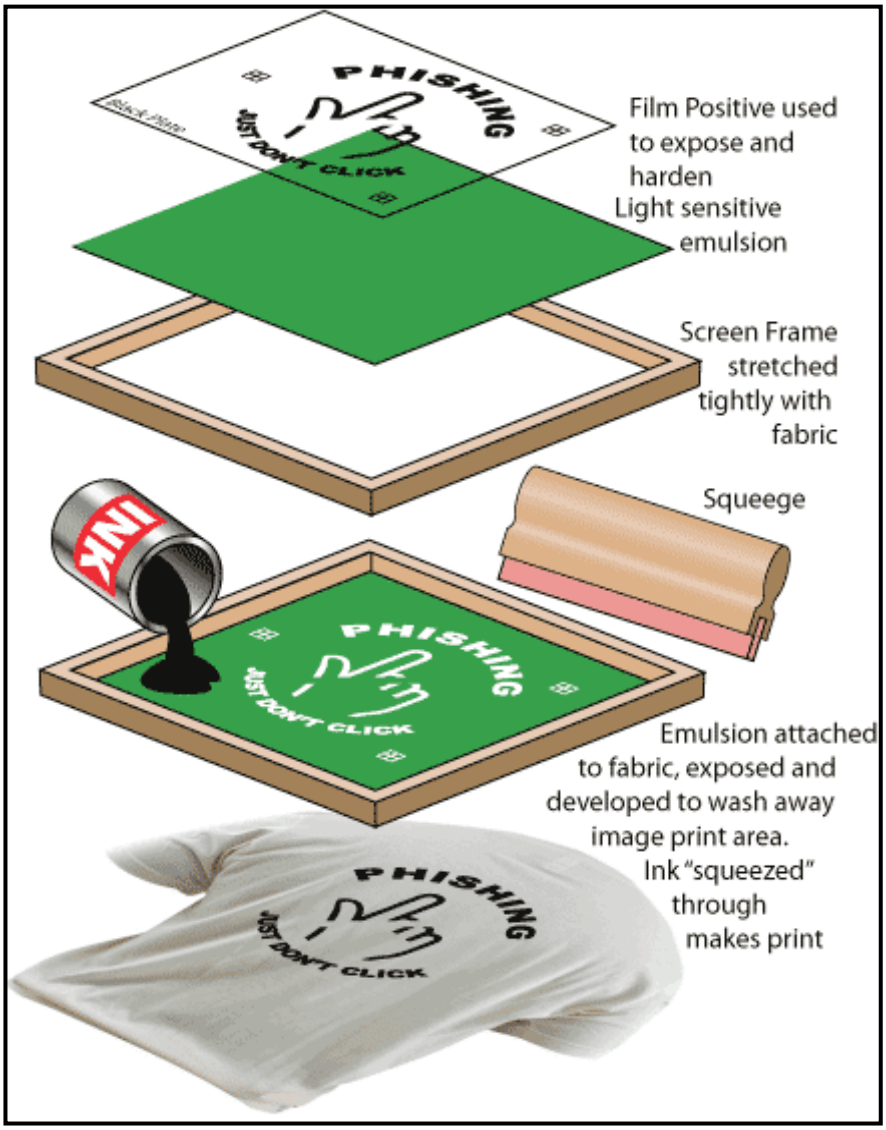


Figure 1.6 - Screen Printing Process [9]

The textile industry makes the largest use of the screen printing technique. The finished products include shirts, skirts, dresses, children's clothing etc. An example of screen printing is shown in Figure 1.6.

1.3 Digital Printing Methods

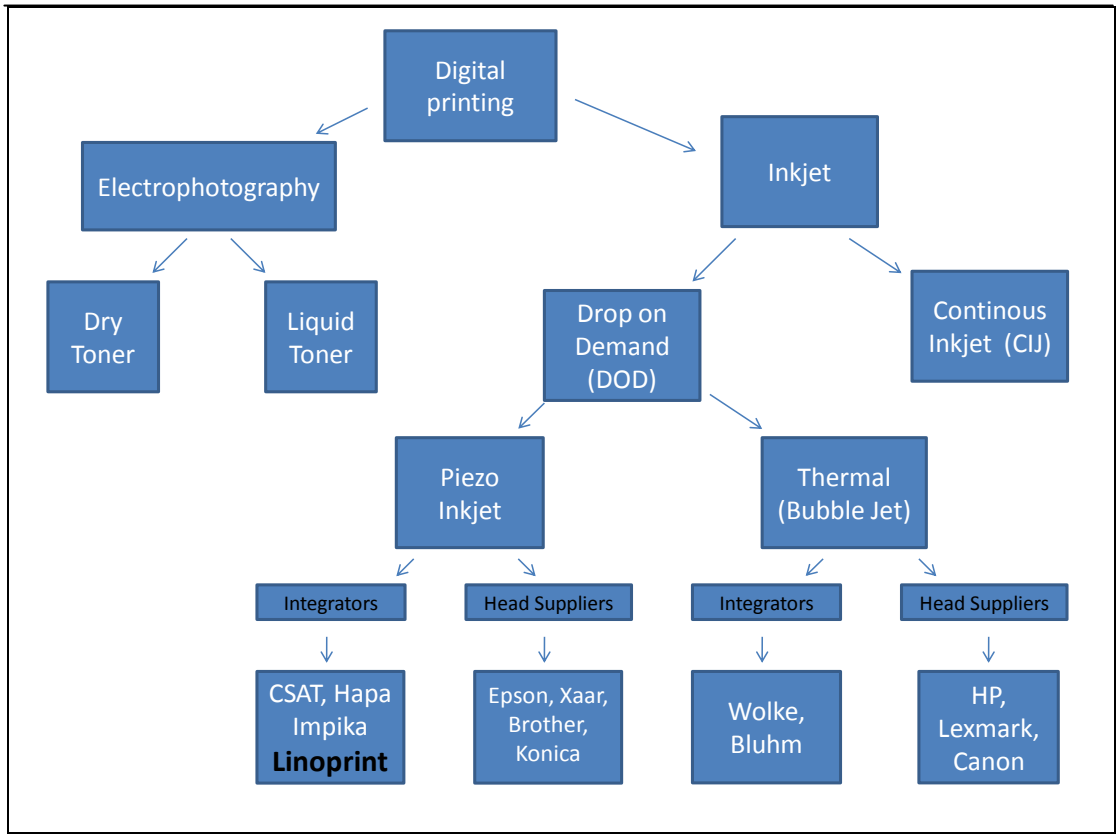


Figure 1.7 - Digital Printing Methods

1.3.1 Electrophotography [10]

A printer using the **electrophotographic** (EP) method is a common type of computer printer that rapidly produces high quality text and graphics on plain paper. The image is produced by the direct scanning of a laser beam across the printer's photoreceptor.

There are two kinds of toner to choose from: dry or liquid. A toner cartridge is filled with either the powder or the liquid toner.

1.3.2 Dry Toner

Dry toner is a plastic, which is heat sensitive. Acrylic and styrene are usually combined. Pigments are added to the toner to make different colors. Carriers are another part of the toner; they aid the toner in being charged, so that the toner can be joined to the paper. Dry toners are fused to the page by a process which uses a combination of heat and pressure. The advantage of dry toner is that it doesn't have to penetrate the paper's fiber to work. This increases the kinds of materials that can be utilized for printing. It also doesn't require drying, so it doesn't smudge, and the document can be used immediately. It doesn't use harmful solvents either; therefore, it is good for the environment and people. In addition, the colors have increased stability over liquid toner, it requires less toner to print each page, and it prints quicker.

1.3.3 Liquid Toner

Liquid toner consists mostly of pigmented plastic resin or dye. The resin particles are held within an insulating liquid. The dye in the liquid toner makes it produce colors. One advantages of liquid toner are that the printer doesn't have to warm up before printing. Another advantage is that liquid toner can have a higher resolution compared to dry powder toner, because the particle size of dry toner cannot be made too small or becomes hazardous when it is breathed in.

1.3.4 Continuous Inkjet [11]

In **continuous inkjet** technology, a high-pressure pump directs liquid ink from a reservoir through a gun body and a microscopic nozzle, creating a continuous stream of ink droplets. A piezoelectric crystal creates an acoustic wave as it vibrates within the gun body and causes the stream of liquid to break into droplets at regular intervals – 64,000 to 165,000 droplets per second may be achieved. The ink droplets are subjected to an electrostatic field created by a charging electrode as they form; the field varies according to the degree of drop deflection desired. The charged droplets pass through an electrostatic field and are directed by electrostatic deflection plates to print on the receptor material (substrate), or allowed to continue on to a collection gutter for re-use.

1.3.5 Drop on Demand [12]

Drop on Demand (DoD) is a broad classification of inkjet technology where drops are ejected only when required. In general, the drops are formed by the creation of a pressure pulse within the print head. The particular method used to generate this pressure pulse differentiates the primary subcategories within DOD, namely thermal and piezo.

1.3.6 Thermal DoD [13]

Most consumer inkjet printers from companies including Canon, Hewlett-Packard and Lexmark use print cartridges with a series of tiny chambers, each of them containing a heater. To eject a droplet from each chamber, a pulse of current is passed through the heating element causing a rapid vaporization of the ink in the chamber to form a bubble, which causes a large pressure increase, propelling a droplet of ink onto the paper. The ink's surface tension, as well as the condensation and thus contraction of the vapor bubble, pulls a further charge of ink into the chamber through a narrow channel attached to an ink reservoir. Thermal inkjet printers are not the same as thermal printers, which produce images by heating thermal paper.

1.3.7 Piezoelectric DoD [14]

Most commercial and industrial inkjet printers and some consumer printers use a piezoelectric material in an ink-filled chamber behind each nozzle instead of a heating element. When a voltage is applied, the piezoelectric material changes shape, which generates a pressure pulse in the fluid forcing a droplet of ink from the nozzle. Piezoelectric (also called Piezo) inkjet allows for a wider variety of inks compared to thermal inkjet as there is no requirement for a volatile component, and no issue with kogation, but the print heads are more expensive to manufacture due to the use of the special piezoelectric material.

1.3.8 Speed Comparison

One of the most important features of a printing machine is the speed. In the next table we want to compare the speeds of the different technologies of today.

Table 1.1 – Speed Comparison

TECHNOLOGY	MAXIMUM SUSTAINABLE SPEED		MANUFACTURER & MODEL
WEB OFFSET	15 m/s		ManRoland - EUROMAN
SHEET OFFSETT	5 m/s		HDM - SM 74
GRAVURE	20m/s		Cerutti -R335
CONTINUOUS INKJET	5 m/s		Kodak - VERSAMARK DS3700
DOD	PIEZO	2,5 m/s	Kyocera- KJ4 Series
	THERMAL	2 m/s	HP- Deskjet 840C
ELECTROPHOTOGRAPHY	DRY TONER	0,5 m/s	Canon – LBP5200
	LIQUID TONER	0,5 m/s	HP Indigo -HP indigo 3050

1.4 Overview of HDM

1.4.1 Introduction

Heidelberger Druckmaschinen AG (HDM) is a technology leader in commercial sheetfed offset printing solutions. With 45% of the market share, 18,926 employees (as of March 2009), and 200,000 customers in 170 countries, Heidelberg is one of the most well known and well established companies in the sheetfed offset printing business [1]. Heidelberg offers comprehensive integrated printing solutions for prepress, press, and postpress operations, as well as print shop software and hardware to integrate and control the printing machines. In addition, Heidelberg offers business consulting services to print and media companies.

1.4.2 History [1]

The History of Heidelberg started on March 11, 1850. Andreas Hamm (Figure 1.8), a 26 year old miller's son, took over the ownership of the bell foundry and machine factory Hemmer, Hamm and Company from his older brother Georg in Frankenthal in the Rhine Valley. Two years later, he broke off and formed his own company.

Figure 1.8 - Andreas Hamm - Founder of Heidelberger Druckmaschinen AG [15]

In 1856, Hamm met Andreas Albert, his senior by three years. Albert had completed his apprenticeship in the factory of Koenig and Bauer in Oberzell on the Main River in western Germany, where he had become well-acquainted with printing presses. Albert and Hamm decided to join forces to produce, along with bells and cast metal parts, mechanical platen presses. Two years later they had already manufactured 14 such presses.

The Frankenthaler Zeitung, a German newspaper, reported in 1864: "In a remarkably short time, this business has established a reputation for itself extending far beyond Germany." Soon the new company was dispatching presses to customers as far away as the Ukrainian cities of Odessa and Kherson.

In 1873, the two partners went their separate ways, and soon afterwards were fiercely competing against each other to see who could build the better press. In any event, in October of 1875, Andreas Hamm came out with a "high-speed cylinder letterpress" for

2,400 marks, which he sold to clients as far off as Egypt. A year after Andreas Hamm's death (on June 22, 1894), his son, Carl Hamm, sold the company. Shortly thereafter, it moved from Frankenthal to Heidelberg, was converted to a joint-stock company and, in 1905, gave itself the new appellation "Schnellpressenfabrik AG Heidelberg".

The main shortcoming plaguing high-speed cylinder presses at that time, namely the lack of a reliable single-sheet feeder, was solved after Karl Georg Ferdinand Gilke arrived in Heidelberg in 1912. He developed what he called the "propeller-gripper", describing it as "an automatic feeding and placing device, in which a pivoting rack picks up the sheet by applying suction to its entire surface, and then uses blast air to deposit it on the platen." This meant that the sheet no longer had to be placed on the platen by hand, which had slowed the overall process considerably.

After series production of the "Express", an automatic platen press able to print 1,000 sheets per hour, began after the end of World War I, it became a sensational success virtually overnight. Its popularity was further enhanced by the new management board member, Hubert H.A. Sternberg, who put his heart and soul into marketing the new product.

This 29-year-old came up with the idea of mounting it onto a car so it could be driven from one printing company to another for live demonstrations. Sternberg sweetened the deal by allowing the printers to pay by installments. He was the one who lent the machine its name "Original Heidelberger Tiegel", thus giving it a touch of German romanticism. He also invited one out of every five customers to visit the factory.

Because demand grew so rapidly, Sternberg installed the very first assembly line in a German printing press factory, permitting 100 "Tiegels" to be assembled each month. The merger of Heidelberg's high-speed press factory with the Giesling machine factory (M.A.G.) in 1929 expanded the company's metal-casting capability. In the early 1930s, various banks acquired a majority interest in the "Schnellpressenfabrik Heidelberg" before transferring their shareholdings to Rheinelektra, a subsidiary of RWE, in 1941.

In 1934, Heidelberg introduced a fully automatic high-speed cylinder press to the market, and it caught on like wild fire. At that time, 60 percent of the company's revenues came from foreign sales, which became difficult to maintain after the outbreak of WW II. Because printing presses were not essential to the war effort, production was cut back. To keep its skilled workers from being sent to the front, the company accepted orders for precision lathes and hydraulic devices. Sternberg kept his distance from the National Socialist movement, which he was always suspicious of. This explain why, when U.S. troops marched into Heidelberg on March 30, 1945, the press factory was neither occupied nor dismantled, and production there resumed on May 8 - the same day that Germany surrendered to the Allies.

In 1957, the largest printing press plant in the world in Wiesloch, near Heidelberg, began production. By 1959 it had churned out 100,000 presses. Today, roughly 400,000 Heidelberg presses are running in 240,000 printing companies spanning the globe. In 1962, the Heidelberg company started building offset printing presses. Sternberg had resisted this move for decades, until some technicians were finally able to convince him of this new technology's advantages.

The company's financial success continued despite several setbacks, such as the slump of the mid-70s. Around 1980, more and more printers were looking to print in color, and Heidelberg presses were selling so well that a second factory was built in Amstetten. This plant, which opened in 1985, was fully computerized. In 1988, Heidelberger Druckmaschinen AG acquired the american web offset specialist, Harris, thus entering a completely new market segment (web printing). During the 1989/90 fiscal year, Heidelberg chalked up record sales of 760 million Deutschmark - at a profit margin of 30 percent.

At Drupa 95, a printing trade show, Heidelberg presented a completely new line of products. Today, as many as ten printing units in a row allow the customers to print both sides of the sheet in up to five colors, with coating and drying in-line. In the Quickmaster DI, an analog printing plate is digitally imaged by laser beams right in the press.

Hartmut Mehdorn, who became Heidelberg's new Management Board Chairman on October 1, 1995, has set out to transform the company into a systems vendor offering everything from prepress to bindery products, thus facilitating Heidelberg's customer's migration to the digital age.

Therefore, in 1996, Heidelberg acquired the prepress specialist Linotype-Hell AG, the Dutch company Stork Contiweb - a manufacturer of web splicers and dryers - and the British-American company Sheridan Systems, a producer of bookbinding systems and mailroom equipment.

Heidelberg also underwent internal reorganization and since April 1997 has consisted of operational divisions of equal status known as Business Units. These deal with the various groups of machinery and are supported by Sales, Service and Corporate Units. On 8 December 1997, Heidelberg was listed on the Frankfurt Stock Exchange for the first time. The performance of Heidelberg shares since then has been very pleasing.

In the year 1999 – 2000 (from April 1 to March 31), the Heidelberg Group achieved sales of 4.6 billion Euro and an annual surplus of 251 million Euro. Exports accounted for 84 percent of these results. The company currently employs 24,100 staff around the world, approximately half of whom are in Germany. A major factor in Heidelberg's success is its dense worldwide sales and service network with over 250 offices in 170 countries. In order to penetrate major markets more effectively, Heidelberg has taken over numerous offices from outside representatives. In 1998 the sales networks in France and Mexico were acquired from Dutch trading company KNP BT and integrated into Heidelberg's own organizational structures, and the "Heidelberg do Brasil" office was set up.

Customers in Asia, Africa and Scandinavia have also been receiving direct support since July 1998, when Heidelberg acquired all the sales companies and activities in print media products from the East Asiatic Company (EAC) of Copenhagen.

In 1998, construction of the Print Media Academy was started on a site near company headquarters in Heidelberg. The new building was officially opened in mid-April 2000,

neatly coinciding with the company's 150th anniversary. The Academy is a center for communications, training and expertise through which Heidelberg offers a wide-ranging training program to the entire print media industry. Courses range from training for printers and fitters through to the "Print Manager" MBA. Visitors to the Academy also receive advice on business and marketing issues and work together on such matters as business process concepts for print shops.

In December 1998, Heidelberg acquired the Stahl Group (Germany and USA) and integrated additional finishing processes for printed products into its portfolio. The company underwent a major expansion with the acquisition of the Office Imaging division of the Eastman Kodak Company, Rochester (USA) in March 1999. This step enabled Heidelberger Druckmaschinen AG to strengthen its activities in digital printing, one of the fastest growing markets in the industry. All the digital expertise of the Group was bundled together to form Heidelberg Digital, which is based in Rochester.

In September 1999, Heidelberg acquired a 30 percent share in Gallus Holding AG (St. Gallen, Switzerland). The two companies agreed to work closely in the fields of marketing, sales and technology. Gallus develops and produces rotary printing presses with a particular focus on flexographic printing and letterpress and screen printing. The group's products are mainly aimed at label printers. In September 1999, Heidelberg also opened its new international spare parts center in Wiesloch. Some 46 million Euros have been invested in the World Logistics Center, which offers customers an even better supply of spare parts than before. Using the latest technology and cutting-edge logistics, original Heidelberg spare parts can be delivered anywhere in Europe within 24 hours, with up to 4,000 orders being dispatched in a day.

Bernhard Schreier, previously Chief Operating Officer (COO) in Rochester, became Chairman of the Management Board of Heidelberger Druckmaschinen AG on 1 October 1999.

More and more frontiers are coming down within the world of printing. The traditionally separate areas of prepress, press, and postpress are moving closer and

closer together and are being linked by comprehensive solutions. The Heidelberg Group has developed from a traditional manufacturer of printing presses into an internationally focused global player on the market for cutting-edge printing solutions, and is therefore playing a major role in this dynamic process. It is the aim of the company to play a leading part in shaping the future of the print media industry. And the customer is always central to everything. Whether you run a small family business or a major company, Heidelberg's modular components offer tailor-made solutions ranging from individual products to complete workflows. This enables Heidelberg to provide the entire print media industry with comprehensive concepts. Heidelberg presented itself as a solutions provider for the first time at the drupa 2000 exhibition in May, the largest trade fair in the industry. There were two particular highlights making their debut at the exhibition - the Mainstream 80, Heidelberg's new newspaper press, and the NexPress 2100 digital color press, which was developed in a joint venture with Kodak [15].

1.4.3 Products

The core business of Heidelberg is the production of large sheetfed offset printing machines, with offerings for print formats from 35 x 50 up to the very large 120 x 160 format [16], at speeds of up to 18,000 sheets per hour [17]. These machines are used to print promotional materials, published material such as books and magazines, business material, and carton packaging materials [18], [19]. Heidelberg also offers all of the 'consumables' and service that goes along with running and maintaining a print shop such as inks, plates, etc, making them a one stop shop for all of the machines a printer might need, as well as all of the supplies needed to run a press and turn a digital image into a finished product [20].

For instance, Heidelberg's SM 74 printing press from their flagship Speedmaster series of printing machines, as shown in Figure 1.9, can print on sheet sizes ranging from 210mm x 280mm up to 530mm x 740mm [21] at speeds of up to 15,000 sheets per hour [15]. It can print on substrate sheets with thicknesses ranging from .03mm to .6mm in up to 10 colors [17], [21]. This allows the machine to print on a wide variety of flat sheets with high quality and reliability, with typical applications including folding boxes,

labels, advertising material, brochures, posters, and newspapers [17]. The Speedmaster system can also be customized with peripherals to fit the customer's needs, including UV dryers for special ink applications, automatic ink fillers, and devices to eliminate electrostatic charge on plastic substrates [22].

Figure 1.9 - Heidelberg Speedmaster SM 74 [15]

In addition to printing machines, Heidelberg offers products to meet the prepress and postpress needs of its customers. Prepress is the creation of the printing plates used in the printing machines, and Heidelberg offers solutions to create image plates using lasers. Computers control the process to ensure reliability and quality. Heidelberg terms this process computer-to-plate, which is designed to maximize productivity by reducing the time for plate creation while maintaining high quality standards [23].
Postpress is the infrastructure used to transform printed sheets into a final product. As well as prepress, Heidelberg offers a full range of postpress products ranging from simple cutting and folding to binding with adhesives or saddle stitches, assembling folded cartons, and die cutting [24].

Aside from the press, prepress, and postpress solutions, another product offered by Heidelberg is workflow software and infrastructure called Prinect. Prinect consists of hardware and software which can be used to integrate printing systems and manage a

print shop. This includes software to prioritize print jobs, for instance, or to automate the prepress process by allowing parameters to be set remotely or automatically. All of these systems allow prepress, press, and postpress operations to become more integrated and efficient. They also allow for the optimization of individual print operations [16], [25].

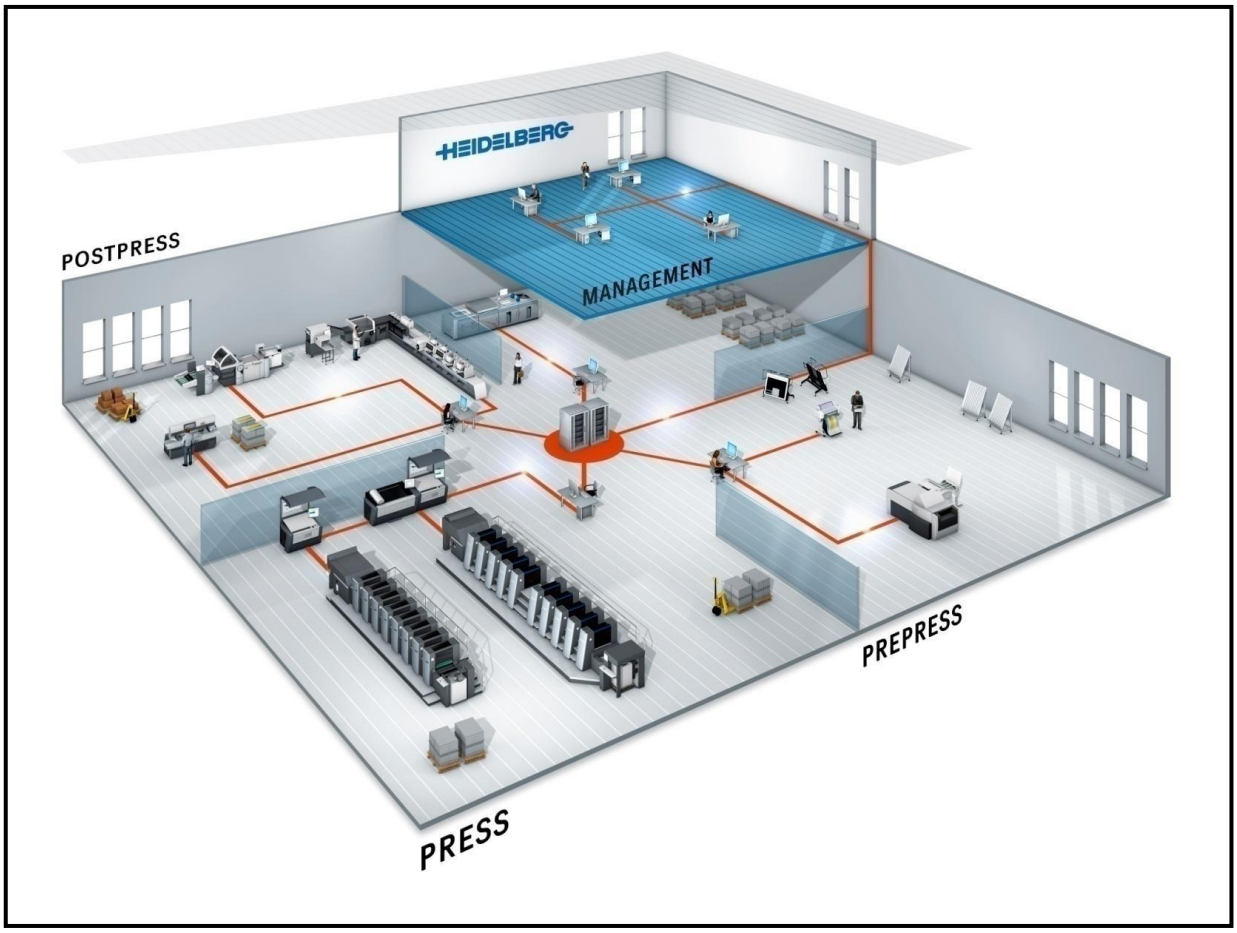


Figure 1.10 - Print Shop Schematic [16]

Figure 1.10 is a schematic, or mock up of a print shop using Heidelberg printing presses and connected using Prinect hardware and software. As shown, all of the different aspects of printing-press, prepress, and postpress-are linked, and the print shop management can control and monitor all aspects of printing directly.

Finally, Heidelberg also offers some business consulting services. They perform audits of print shops to determine efficiency and suggest improvements. They also provide investment planning consulting and can help plan new print shops [26].

This broad product lineup puts Heidelberg in the unique situation of being a one stop shop for a wide variety of printing requirements. Because they sell press, prepress, and postpress machines, as well as Prinect products to manage and integrate the machines, Heidelberg sells everything that a company might need to set up a print shop. They even help inexperienced companies set up their first print shop and help optimize existing print shops through their business consulting experts.

1.4.4 Markets

Although Heidelberg has a very large customer base, it commands high brand loyalty. Due to its position as a one stop supplier of all of the products and services needed in a print shop, customers don't need to involve other companies to purchase software or inks or different types of machines. In addition, Heidelberg is well known for its extensive and efficient service network. Service parts are dispatched within one hour and delivered within 24 hours around the world [27]. This close customer relationship is furthered by Heidelberg's print media academy, which is an academy to train Heidelberg employees as well as customers in the maintenance and operation of Heidelberg's machines.

The bulk of Heidelberg's market consists of medium sized companies with less than 20 employees [27]. They are mostly printing medium to long runs (up to 1 million) and are printing things such as brochures, newspapers, books, business forms, directories, advertising, labels, folding boxes, and flexible packaging. Heidelberg's market is segmented by 37% promotional materials, 21% packaging, 18% business, and 24% publishing [15].

Although Heidelberg has a very large market, it is also a very narrow market. Heidelberg sells all of the products needed to run a print shop, and provides an extensive support network, but Heidelberg focuses exclusively on sheetfed offset printing. This limits the types of materials that Heidelberg's machines can print on, and

it also puts constraints on the length of a print run that is needed to be profitable. Many markets, particularly in packaging, are better served by web printing instead of sheetfed printing. Also, because the printing plates are a fixed cost, printing becomes less profitable for small runs, which makes offset printing impractical for applications such as test runs or printing which has to be varied on demand.

1.4.5 Market Trends

The most worrying trend is the shrinking revenues of all analog printing methods. Since the middle of the 80´s the printing revenue is growing at a lower rate than the GDP in the industrialized countries. Furthermore, the print market is trending towards smaller runs, a larger number of print jobs, and more complex printing [28]. Heidelberg is facing increasing difficulty in staying competitive with its sheetfed offset printing technology. This, combined with the economic downturns of recent years, is causing Heidelberg to re-evaluate its position as the world leader in sheetfed offset printing, and look to expand into new markets and new technologies.

1.4.6 Research and Development

Heidelberg invests about 6% of its sales in research and development [15], which is quite high. Traditional printing is a very mature technology, which means that the actual printing process is highly developed, and that the print speed is near its physical limits. However, it's not only actual printing that has matured, but many areas in print shop optimization, including reduced makeready times and faster/automated color control, have also been developed close to their limits [20].

There is one major area that still has room for improvement, though, and that is workflow optimization [20]. Therefore much of their research and development investment is probably focused on improving printing efficiency through programs such as Prinect instead of improving the actual printing machines.

1.4.7 Company Strengths and Weaknesses

One of the main strengths of Heidelberg is the product lineup itself. Heidelberg has been manufacturing printing presses for over 150 years [15], so they are not new to the printing business and have 150 years of research and experience. In particular, Heidelberg understands paper transport very well [20]-arguably one of the most complex and limiting components in a sheetfed printing press.

This long history also gives Heidelberg a very good brand image, because they are an established presence in printing. They also have very high customer loyalty, because they have an extensive service and distribution network, and customers know that they can get service for their machines whenever they need it. This extensive service network also gives Heidelberg good access to its customer base.

Heidelberg has some weaknesses though, mainly because the technology is so well developed. New technologies like digital printing are intruding into parts of their target market, and changing market trends are making these new technologies seem more and more attractive to potential customers.

1.5 Overview of Linoprint

1.5.1 Introduction

Linoprint is a young company founded by Heidelberg 4 years ago, in 2006. Its objective is offer Drop on Demand digital printing machines and services to industrial companies. Linoprint integrates the printing machines inside the packaging or production lines. Linoprint is situated in Kiel because its activities were closely related to the electronics activities of HDM that took place there. Although it only has around 30 workers, it currently has several different models of printing machines that cover a wide range of industrial printing needs on blister, label, box and carton.

Actual efforts are being made to be increasingly present in the pharmaceutical industry. There are several reasons for this. One is that in the tendency in the pharma industry is

turning towards small runs. Another reason is the increasing need to customize or even individualize production. For both situations, digital printing is considered the best solution.

1.5.2 Why Linoprint was Created

1. Acquire digital knowledge inside Heidelberg.

The first reason why HDM created Linoprint is the strong competition HDM is facing in its core business. Heidelberg´s business, sheet feed offset printing, is being attacked on all sides.

The top printing size is in danger from gravure and web offset. In the commercial market gravure is able to print the formats of 100 x 70 and larger in an increasingly competitive way. 10 years ago, gravure had the breakeven point near 1.000.000 copies. Now, the break point is close to 200.000. The same happens in the packaging market, where flexo is now cost effective with far less copies.

At the same time Heidelberg is facing increasing competition from digital printing in formats near 50x70. In fact, everything under A3 size has already been taken over by digital printing.

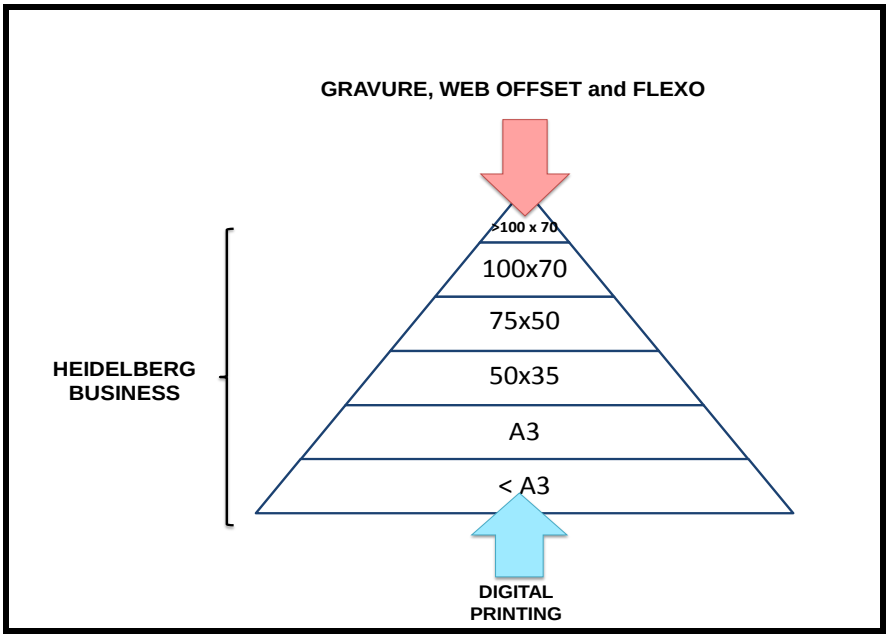


Figure 1.11 – Competition Facing Digital Printing

Thusly, Linoprint could be regarded as a logical move to where, with time, part of the current HDM company could also migrate.

2. Enter high growth potential markets.

Linoprint's objective is to benefit from two high potential growth markets. On one hand, with DoD piezo technology they are trying to benefit from the high potential growth of digital print market. On the other, by focusing on segments of the packaging market like pharmaceutical, they are trying to benefit from the high growth potential of this market. We will explain in more detail these aspects in Chapter 2.

Why the name Linoprint and not Heidelberg Digital?

Coherency

Heidelberg entered the digital business in the 90's but due to a deep crisis, in 2004 Heidelberg sold Kodak its Digital Division. After this painful divestment just 6 years ago, a new Digital Business with the Heidelberg name would seem confusing to customers.

Freshness

Linoprint addresses new markets with a different approach, different language and different needs. In consequence, they think that a new company with a different culture than HDM is needed.

1.5.3 Products

Linoprint is divided into 5 business areas. These areas are named LinoSystems, LinoFit, LinoFlow, LinoLab and LinoServices. It might be said that "Linoprint is 5 for 1": five different products that can be adapted to one packaging or production line to optimize it.

LinoSystems includes print units or engines, called FixedLine, and 3 digital print systems (or DriveLines) which are adapted to print on different kinds of materials. In describing the LinoSystems, it is important to mention firstly that Linoprint does not produce its DoD print modules. They are bought from companies specialized in inkjet module production. The product LinoSystems combines third party print heads with an idea of

how to optimize printing for production. This idea allows companies to print small runs quickly and to reduce storage costs.

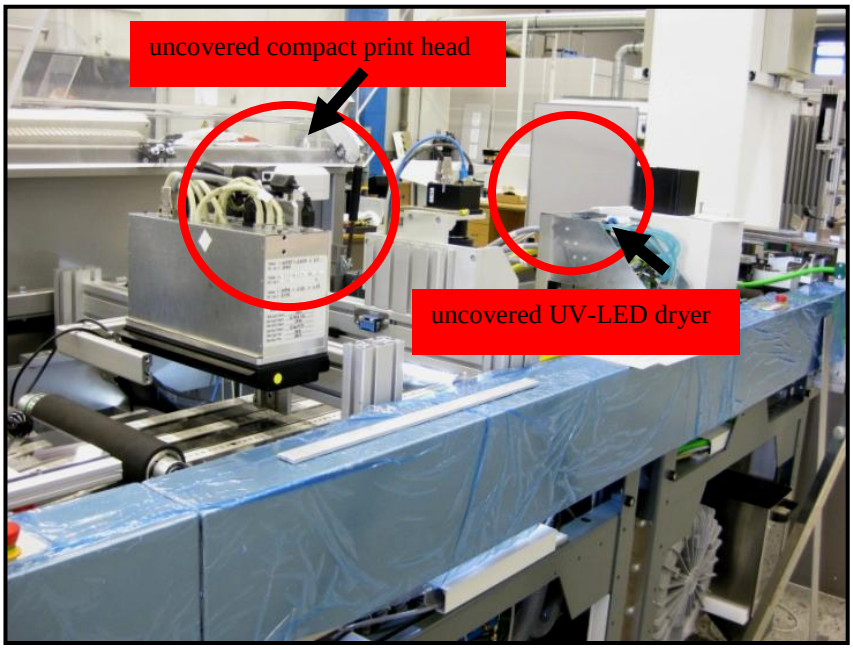


Figure 1.12 - FixedLine Integrated Into a Packaging Line

FixedLine, as it is illustrated in Figure 1.12, contains a compact print unit and a dryer. The print head is able to print on paper, cardboard, aluminum, and plastic foils with many desired colors [29]. It works with a rate of up to 25 m/min [30]. To receive high quality materials printed with that speed it is required to dry the printing ink extremely fast. This is the reason why FixedLine is also equipped with a UV-LED dryer, which does not produce heat to avoid deformation of the material.

Because of the small size of the machines, FixedLine does not require a lot of space so the machines can be easily integrated into a production or packaging line at any location.

Figure 1.13 - Driveline B

The first digital print system offered and sold by Linoprint – DriveLine B (Figure 1.13) – prints on aluminum, plastic, foils, self-adhesive labels, paper and other flexible materials [31]. It allows the printing of various variants of graphics, text and data in a designed order, from simple text to more complicated and colorful graphics and text/data combinations. By means of this system, it is possible to print an exact quantity of materials very quickly and reduce costs of warehousing because the company is able to print packages just in time. This is particularly important for seasonal and limited durability goods [32].

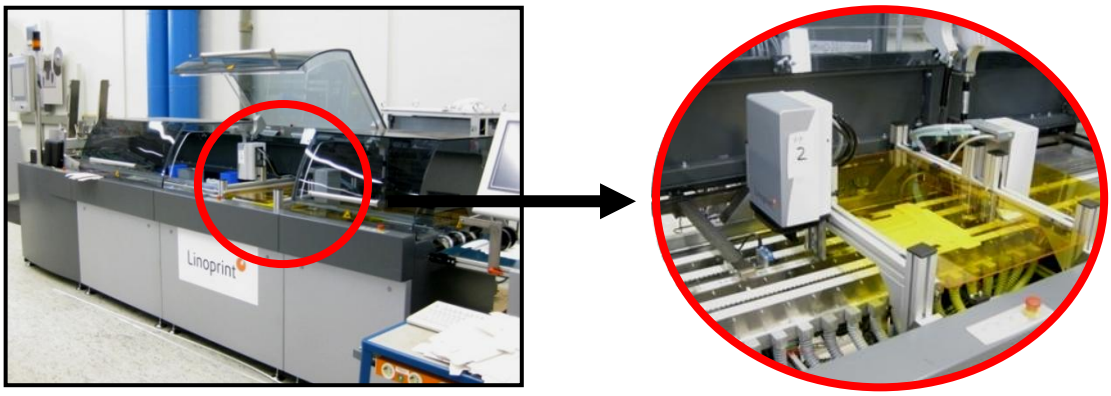


Figure 1.14 - DriveLine C Integrated Into Packaging Line

DriveLine series C, presented in Figure 1.14, prints on flat materials: flat boxes, flat metal objects, pierced plastic cards, CDs and DVDs [33]. This system allows small amounts to be produced quickly, for example products for market tests or promotion samples.

Third print system series – DriveLine D – enables printing on erected, filled boxes and on other tree-dimensional objects made from a stable material. It allows printing on horizontal and vertical areas of the boxes [34] which results in faster printing and optimization of packaging process.

All DriveLine systems can be integrated into a packaging or production line. They are offered as offline versions as well.

Additionally to the systems, Linoprint offers several products to adapt print systems to individual customer needs, and to make system using easier and more optimized. These products are:

1. LinoFit – Each packaging and production line is different and requires various adjustments. Linoprint has its own "engineering consulting" responsible for integration separated FixedLines or DriveLines into production line.
2. LinoFlow - Software controlling and checking a workflow. According to the print system functions, there are two software versions preparing and creating print jobs: LinoFlow Spot, for monochrome print application, and LinoFlow Color, for gray and multicolor-printing. Moreover, it is possible to provide print inspection systems to give complete quality checks (LinoFlow Vision). Thanks to a clear and well-designed interface, the programs can be used without special knowledge about printing [35].
3. LinoLab – Makes it possible to get the perfect inks from ink manufacturers, test them and design inks appropriate for high quality printing on different materials.
4. LinoServices – Post-sell services including, for instance, selling of inks and spare parts.

1.5.4 Differences Between the Business Models of Heidelberg and Linoprint

Table 1.2 compares Heidelberg's and Linoprint's business models. Heidelberg's core business consists of selling printing presses, whereas Linoprint's core business consists of engineering and integrating digital print heads into existing packaging lines. This means that they have different approaches to manufacturing, marketing, and profit generation. They also use different technologies-Heidelberg uses offset printing, which is a very mature technology, whereas Linoprint uses digital printing, a technology which is just starting to be used in commercial and industrial settings.

Table 1.2 – Differences Between the Business Models of Heidelberg and Linoprint

		HEIDELBERG	LINOPRINT
MANUFACTURING	**MANUFACTURING PROCESS**	Mass manufacturing of presses	Individual manufacturing of presses addressing specific customers' needs
	Static vs. Flexible integration	Fabrication of the whole machine in house	Integration of external parts coming from different suppliers
PROFIT GENERATION		Concentrated on the sale of printing equipment	Dispersed between the selling of presses, inks, engineering and services
MARKETING APPROACH	**DESTINATION MARKETS**	Magazines, Catalogs, Newspapers, Commercial, Packaging PRINTING INDUSTRY	Packaging lines of little labels (up to 0,2mx0,2m). PACKAGING INDUSTRY
	DISTRIBUTION CHANNELS	Own distribution channels and sales force	Agreements with local distributors
	NEEDS OF CUSTOMERS	Broad	Very specific
	SALES PROCESS	Shorter time to make a deal and weaker customer relationship	Longer time to make a deal and stronger customer relationship

1.5.5 Manufacturing

Because Linoprint integrates printing heads into existing packaging lines, Linoprint's products aren't mass produced like Heidelberg's are. The whole product isn't manufactured in house, but inkjet modules are actually bought from other companies and used in Linoprint's products. The machines are then custom-built depending on the customer's needs. This contrasts with Heidelberg, which builds machines to print using standardized plate sizes on standard substrate sizes.

1.5.6 Marketing

Heidelberg and Linoprint also have vastly different marketing strategies. Heidelberg knows its customers well and understands their needs, but they are entering a completely new and unknown market with Linoprint. Over the years, Heidelberg has built up its own worldwide distribution network, but Linoprint has a very small distribution network through external distributors. Linoprint's customers have very specific needs, which means that they might need to print on an unusual type of substrate, or have a unique requirement for the type of ink. In comparison, Heidelberg's customers are typically print shops printing different things, but who print on standard sheet formats and can adapt their print job (or have their entire print shop tailored to) Heidelberg's machines.

Finally, although Heidelberg has high brand loyalty and often has customers that stick with Heidelberg products for long periods of time, Linoprint's customer relationship is just a bit more intimate, because Linoprint works so closely with the customer to learn the needs of the customer and build a machine that the customer will be happy with.

1.5.7 Linoprint Strategy: The Nightmare of Consultants

It's widely accepted that, throughout its life, each technological breakthrough follows the curve shown in Figure 1.15. First, the technology will experience a relatively slow start during its beginnings, as shown in region A. After a very high growth (B), and finally a slower growth (part D), the summit (C) is reached. In the industry, there's a belief that Heidelberg's business, which is based in offset printing, is walking now on in

the summit of the curve. There, productivity gains are incremental, and very slow. It's a mature business.

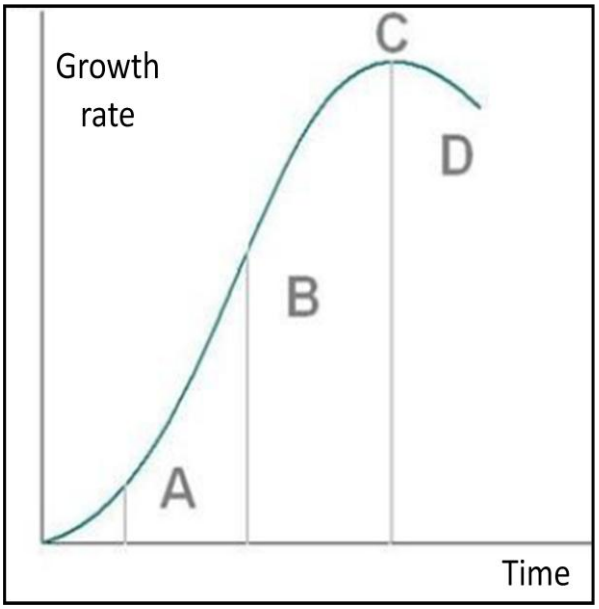


Figure 1.15 - Typical Evolution of Any Technology

The next step in the logical evolution of any industry is expected to be the appearance of a new technology which regains high growths and makes the old one obsolete. Again, the feeling is that digital is the new paradigm.

Of course, Linoprint is Heidelberg's try to be present in this new future. Its business is starting in a very different situation compared to Heidelberg's. To the different technologies, the different markets they are addressing must be added: the packaging market which, although a small portion of the total, is experiencing high growth, and is well suited for digital printing.

If a business is classified as a function of its technology and market segment, as shown in Figure 1.16, Linoprint is moving to the opposite quadrant of Heidelberg. This is considered a very risky movement and the reason why, using a journalistic language, we could call it "the nightmare of consultants".

Linoprint is aware of that risk and to succeed it is taking different steps: using a different business model, realizing that it's not just "printing as usual" but completely new markets, and trying to create a new working culture different from Heidelberg's.

That need to change is nothing new. During its 150 years of History Heidelberg has done it more than once. After all, they started off building bells, not printing presses.

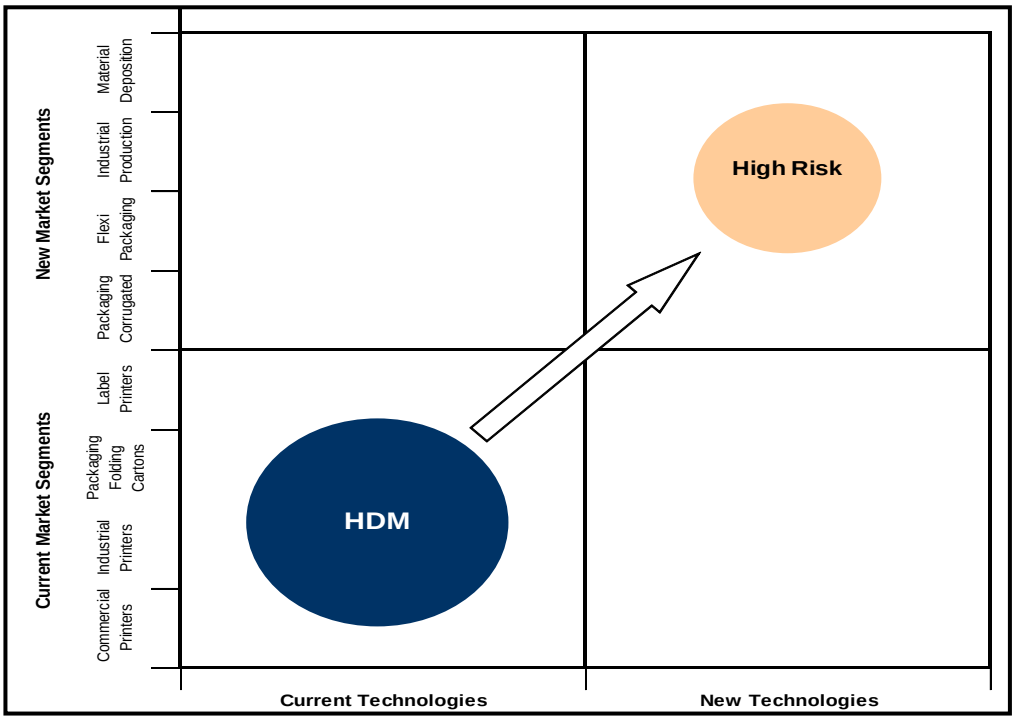


Figure 1.16 - Location of the Different Business Models [36]

CHAPTER 2: The Packaging Industry and Customer Needs

2.1 Introduction

Our next step, before we'll start studying competitors, distributors and marketing tools, we believe we should make an overview of the industry where Linoprint stands. Our company is in the crossroads of two fields: the packaging industry and digital printing. In this chapter, we'll analyze both. Moreover, we'll describe how the packaging print industry is going through deep changes. We'll also discuss whether or not digital technology can be the answer to these changes.

2.2 Linoprint: Where Digital Printing Meets Packaging

As we said before, Linoprint is in the crossroads of two fields: packaging and digital printing. Our company, with piezo DoD Digital printing machines, tries to print on many of the multiple substrates used for packaging.

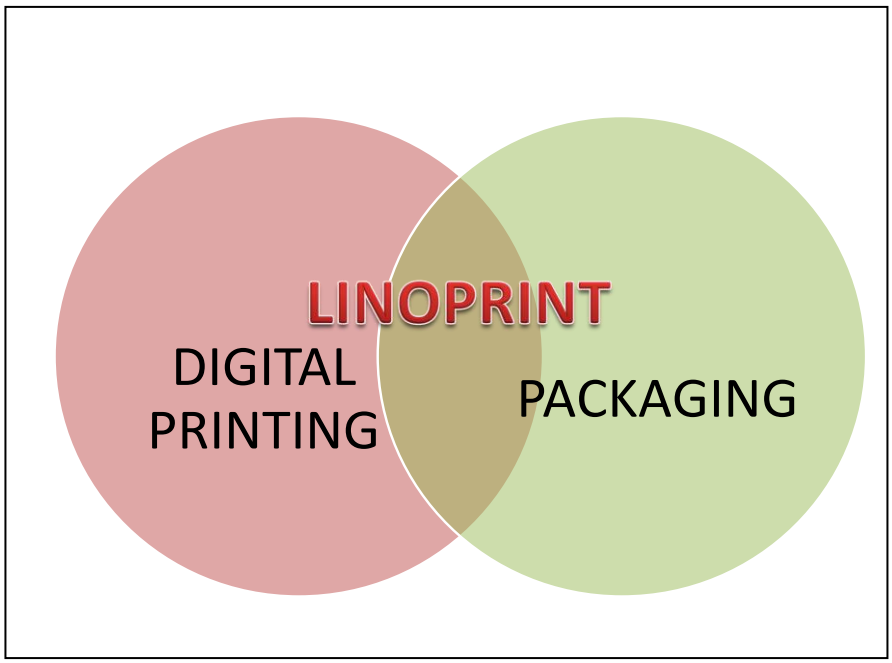


Figure 2.1 - Linoprint: Where Digital Printing Meets Packaging

2.3 The Packaging Industry

2.3.1 Description of Packaging and Package Labeling [37]

Packaging is the technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the processes design, evaluation, and production of packages. Packaging contains, protects, preserves, transports, informs, and sells.

In our project we are interested on the package labeling, which consists of any written, electronic, or graphic communications on the packaging or on a separate but associated label. Package labeling has several objectives:

- **Information transmission** - Packages and labels communicate how to use, transport, recycle, or dispose of the package or product. With pharmaceuticals, food, medical, and chemical products, some types of information are required by governments. Some packages and labels also are used for track and trace purposes.

- **Marketing** - The packaging and labels can be used by marketers to encourage potential buyers to purchase the product. Package graphic design and physical design have been an important and constantly evolving phenomenon for several decades.

- **Security** - Packaging can play an important role in reducing the security risks of shipment. Packages can be made with improved tamper resistance to deter tampering and also can have tamper-evident features to help indicate tampering. Packages can be engineered to help reduce the risks of package pilferage. Packages may include authentication seals and use security printing to help indicate that the package and contents are not counterfeit. Packages also can include anti-theft devices, such as dye-packs, or electronic article surveillance tags.

2.3.2 Economical Overview of the Packaging Industry [38] [39]

The global packaging industry turnover is around $500 billion (2007), and the economy is the single most important influence on packaging consumption. The health of the packaging industry is then strongly linked to that of the world economy as a whole. Of the total turnover of the packaging industry, more than 85% of the total belongs to consumer packaging.

From 2005 to 2008 it has been growing at a pace of 5% a year, although lately it is decreasing due to the economic crisis.

In the following lines we are going to divide packaging using 3 variables. The first is going to be "by end use", referring to the ultimate application for which a product has been designed. The second variable is going to be "by geography", in which we are going to describe the importance of the different regions in the global market. Finally, the last criteria will be "by material", meaning the physical substance used in packaging (Fig. 2.2).

By end use, packaging is the largest segment, accounting for more than half the total market value, followed by beverage. It is important for Linoprint know that packaging for healthcare products and cosmetics, two of the segments that Linoprint are most interested in, are the ones experiencing the most growth. They were growing at around 6% in 2005 and 2006, two points above the average.

By geography, mature markets show moderate year on year increases, while developing countries feature above average growth rate for all markets (See Fig. 2.2.b).

By material, plastic represents close to 40% of world packaging and is growing faster than any other packaging material. Its growth is mainly attributable to advances in material properties which have lead to a substitution of existing packages by plastic and the development of new applications (See Fig. 2.2.c).

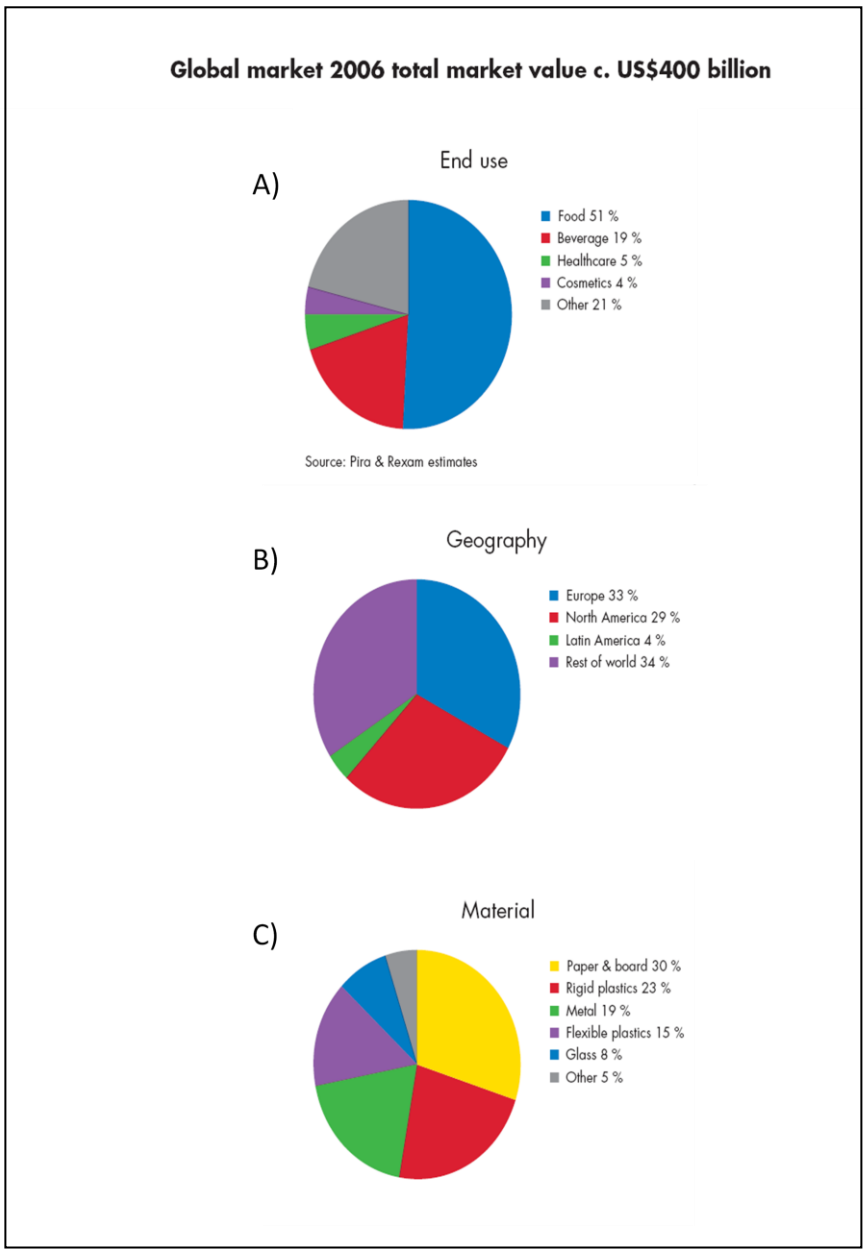


Figure 2.2 - The Packaging Market by End Use, Geography, and Material in 2006 [40]

In stark difference to other markets where there are a few big players, the packaging market is a very segmented industry. The top ten consumer packaging companies only have around a 15% share of the global consumer packaging market.

Packaging is growing more in the non mature economies. The reason why packaging growth is typically higher than GDP in emerging markets is that increases in standard of living are typically used to buy packaged food, beverages and other everyday

commodities [41]. In mature markets, packaging growth is typically in line with (or sometimes even below) GDP, as increases in standard of living are often used to consume services with limited physical packaging. There are, however, also packaging opportunities to outpace GDP in mature markets, as packaging can be used as a means to create services like convenience, tracing.

2.3.3 Drivers of the Packaging Industry [41]

The progression of packaging demand is influenced by a wide range of factors. While the economy plays a central role in influencing the size and growth of the market, there are a number of other factors which can be seen as having a direct influence on packaging demand, irrespective of the performance of the economy. These include:

- The aging of the world population.
- The trend towards smaller households.
- The increasing requirement for convenience among consumers.
- Rising health awareness among consumers
- The trend towards 'on-the-go' lifestyles among increasingly time-poor consumers.
- Growing requirements for brand enhancement/differentiation in an increasingly competitive Environment.
- New packaging material development.
- The move towards smaller pack sizes as the incidence of families eating together at the dinner table become less common.
- Increasing awareness of environmental issues, and the adoption of new regulatory requirements on packaging recycling.
- Climate change combat and carbon footprint.
- E-commerce.

2.4 The Printing Industry [42]

The worldwide print industry has, interestingly, a volume just a bit higher than the worldwide packaging industry. In 2006, it was around $641 billion in current 2006 prices. As we said, worldwide packaging was around $500 billion in 2007. In order to give a reference, the US GDP was, in 2006, $13.398,9 billion current dollars. The worldwide print industry was then, in 2006 around one twentieth of the US GDP, and the world packaging industry was around one twenty fifth of the US GDP.

The print industry, by company type, had these numbers in US current billion $:

Table 2.1 – Global Print Market by Company Type in Billions of $, 2006 [40]

Sector	2006
Package printers	$153.5
Newspaper publishers	45.1
In-plant reproduction	42.4
Commercial printers	314.3
Business support services (BSS)	20.3
Quick printers	8.2
Prepress	12.9
Postpress	13.2
Total above	$609.8
Copy shops	11.3
Photocopying by BSS	8.6
Mailing services by BSS	11.9
Grand total	$641.5

The three main markets, with nearly one third each are, by importance: North America, Western Europe, and Asia.

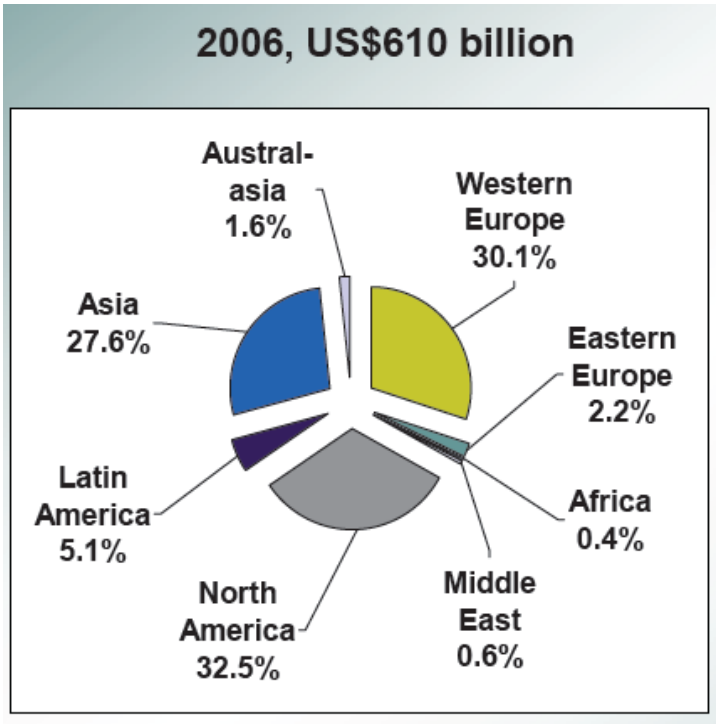


Figure 2.3 - World Print Market by Region, 2006 [40]

In the world print market, trends are the same as in the packaging market. The markets that are growing more are the ones of Latin America, Eastern Europe, the Middle East, and Australasian. They are outgrowing mature markets such as North America or Western Europe. Again in USD, and current prices, we show in the chart below the importance of the different markets:

Table 2.2 – Top Level Global Print Markets, 2000-2006 [40]

Region	2000	2006	Growth 2000-06
Global	$477,765	$609,809	27.6%
Western Europe	125,539	183,379	46.1%
Eastern Europe	5,387	13,227	145.5%
Africa	1,860	2,206	18.6%
Middle East	2,225	3,406	53.0%
North America	173,705	198,137	14.1%
Latin America	22,840	31,198	36.6%
Asia	138,642	168,309	21.4%
Australasia	7,566	9,947	31.5%

2.4.1 The Packaging Industry Inside the Print Industry [43]

The packaging print market is just a little portion of the print industry, and is only around 12% of the total (See Fig 2.6). The main part of the industry is dominated by the informational and the promotional categories, which add up to 70% of the total. The informational category includes periodicals and newsletters, newspapers or books, among others. The promotional category is closely related to marketing.

Table 2.3 – Four Broad Categories of Printing, 2005 [44]

Informational	41%
Periodicals and Newsletters	
Newspapers	
Books	
Directories	
Technical Documentation	
Financial, Legal, and Transactional	
Promotional	30%
Catalogs	
Direct Marketing	
Advertising and Promotional	
Packaging	12%
Packaging and Labels	
Product	17%
Stationary and Envelopes	
Internal and Forms	
Miscellaneous	
Wallpaper, Wrapping Paper, Greeting Cards, Paper Plates, etc	

2.4.2 Classification of the Package Printing Industry [15]

The package printing industry worldwide covers a wide range of different segments, including flexible packaging, corrugated packaging, folding cartons, paper bags, rigid packaging, metal cans, pouches, sanitary packaging, plastic containers, glass containers, multisack, and miscellaneous packaging. Paper and board is the world's preferred packaging material: it holds a 40% market share, followed by plastics with 30%, metal with 17%, glass with 7%, and finally wood and fabrics with 6%. In the next slide, Fig. 2.4, we can see samples of each of these market segments:

Figure 2.4 - Segmentation of the World Packaging Market, 2005 [15]

2.4.3 Digital Printing Industry [43]

Digital printing, of course, is the printing job made by any digital printing press. The two digital families are electrophotography and inkjet, the differences and subdivisions of which were explained in Chapter 1.

We can explain the increasing importance of digital printing inside the print industry with the words of the noted authority on printing Frank Romano, and his book "Digital Printing is where the Money is" [43]. The reasons are simple: less competence and higher growth. Both elements mean that digital printing has not seen the relentless price competition that has befallen other printing processes such as offset.

Each time digital printing is paying off more for those printers who added this capability to their company over the last decade. In fact, printing companies that are doing the best are those that print both offset and digital. Most digital printing customers are also offset customers and the synergies between the two are an advantage [43].

2.4.4 Evolution of the Digital Printing Industry: Growth and Revenue [42]

The growth of digital printing is surpassing the rest of the printing technologies. If we make a projection based on the growth trends of 2003 to 2006, we find that the two digital systems are outgrowing in a very clear way the rest of printing systems:

Table 2.4 – Expected Growth of the Global Machinery Market, 2006-2011 [42]

Sector	2006	2011	Growth 2006-11
Sheetfed	$4,892.2	$4,575.9	-6.5%
Coldset	1,765.0	1,677.9	-4.9%
Heatset	2,126.6	1,972.4	-7.3%
Gravure	1,315.6	1,161.3	-11.7%
Flexo	2,783.9	2,510.3	-9.8%
Screen	811.7	689.7	-15.0%
Letterpress	403.9	291.7	-27.8%
Electrophotography	1,431.0	2,055.6	43.7%
Inkjet	1,310.8	1,989.9	51.8%

The printing revenue generated by digital printing was in 2002 10% of the total printing industry revenue of nearly $150 billion. By 2010, it has jumped to 30%. A similar way to represent this growing trend is done in Figure 2.5. From 2000 to 2005, the digital printing industry has tripled, and similar tendency is expected to follow in the coming years. It is expected to have a CAGR, the year-over-year growth rate, for the first 15 years of this century, of 17,5%. That represents the smoothed annualized gain earned though the time horizon. Few current industries can expect such a high growth rate.

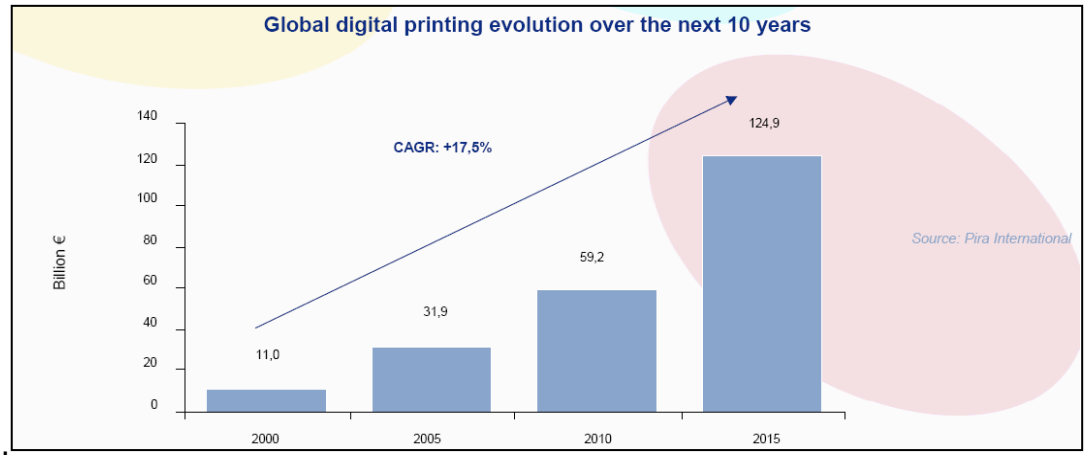


Figure 2.5 - Expected Growth of Global Digital Printing, 2000-2015 [19]

Digital is growing every year but now is increasingly present in three main markets: photo products, commercial printing and packaging.

2.5 Changes Affecting Linoprint´s Customers [15]

The packaging industry is experiencing continuous changes. Each time, new ways of life are requiring new forms of packaging, especially for food products. With a combination of design, physical features and communication capacity, packaging has to be competitive in this ever-changing market. There are changes with regards to increasing environmental concerns (recyclability), resealable packages, convenience changes, etc. This section will focus on the changes which affect labeling of packaging.

The most significant trend in the industry is the movement to short runs [45].
This is the most important trend. As we can see in Figure 2.6, taken from the North America Label Study of 2007, 63% of all label jobs are less than 50.000 labels in length. This is the result to add the first column, lot sizes under 25.000 copies, which are the 34% of the total, and the second column, lot sizes from 25-50.000 copies, which represents 29% of the total. The same trend applies to carton and blister.

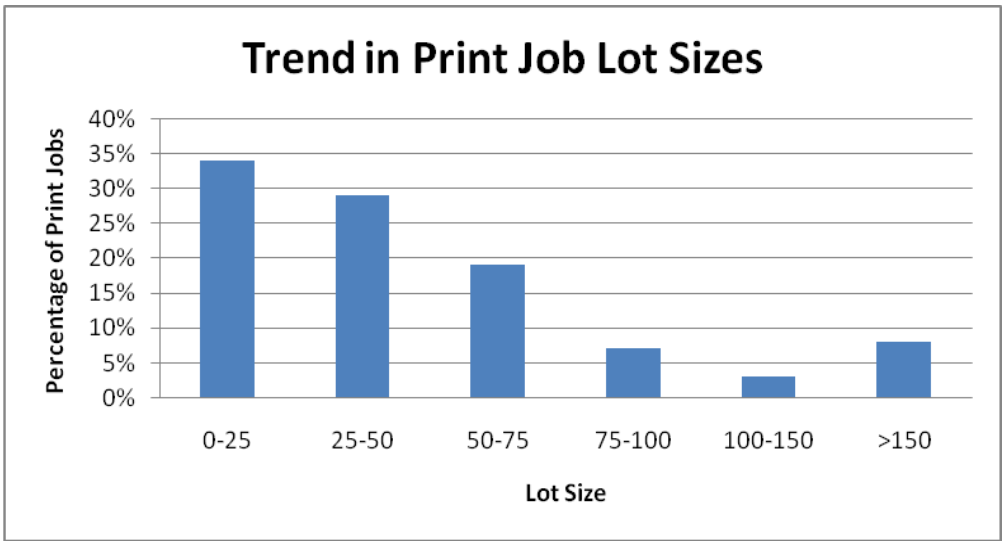


Figure 2.6 - Trend in Print Job Lot Sizes [45]

Continuous changes in rules and regulations require continuous labeling adaptations [46] [47]

New packaging regulations and guidelines are appearing continuously in North America, the European Union and the rest of the world. The Bioterrorism Act in the US and EU Regulation 178/2002 of the European Food Safety Authority, for example, have introduced important changes, and there are many more to come. Two examples could be:

- The California State Board of Pharmacy **pedigree law.** California's law requires pharmaceuticals to be identified with a unique serial number at the unit level and to be tracked from the time they are produced to the time they are distributed to consumers. The law was originally scheduled to take effect January 1, 2009, but the California Board of Pharmacy moved the compliance deadline to January 1, 2011.

- From the 1st of January 2011, the AFSSAPS (French Agency of Sanitary Safety and Health Products) will establish an improved coding standard for the French pharmaceutical market, based on Data-matrix bar-coding. The new standard is designed to improve the traceability of medicines and ultimately increase consumer safety. Other European states, such as Germany, Spain, and Italy, are looking to introduce similar regulations to improve consumer safety. 2D Data-matrix barcodes are able to store large amounts of information (up to 2,300 alphanumeric characters) on a small label. This makes it ideal for the small products and packaging often used for pharmaceuticals.

Customization [48]

When we talk about customization we mean altering the packaging to suit individual requirements or specifications. One example increasingly demanded is versioned packaging. Versioning is a form of customized printing that allows for the creation of different versions or renderings of a package for different groups. This approach is often used to customize groups based on geography, language, or demographics. While the package may not be personalized for each recipient, there is enough commonality within

each segment that the versioned piece will be much more effective than a generic version. Versioning enables changes to the images and text on the standard package.

Less time to prepare the labeling [15]

In a rapidly moving environment, manufacturers need a fast method to label their products. This is also very important in the conception phase of a product. It is acknowledged that the early comers have more possibilities to be successful than the ones who come later.

More Stock Keeping Units (SKU´s) [49]

SKU (Stock Keeping Unit) is a form of identification, usually alphanumeric, of a particular product, that allows it to be tracked for inventory purposes. Typically, an SKU is associated with any purchasable item in a store or catalog. For example, a package of a particular product and color might have an SKU of "3726-8," meaning "product 3726, color 8". Because the amount of customization is increasing, the amount of products that need a unique SKU is also increasing.

More color and more complexity [49]

The importance of these factors can be easily understood with customer behavior: 60% of purchasing decisions in a store are made in a mere few seconds. With such a short time, the impact of packaging quality and design is everything. Nothing is more important for brands than making their products stand out on crowded retailer's shelves. All of this in an environment where competitors are working to make more and more attractive products every day.

Customers do not want warehouses expenses or inventories [48]

Without inventories they cut the considerable costs of storage, which are particularly high with cold products. That way they cut costs and avoid obsolescence too.

Increasing demanding of Track and Trace mechanisms [49]

Track and trace is one of the main weapons used currently to try to improve security, brand protection, and supply management. It consists of barcodes and RFID chips.

A barcode is an optical machine-readable representation of data, which shows certain data on certain products. Originally, barcodes represented data in the widths (lines) and the spacings of parallel lines, and may be referred to as linear or 1D (1 dimensional) barcodes or symbologies. They also come in patterns of squares, dots, hexagons and other geometric patterns within images termed 2D (2 dimensional) matrix codes or symbologies. Although 2D systems use symbols other than bars, they are generally referred to as barcodes as well. Barcodes can be read by optical scanners called barcode readers, or scanned from an image by special software. They were not commercially successful until they were used to automate supermarket checkout systems, a task in which they have become almost universal. Their use has spread to many other roles as well, tasks that are generically referred to as Auto ID Data Capture (AIDC).

In recent years what is called a 3D barcode has appeared. Manufacturing companies have been trying to implement a barcoding system similar to the barcodes for purchases and the retail industry. The only problem is that in manufacturing there are high temperatures, extreme solvents, as well as a wealth of chemicals and processes that inhibit the use of a label with bars on it. The manufacturers need to identify individual parts and not just the entire batch as has been done for years. They wish to improve their inventory and tracking system - and have done so through the use of 3D barcodes. 3D barcodes use the same basic principle as linear and 2D barcodes. An image of some sort is applied to a product and then read by a device to log, categorize, inventory, or track an individual product. As previously stated, the manufacturers need a more permanent solution than a label or sticker. The 3D barcode is engraved or applied to the product itself as a part of the manufacturing process. The bars are not read by variances in reflected light as with linear barcodes but by determining the height of each line. The time it takes the laser to bounce back and be recorded determines the height as a function of distance and time and the character represented by the code can be interpreted.

The 3D barcodes are embossed on the product and the scanner recognizes new characters in the string by the lower regions of the code. This works in much the same way as the white lines or spaces in linear barcodes. The gap allows the system to record

a new height of a line, and thus a new number or alpha character. The 3D barcodes also make it nearly impossible to alter or obstruct the barcode's information and results in fewer inventory mistakes and in turn lowers operating costs of a manufacturing process. The code can be part of the manufacturing process or applied after with a press.

Figure 2.7 - 2D, 1D and 3D Barcodes

RFID, or radio-frequency identification, is the use of an object (typically referred to as an RFID tag) applied to or incorporated into a product, animal, or person, for the purpose of identification and tracking using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. RFID has many applications; for example, it is used in enterprise supply chain management to improve the efficiency of inventory tracking and management.

2.6 Linoprint´s Customer's Needs [15]

Just like the packaging industry as a whole, Linoprint´s customers have different technical needs that must be covered to meet the changes that we enumerated before.

Reliability of the printing machines.

Reliability is the most important factor for the industry. More than anything else they must be able to make production. Here the advantage is on the side of conventional

printing, where the reliability is high and the quality control is easy and well established because if you control the quality of the printing plates, the image is always going to be correct. On the contrary, digital, as a new technology, faces more unforeseen circumstances. Digital for the quality control needs up to100% inspection with the adequate cameras and software to analyze each product. Especially in certain segments such as pharmaceutical or other security relevant sections.

Automation

Automated workflow systems eliminate manual touchpoints in the printing process, which reduces costs, turnaround times, and labor.

Up time production

The uptime production is the percentage of the total time where the machine is operational. For companies like Coca-Cola the standard is an astounding 99% of the time. Only 1% of the time is lost in set up or maintenance. Digital offers a 98% uptime with an adequate maintenance contract [15].

Easy integration

The manufacturers need to integrate properly in the production line the mechanical and electrical interfaces of the printing heads. For example, the printing heads must give and receive information from the rest of the production line about when to start or stop printing, if everything is ready or if there's a lack of ink. All of that without complications and continuous maintenance stops.

Adequate specifications of inks [50]

Inks are critical in any production process, and modern ink formulations are rather complex. In addition to the pigment, they contain many other ingredients in varying levels. Collectively known as the 'vehicle', these additional ingredients include pH modifiers, humectants to retard premature drying, polymeric resins to impart binding and allied properties, defoamers/antifoaming agents to regulate foam efficiency, wetting agents such as surfactants to control surface properties, biocides to inhibit the fungal

and bacterial growth that lead to fouling, and thickeners or rheology modifiers to control ink application.

Over 90 percent of inks are printing inks, in which color is imparted by pigments rather than the dyes used in writing inks. Pigments are insoluble, whereas dyes are soluble, though sometimes these terms are used interchangeably in commercial literature. Ink pigments are both inorganic and organic. Most red writing inks are a dilute solution of the red dye eosin. Blue color can be obtained with substituted triphenylmethane dyes. Many permanent writing inks contain iron sulfate and gallic and tannic acids as well as dyes. Ballpoint ink is usually a paste containing 40 to 50 per cent dye.

Most white inks contain titanium dioxide as the pigment, as rutile and anatase in tetragonal crystalline form. However, growing concerns over the known toxicity of heavy metals have led to the replacement of many inorganic pigments such as chrome yellow, molybdenum orange and cadmium red with organic pigments, which offer better light fastness and reduced toxicity. Furthermore, carbon black now replaces spinel black, rutile black and iron black in nearly all black inks. In fact the ink industry is the second largest consumer of carbon black.

Other inorganic materials such as clays serve as fillers or extenders, which primarily reduces the cost of pigments, though some also improve ink properties. Metallic pigments like aluminum powder (aluminum bronze) and copper-zinc alloy powder (gold bronze) are used in novel silver and gold inks. Miscellaneous inorganic pigments provide luminescent and pearlescent effects.

Similarly, the composition of printing inks depends on the type of printing process - specifically, how the ink-distribution rollers are arranged in the printing press. The major classes of printing processes are lithography or the offset process, flexography, gravure printing, screen printing, letter press and digital printing.

The various printing processes differ in the way the type is impregnated with the ink, although digital printing does not involve movable types. Each process therefore

demands an ink that differs in its viscosity and drying efficiency, which is possible by fine-tuning the composition.

A printing ink chemist is primarily interested in preparing a dispersion of pigment particles that does not settle into clumps. Inorganic pigments can be easily dispersed by applying minimal force, but most organic pigments require special milling techniques to produce sub-mm size particles for stable dispersion. In general, the color of the ink arises from organic pigments; the particle size of the pigment governs the color intensity.

Milling is carried out in two stages: the primary mixing is done with an ordinary mixer and the resultant pre-mix is subjected to secondary grinding in a ball mill or a roller mill. After the primary mixing, the chemist adds chemicals called dispersants or grinding aids to prevent the fine pigment particles from reaggregating during the grinding stage. The correct choice of dispersants, along with the right grinding technique, is the key to obtaining a stable dispersion.

Dispersants stabilize the pigment particles by lowering the mechanical energy needed for grinding. Two classes of compounds are used for this purpose: surfactants and polymers. These compounds adsorb to the pigment particles and form a coating of varying composition and thickness. The resulting modified particle surfaces either attract or repel each other - leading to flocculation or stabilization, respectively. Flocculation hampers dispersion, and stabilizing forces are essential to prevent the fine particles of pigment from settling. The size and shape of the pigment particles dictates the color intensity, shade and light fastness.

There is a growing tendency these days to exclude organic solvents from commercial products, and inks are no exception. Strict regulations limit the use of volatile organic compounds (VOCs) everywhere from paint to plastic manufacture. As a result, ink chemists have been forced to abandon many efficient and time-tested recipes by replacing organic solvents with water. Water-based inks have in turn introduced new classes of surfactants and polymers into ink chemistry.

An obvious disadvantage of using water as a medium is the increased surface tension of aqueous inks, which makes 'wetting' substrates such as coated paper or plastics more difficult. A two-pronged approach has helped to alleviate this problem: special surfactants lower the surface tension of inks, while modifying the surfaces of substrates like plastic (e.g. the corona treatment) enhances the surface energy, and so makes wetting easier. Surfactants have the downside of producing stabilized foam.

Inks should have a viscosity (loosely called thickness) appropriate to the printing process. Some inks have a butter-like consistency and others have intermediate viscosity. Various polymeric thickening agents are added for this purpose. In this regard, ink chemists are interested in rheology, the study of the relationship between the applied stress and the resulting deformation. Complex fluids like inks show non-Newtonian behavior, i.e. their viscosity changes when stirred, although by themselves most of the raw materials in a typical ink composition show the opposite, Newtonian, behavior. Furthermore, most inks exhibit pseudoplasticity, which essentially means that they become runnier when stirred or spread.

Modern solvent-free inks are high solids types, incorporating monomeric and oligomeric polymer precursors that can be polymerized in situ after applying the ink to the substrate, for example by UV light or a high energy electron beam. These inks contain easily polymerisable monomeric or oligomeric units mixed with an initiator that produces radicals or ions on irradiation that will initiate the polymerization process. Electron beam inks do not require an externally added initiator because the electrons can themselves generate radicals. Aside from being solvent-free, these inks cure instantly, giving fast printing speeds. Demand for these inks is currently growing at about 10 per cent per year.

How fast the ink dries governs the speed of the printing process. Drying can involve the absorption or penetration of liquid components into the substrate; evaporating the solvent at a certain temperature; or chemical processes involving oxidation or polymerization.

A newly developed ink that meets the requirements of a printing process and substrate will be subjected to a number of quality control tests before being marketed. These tests vary with the end application. Some of the tests are termed print quality, block resistance, scrubbing, light fastness, bleeding, 'foamability', shear stability, gloss, water resistance, tape adhesion and drying in air. Print quality tests how good is the print, block resistance tests the transfer of ink from a printed roll to an unprinted surface and 'foamability' indicates the extent of foam generation in an ink formulation, and so on.
In addition to these properties, many specialty inks are designed for other specific end uses. With some new thermochromic and photochromic inks heat and light are needed to produce color, while electronic ink requires an electric field to induce color. Thermochromic inks help detect temperature changes in a moving part while electronic inks find application in various displays. Magnetic inks incorporate certain magnetic materials in the ink and are used in printing cheque books for efficient screening by cashiers.

As these lines show, ink is a complex matter and a continuous challenge for the printing industry.

Web-to-Print [48]

Customers working on tight deadlines appreciate the ability to submit jobs directly and securely over the Internet to a printer's workflow system. Removing the time-consuming step of manual file transfer means that press-ready jobs can sail through the operation without delay.

Open system [48]

Open industry standards enable an operator to control all processes and supported output devices from a unified interface. Open systems also avoid obsolescence and incompatibly that can plague proprietary approaches.

Useful technological features

When we talk about useful technological features we mean whatever innovation that can increase production, reliability, or control. Here are some examples:

- **Drum to avoid distortion**

Printing surfaces like plastic foils work with a thickness of 20-25 microns. The behavior of these kinds of foils is like a rubber band, deformations that impede the printing process appear everywhere. In order to obtain high quality, you need a drum to attach the plastic foil to it. That way you avoid distortions.

- **Gapless Reprint/Resynchronization procedure**

The gapless reprint or resynchronization procedure is an interesting feature offered exclusively by Linoprint DriveLine B. When you stop printing you need to dry because we use UV inks that must be dried because they are poisonous. If afterwards you want to restart a new printing process just after the last printed image, Linoprint has an exclusive feature to resynchronize and find the last image.

2.7 The Big Question: Digital or Conventional

The million dollar question for Linoprint in order to convince its customers that the products are worthwhile is the following: Are there now enough savings and potential growth in digital packaging printing to provide good profit or acceptable return? Of course there's not a simple answer and for the companies what will make or break the digital conversion is the type of job and its amount. Since it would not be fair say that every job should be run on digital press, in the following lines we try to shed some light on the dilemma.

2.7.1 Advantages of Digital [15] [51]

Digital sometimes is a better complement than replacement [51]

At least in this moment, for many professionals digital is considered more of a complement than a replacement of flexo or offset. The industry saying "Right job, right press" means that the ability to have various press assets and determine which job to produce on which press is one of the keys to being a low cost provider.

Digital is cheaper for short runs [52]

Modern digital-to-plate technology has made it possible to produce smaller quantities of high-quality color products at prices everyone can afford. With the advent of digital printing, it is now possible to print 50 or 500 unique brochures, in full color, at the quantities that companies need. Instead of printing large amounts of expiring information, companies are printing what they need and updating content more frequently. And when demand exceeds forecasts, they just print some more. Short-run printing also eliminates the high costs of managing and storing inventory. You can offer customers smaller quantities of professionally printed color marketing materials at very affordable prices

These jobs by nature are more cost-effective for customers. This just-in-time model is being embraced by large and small business across all vertical markets. With the move to digital output, the printed page has a much shorter life. With traditional offset printing, customers tend to print far more than they will ever need and end up wasting 30 percent or more. More efficient processes are essential for businesses that are under the gun to reduce costs and improve profitability. On a digital press, you can print as little as a quantity of one. For example, a popular short-run application for design agencies is proofing and prototyping. You can print different versions of your piece for different markets and test their effectiveness before you settle on a concept. Or you can create packaging prototypes for client presentations or testing. The selection of available substrates and ink quality enable extremely accurate one-off prototyping at a very reasonable cost.

To demonstrate the fact than digital is better for short runs, the industry uses the concept of cross over. The cross over shows the point where there is no difference in price between producing the job conventionally or digitally. Determining where this point is a complex exercise and is unique for every printing job. Some of the variables that influence the cross-over are how big the label is, how many SKUs there are, if is a new job or a reprint, how many colors, etc. Usually the cross over is somewhere between the 25000-50000 labels region on a single SKU (See Fig.2.12). Obviously this number changes depending on the coverage, ink price or ink laydown.

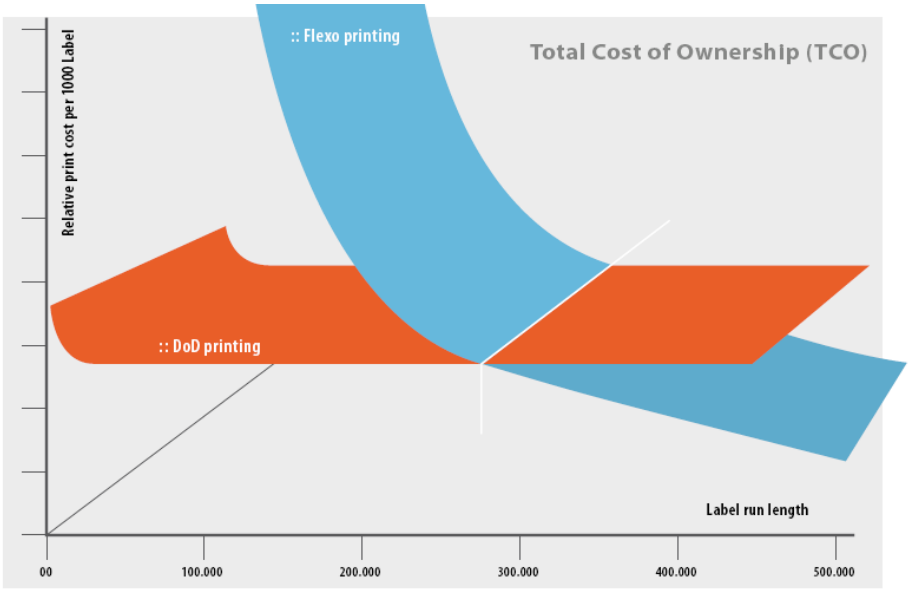


Figure 2.8 - Printing Costs as a Function of Lot Size [31]

The combination of the elimination of the waste, set up times, films, and plates translates into a dramatic reduction in the direct costs of a job that lifts margins.

Digital reduces weeks the product launching [53]

With digital, a new product can reach the market 7 weeks ahead from the 14 standard weeks that takes with conventional methods. There are several reasons why digital printers reduce so much the product launching:

- **Great reduction in the time needed for the correction cycles.** There must be corrections, mainly from the marketing department, but also from production and top management. Every time there's a correction, sending the preliminary version to print takes from 2 to 3 days. These 2 to 3 days are shortened to minutes with digital printing. The corrections are needed in multiple steps of the product launching. In the advertising material, package design, labels design, etc. With digital, in each step the same can be done that is done in homes with desktop printers: printing immediately. We're applying our domestic technology to the production line. Usually that takes 3-4 weeks, but it can be reduced to 5 to 10 days.

- **Don't need to wait from inventories to come**. With digital, production can start immediately, without waiting for lorries to bring in labels from outside. The company produces the needed labels with its own machines. That takes usually from 3-4 weeks and with digital it takes just 1 week or less.

- **Reduction in quality inspections.** We must ensure that the packaging has been printed correctly, has no content errors, and conforms to the original signed-off artwork. That is vital for both regulatory compliance and image quality. Currently this is done manually, which is time consuming and, in a product launching, takes a couple of weeks time. Incoming quality control of printed packaging materials can be carried out with the digital printer inspection system which saves that precious time. For conventional printing this takes 2 weeks, which can be shortened to 2 days with digital printing.

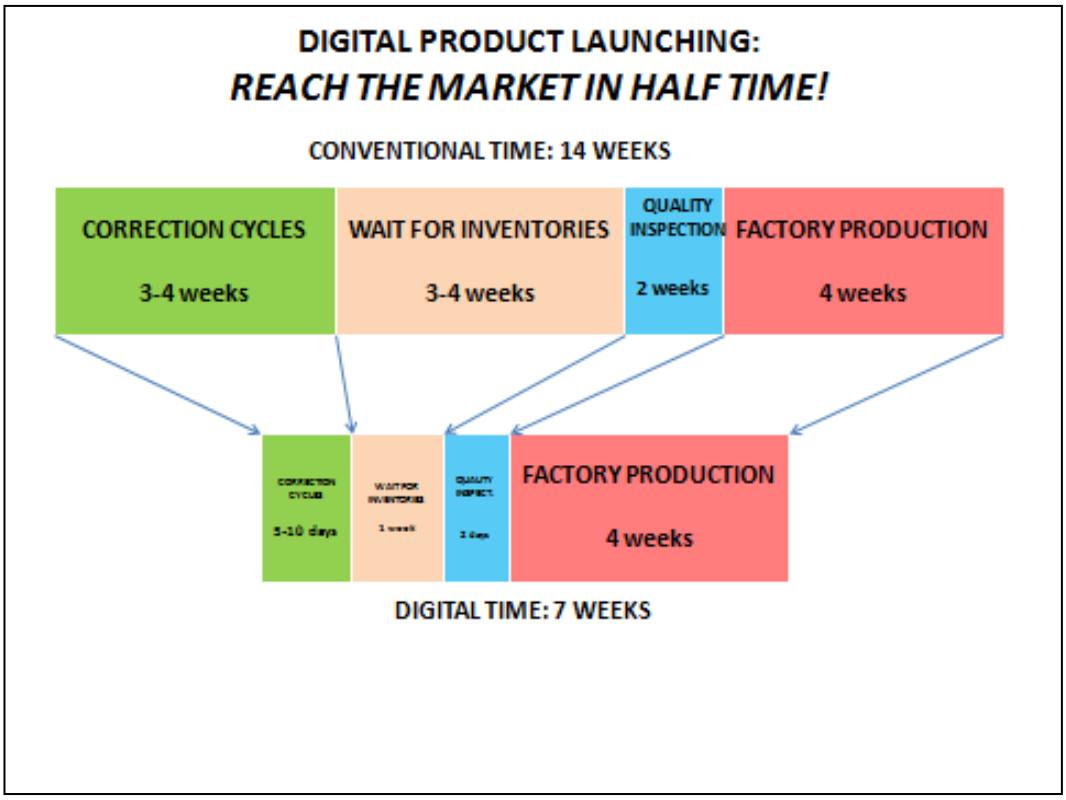


Figure 2.9 - Product Launching Time Reduction with Digital.

The advantages of reducing the product launching time are very important as the first product to reach the market has many more chances to be successful than its competitors.

Digital increases efficiency [52]

Digital can be even a better complement than substitute. Flexo presses need more set up time and change over time. If we move from the conventional jobs that can be better done with digital to digital presses, there is a lot more time to use the flexo machine and less time spent doing the job.

To illustrate the above we use one example from the *Label Job Estimator* of HP Indigo.
In the Pre conversion bar, where all of the jobs are done with flexo, there is a relation of 3 to 1 between settings up time versus running time. When the jobs inefficient for flexo are removed, the relation between set up and run time is nearly 1 to 1. In the post conversion bar, there is a lot of more idle time in the flexo machine that can be used for proper flexo works.

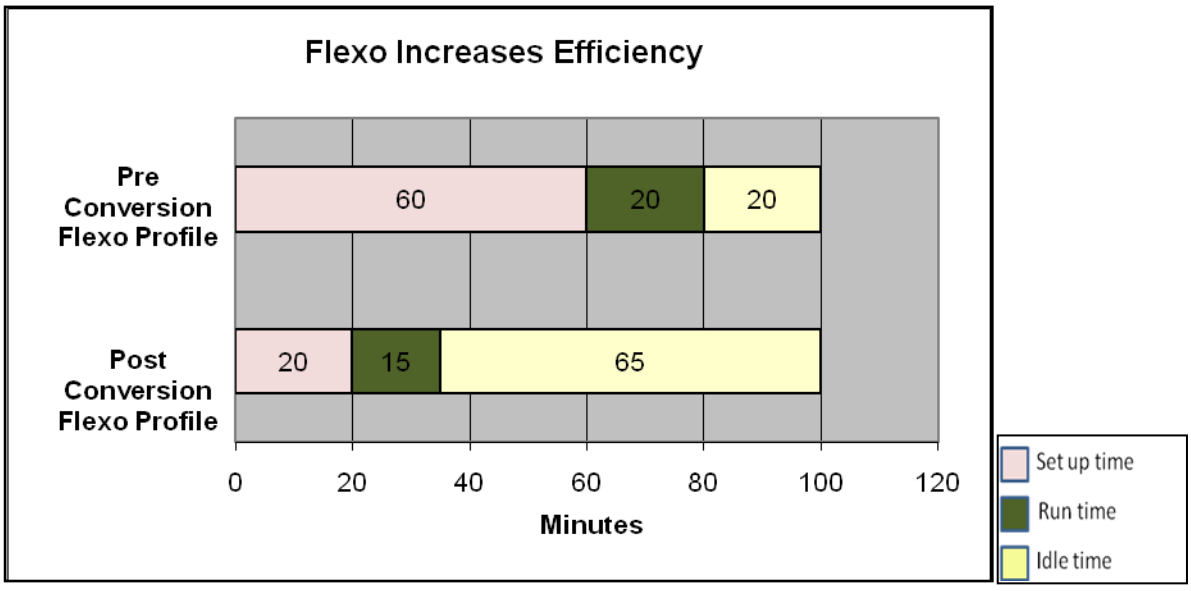


Figure 2.10 - Flexo Increases Efficiency [48]

The above exemplifies not only that digital can increase efficiency, but also shows that we should look at the return on assets and not just at the return on investment when we

buy a digital press. The concept is that the profitability of buying a digital press lies not only in the particular return that the digital press investment generates. It should include the increased profitability that it brings to the flexo or offset machines, because they can now work in the jobs that they are more efficient at. The digital press just helps to increase the profits from other presses.

Digital is the best way for variable data applications [54]

In variable data applications, every printed piece includes personalized information that makes it more attractive and more relevant to the individual customer. Only with a digital press, you can produce content that is automatically tailored for a specific customer, or you can print long runs of nearly identical copies with some select, customized content for different target groups. For example, a university can print student recruitment materials with customized text including a student´s name and photos tailored to a prospective student´s interests, or it can produce thousands of copies of the same brochure with some customized content for students interested in particular majors.

Another interesting explanatory example is one of the last Lexus dealer programs in North America. This personalized marketing application was driven by a customer database. Each one of thousands of direct mail brochures provided individual Lexus customers with personalized elements such as vehicle models, sales messages, special incentives, and photographs of local dealership managers. Lexus estimated that every dollar the average dealer spent on the direct mail program generated seven dollars in return [11].

2.7.2 Disadvantages of Digital [15] [51]

Investing in digital press faces more obsolescence risk

The fact that digital is a new and rapidly growing technology means it goes through more changes compared to other mature technologies like flexo. A new digital press machine will be obsolete before a flexo machine bought at the same time.

Conventional presses produce better quality than digital presses [53]

Today conventional presses like flexo produce higher quality than digital. True is that digital is catching up, and the newest digital presses are printing better halftones and they are getting very good ink-over-ink trapping and registration, allowing for far less colors required to achieve the same effect in the flexographic process. Currently, digital presses have the ability to match PMS and Designer based colors typically within 3 delta E or better. Although these are complex concepts, we put them as an example of how digital presses have considerably improved quality in the last years. We assume that a similar development will occur to inkjet and especially DoD printing.

In the next graph it is shown how digital is increasingly matching the quality of offset and flexo. Only gravure is still out of reach of digital printing.

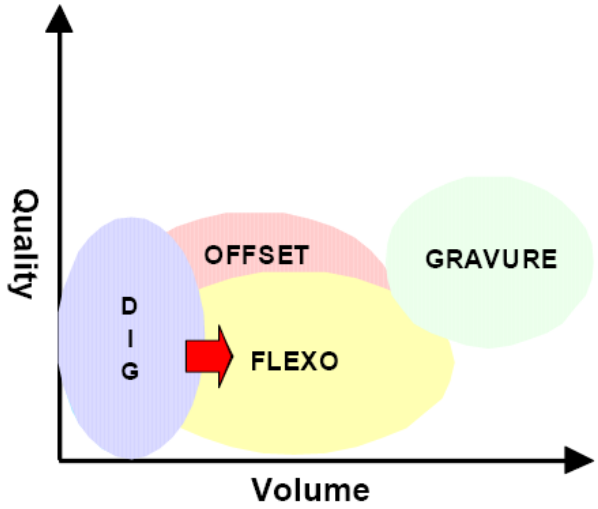


Figure 2.11 - Digital is Approaching the Quality of Flexo or Offset Printing

Digital presses do not have certain inks

Electro Photographic (EP) process limits the ability to put metal particles in the ink. The industry is trying to achieve the same effects by other means.

Table 2.5 – Digital vs. Analog Printing

	ADVANTAGES	DISADVANTAGES
ANALOG PRINTING	COST EFFECTIVE FOR LONG RUNS, LOW INK LAY-DOWN, CHEAP INKS, HIGHER QUALITY, RELIABLE AND WELL ESTABLISHED, PRODUCTION	STATIC PRINTING, MORE SPACE REQUIRED IN PLANT
DIGITAL PRINTING	COST EFFECTIVE LOW RUNS, CUSTOMIZE PRINTING, OVERPRINTING, BETTER COMPLEMENTARITY, JUST IN TIME, REDUCED STORAGE, LESS SET UP TIME, REDUCES PRODUCT LAUNCHING TIME	HIGH INK LAYDOWN, HIGH INK PRICES, FASTER OBSOLESCENCE, SPECIAL INK FORMULATION REQUIRED FOR SUBSTRATES AND APPLICATIONS LESS RELIABLE, PRE EMPTIVE SUITABLE MAINTENANCE

2.8 Summary of Findings

In this chapter we started thinking about the fact that Linoprint is the nexus between packaging and piezo Drop on Demand digital printing. We learned that packaging is a huge industry increasing in importance every day. What is important for Linoprint is that the packaging markets that are growing most are precisely the ones on which Linoprint is focused: healthcare and cosmetics. We learned too that although packaging printing represents only a small part of the total business print revenue, currently around 15%, it is growing in importance every day. With regards to printing technologies, digital is the one that is thriving the most.

In order to understand Linoprint´s business better we tried to analyze what are the most important changes that the printing and packaging industry is suffering. Of them, the most important is the increasing importance of small runs. Next are the continuous changes in rules and regulations and the increasing demand for customization. The

trend for increasing printing quality, track and trace mechanisms and the need to avoid warehouses expenses are also important factors important. In order to confront these changes, Linoprint must offer solutions that fulfill some requisites: reliable, automated, or easily integrated into a production line.

Finally, in the last part of the chapter we analyzed the digital solution that Linoprint is offering the industry and we compared it with conventional printing. We covered in the digital vs. conventional printing debate and tried to objectively cover all of the pros and cons.

At the end, the advantages of digital printing seem clear for certain kind of jobs, and we could understand a bit more the well known industry saying: "Everything that can become digital, will become digital". From what we can see, printing will not be an exception.

Chapter 3: Competitor Analysis [55], [56], [76]

For Heidelberger Druckmaschinen AG's brand Linoprint it is important to know how their overall situation is in the different segments of the digital printing and packaging industry in comparison with their specific competitor. This analysis shall give a narrow overview of these different situations in the three segments of blister, carton and label.
The further steps will be the identification of the possible problem given through this analysis and comparison of the strengths and weaknesses of Linoprint and give some opportunities and threats (SWOT) for each segment and all segments combined as a solution recommendation for the future of Linoprint and what strategy to follow to have a successful market penetration.

3.1 Introduction [57]

To understand the overall situation of a company in its markets, it is important to know the assessed state in comparison to the competitor's. After having achieved this knowledge the possibility to look or find a solution for the problem may appear.

By understanding the competitors it is easier to differentiate the company, therewith its products and the segments of the market that are to be addressed.

Without a systematic competitor analysis failures can appear. The mistakes in competitor analysis usually are that the identification of the competitors is too narrow in dimensions of e.g. just looking on the competitive products on the market instead of knowing the true demand of the customer. The competitors shall not be limited to successful ones nor shall the criteria to understand the competitors be conceived as something static but dynamic, especially in our case of the digital printing and packaging industry which is evolving and enhancing constantly.

Information Retrieval

The sources of information in this analysis had primary sources like already existing internal analysis of the competitors or an external official market share rankings which were provided by Linoprint, too. All other sources were in the nature of external secondary sources such as homepages and downloadable product brochures and revenues which are publically available.

The informational resources were limited to the just mentioned ones. The analyzed competitors in chapter three are a selection of many partly chosen by chance and some by purposely to show the overall situation of Linoprint in the three segments of blister, label and carton.

Moreover it is necessary to know that all competitors in this analysis and the already existing segmentation which is divided in the parts of blister, carton and label were provided to us by the brand Linoprint.

3.2 Criteria Descriptions [36]

3.2.1 Y-Axis

Relative Technology/Product Strength

The two parts of this section are “technology” and “reliability” of the technologies used. It shall show the strength of their distributed products in comparison to Linoprint products. The criteria will be explained in the following section.

Technology

This criterion is split into the categories of “own technology” meaning whether a company is producing its own products, such as print heads for example, to install in their own machines, products or applications and into usage of “more than one technology”. If the answer to the 1st one is “yes” then the scaling point is 25% and if not then there no points given.

So the 2nd criteria is whether more than one technology is used, e.g. Electrophotography, Piezo Inkjet, etc., in a company and its products. With using more than one technology the company gains 25% on the scaling rate. By using more technologies the customer has the possibility to decide which product to take or buy. The flexibility of each company grows with the rising amount of useable technology so the possibility of adapting to the customer needs, and therefore his/her satisfaction, is higher by receiving an optimized and customized solution.

The first category shall indicate how independent a company can produce without having to be dependent on distributors of print head modules.

TECHNOLOGY	**50%**		**OWN TECHNOLOGY**	**25%**
			MORE THAN ONE TECHNOLOGY	**25%**

Figure 3.1 - Technology

Reliability

This criterion is split into two parts, too, each of them with maximum of achievable 25% in the scaling.

Reliability of a product is very important to achieve customer satisfaction. The less down times with well approved products and their technologies there are the more a customer is satisfied with its solution. Down times appear not only when modules or print heads have to be change because of breakdowns but because of regular fatigue fretting.

Furthermore is service an indicator for reliability because a it is not only important to sell a product but perhaps even more important the after-sales-service which means that help, in forms of spare parts supply or maintenance and repairs e.g., is there when needed in a short period of time.

The 1st criterion is called “technology reliability”. It is scaled like the following picture demonstrates:

TECHNOLOGY RELIABILITY	**25%**	**EP**	**10%**
		PIEZO	**7,5%**
		THERMAL	**5%**
		CONTINUOUS	**2,5%**

Figure 3.2 - Technology Reliability

A company achieves 10% for using Electrophotography technology, 7.5% for using piezo DoD technology, 5% for using Thermal Inkjet and 2.5% for using Continuous Inkjet.
The Electrophotography (EP) technology is the most reliable technology of these four because it is the most developed one due to its long history of more than 40 years. It started to be widely sold more than one decade before inkjet and it´s well proved. Furthermore it is important to mention that the lifetime of EP is the highest in comparison to the other three.

The Piezo Inkjet technology’s nozzles a lifetime has of approximately around 10^9-10^{10} drops until they become useless or ineffective.

The Thermal inkjet technology’s nozzles have an even shorter lifetime of approximately 10^7-10^8 drops before becoming ineffective. After this time the nozzles suffer destruction by cavitation.

The Continuous Inkjet technology is the less reliable one which needs high pressures that are around 5 bars, to generate the drops. The conducts might suffer a high risk of bursting because of the high pressures they have to deal with.

If a company uses all three technologies in its product range then it gains a sum of the total 25%. The more technologies are used the more flexible the company can act, meaning that it can then adapt again better the needs of its customers to provide them with individual solutions.

The 2nd criterion is called “size of customer service”.

SIZE OF COSTUMER SERVICE	**25%**	**WORLDWIDE**	**25%**
		CONTINENTAL	**12,5%**
		NATIONAL	**6,25%**

Figure 3.3 – Size of Customer Service

As it is very clearly recognizable each company earns 25% points if the distribution and therewith the service network is acting worldwide to provide the customer with an overall service, information, spare parts, even new applications and machines or anything else the customer needs in a very short period of time.

By earning 12.5% points it means that a company’s distribution and service network is acting not on all continents but on some of them.

Each company obtains 6.25% points if their distribution and service network is only acting nationwide or more precisely if their actions are operated and controlled from the home country for their customers all over the world.

Service is a product. In this case it is a product which is very strongly connected with the digital printing and packaging solutions every company is offering. It is difficult to sell a solution if it is well known that the service is weak or bad. In this analysis nothing else but the worldwide appearance of the service network is being measured and scaled.

100%

In conclusion, the total summation of all the criteria on the Y axis will be 100% if a company provides its products with its own engineered and developed technologies, makes use of more than one technology in its product range or customized products, uses all four technologies that are mentioned in the “reliability” part (EP, Piezo, Thermal and Continuous) and its distribution and service network is acting worldwide.

3.2.2 X-Axis

Relative Company Strength

The section is divided into the four parts called “brand perception”, “focus in segments”, “business relations” and “Revenue”. In each of the first three criteria the companies can achieve a maximum of 20% points and 40% in the last criterion.

These criteria will be explained in the following.

Brand Perception

The focus here is on the already achieved market share ranking in each of the analyzed segments (carton, blister and label). The segment leading company obtains 20% points, the 2nd placed 15% and 10% points the 3rd ranked company. Additional percent points were given for the rest of the companies to provide an overview of the general situation on the market segment.

BRAND PERCEPTION	**20%**	**20%**	**MARKET SHARE RANKING**	**ranking: no.1 = D2/3 ; no.2 = D2/6; no.3 = D3/10**	**LABEL**	**20,00%**
						15,00%
						10%

Figure 3.4 – Brand Perception

Focus on segments

Focus on Segment(s)	**20%**

Figure 3.5 – Focus on Segment(s)

As mentioned before 20% points are achievable in this part. The meaning of focus in this case is not the technological view but the segmentation in markets e.g. pharmaceutical industries, beverage industries or food in general. The more a business is concentrated on less of these explained segments the more percent points it gains. The formula of the excel sheet is constructed the way that if a company’s concentration is on one or two

markets than it receives 10 or 9 points which turns the obtaining percent points into 20 or 18.

in points from 10(very focused) to 0(very wide spread)	**20%**

Figure 3.6 - Points

Business Relations

This part is divided into 3 parts as it is shown here:

BUSINESS RELATIONS	**20%**		**STRATEGIC INVESTOR**
			FINANCIAL INVESTOR
			NONE

Figure 3.7 – Business Relations

A company can be supported by a strategic investor which gives provision of intangibles such as knowledge and know-how, sometimes even resulting symbiotic effects. But de facto a strategic investor is a financial investor at the same time. The financial investor only supports the company to gain profit out of the partnership. The 3rd case is that a company has no investor at all but might have big banks supporting it, in this case the company receive 5% points other no points are given. The other ratings are listed below in the Figure 3.8.

STRATEGIC INVESTOR			**20%**
FINANCIAL INVESTOR			**10%**
NONE			**max 5%**

Figure 3.8 - Investor

Revenue

A company's revenue can show very well how good or successful it is acting on the market. It even may show the size of the company. Therefore this part of "relative company strength" has a maximum percent point achievability of 40.

Companies with total revenue of more than 500 million € for the year 2009 obtain the maximum of 40% points in the scoring. If the revenue was between 500 and 200 million € the score will be 35% and between 50 and 200 million € 30%. From a revenue between 20 and 50 million the achieved score is 25% and from 5 to 20 million € 20%points. All the other companies which had a revenue of less than 5 million € in 2009 receive 10% points.

100%

A company can come by 100% in this section by being the number one in the criterion of "brand perception" in each relative segment (still only the 3 mentioned before which are label, blister and carton), by focusing on only one market segment, by having a strategic investor and showing more than 500 million € of revenue for the year 2009.

3.3 General Overview of the Digital Printing/Packaging Markets and Competitors [58]

The evolving market of digital printing and packaging companies is wide spread. The general customer needs specialized and customized products and solutions to adapt its company's products to a dynamic market. The outcome for such a market and its needs like short-run lengths, lack of time to put designs on plates, control and check the fit and whether the performance is of satisfaction or a rerun of this cycle is needed until the achievement of the final result and furthermore the important factors of costs are the main decision matters for the purchase of these machines.

The costs per unit caused by old, analogue machines pay initially off when a certain amount of units are produced but until the achievement of this number it is in, most

cases at least, more profitable to use a digital printer. Storage costs are the next cost-effective reason why companies decide to use a digital printing solution because of the ability of diversification of these machines.

The focus of the suppliers of the digital printing and packaging industry vary very much. Some companies either just focus on special market segments like HAPA which concentrates on the pharmaceutical industries or they focus on only some forms of technological segments like only the printing on carton. But there are also companies which try to provide their customers with overall solutions from labeling over blister to carton e.g. and make use of all forms of application, whether it is integrated solutions for production lines or complete machines, and address their products to all industries like food, beverage, pharmaceuticals and medicals and others, providing all industries with the total amount of their varied competencies, some with more and some with less success.

3.4 Competitors for Blister [36]

In the following three competitors of Linoprint in the segment will be introduced:

- Atlantic Zeiser
- CSAT
- HAPA

3.4.1 Atlantic Zeiser [59], [60], [61]

ATLANTIC ZEISER

Introduction and Important Milestones and Achievements

The company Atlantic Zeiser was found in 1956 as a mechanical numbering application manufacturer. In 1991 the company merged together with the US American enterprise Atlantic Force Control Systems Inc.

In the 90's Atlantic Zeiser launches the industrial inkjet printing which slowly detaches the mechanical numberings in the commercial printing segment. Entering the booming market of plastic cards appears to have been a good strategic decision because of the company's positioning there after a short period of time. Atlantic Zeiser is being taken over in 2002 by the Swiss "Orell Füssli Holding" who is present in the markets of high security printing, book trade, publishing industry and economical information systems. Two years later Atlantic Zeiser distributes the first e-passport-personalizing-systems for programming biometrical data and contemporaneous products and systems for product marking and tracing are developed and brought to market.

Over the last decade Atlantic Zeiser has invested in the re- and further development of its digital inkjet systems. The company develops and produces all kinds of industrial applications for the digital printing and packaging industry and furthermore their portfolio includes UV dryers, controllers and software components. The company wants to push developments in the fields of software for industrial digital printing, has therefore bought the software company SOFHA in 2010 to improve innovations and has already complete software solutions for controlling systems in its portfolio.

Conclusion/Interpretation

Atlantic Zeiser is among the three leading companies in the segment of blister application, although their distribution and service network does not operate everywhere in the world. The company does not provide their customers with their own developed printing technology but with the ability of using more than just one digital printing method they can adapt to the customer needs and customize their products and applications and give individual solutions. The focus on segments is not only on one but not too wide spread to overburden the capacities they have. The company has some competences, which are e.g. plastic cards in the segment of high security printing, printing and packaging solutions in the medical and pharmaceutical segment and the blister segment, they concentrate on.

With the support of the Orell Füssli Holding from Switzerland, Atlantic Zeiser is well backed up financially and especially strategically due to the knowledge of printing

banknotes and high security printing of the holdings self named “OF” there is knowledge transfer between these two companies meaning benefits on both sides and for the owning holding.

The company’s revenue for the last year was around 68 million € and is in relation to the number of employees and in comparison to the whole digital printing and packaging industry high.

3.4.2 CSAT [62]

Introduction and important milestones and achievements:

The company called CSAT GmbH was found in 1987 in Karlsruhe, West Germany.
In 1988 the first “dot matrix” print head based label printers were introduced which were sold over 200 times, followed by the company’s first Electrophotography Printer named “LASER 6000” in 1989. The first installation of an inline-blister printer is produced for the pharmaceutical industry in 1993.

In 1995, for the first time, synchronized printing integrated into an intermittent working packaging machine was put into practice. This process became a worldwide patent, because it enabled image printing to be synchronized to blistering without the mechanical stretching unit in the production line. Four years later, the first synchronized printing on a continuous working packaging machine occurred.

CSAT enters the American market with the first installations of CSAT-Laser printers in the US in 1996.

The second half of the 1990s and the year 2000 were also an intensive time of introducing new and improved products to market. In 1996, the first application of

a continuous working packaging machine was launched onto the market. One year later, in the middle of April, the newest series of a digital printer – CSAT 6335 – appeared on the market. The first 2-color printer of CSAT was introduced in 2000.

In successive years CSAT entered the TOP 10 most innovative medium-sized companies in Germany and won many prizes: the "Award of Excellence" in Birmingham (2005) for a 2-color full digital printing system named DTS 1200, and "Innovation Success" of 2006 and 2007. At present CSAT, as an innovative image company, is expanding its technology range by means of the ITS 600 label and foil printer which is a new DoD printing system.

Conclusion/Interpretation

Although the CSAT GmbH has no support through any financial or strategic investor they have managed to achieve being the number two in the overall marketing ranking in the blister segment. Their revenue in 2009 amounted to 10 million € with only 70 fulltime employees. The company has developed its own technologies to manufacture its products and solutions. The usage of different technologies which are Electrophotography and Piezo Inkjet combined with the concentration on specific markets such as pharmaceutical and medical segments' solutions lets CSAT address this market segment with a variety of individual and specially customized products to each customer needs. Furthermore it is important to mention that except for Australia the company has distribution and service networks all over the world to assure a total service, sales and information performance.

3.4.3 HAPA [58], [63]

HAPA Swiss Printing Technologies

Introduction and important milestones and achievements:

HAPA AG was founded in 1933 in Switzerland. The company's innovations have made them achieve a strong customer base in the pharmaceutical industry.

From the 60's to the 90's more than 7.000 Druma overprinting machines, which are machines that print again on top of something that has already been printed once, were sold. In the 1970s they introduced the first flexographic printing machine capable of printing on aluminum foil called the HAPMATIC, but it is unclear if this was the first such machine in the world or Hapa's entry into flexographic printing of aluminum foils.[2] In the 80's the company started producing and selling a printing and labeling machine called "400". The 1990s was a period of rapid technological development, where Flexographic and Digital machines using UV inks were introduced. Hapa was one of the early players in digital printing, while they were still maintaining a strong presence and know-how in flexo printing. In the 90's HAPA entered with their products into the industries of foils, leaflets, carton and lidding materials, UV digital technologies, such as UV Flexo, enriched the product range.

In 2007 the DoD inkjet-systems, such as the "Hapa 800" were introduced to the market and industries and with this action the company entered the Drop on Demand printing market.

Since 2006, Hapa has been a part of the Coesia Group [4], which is a private Italian company that originally produced wrapping machines for confectionary but has steadily been acquiring companies involved with the packaging industry since the 1980s [5]. Coesia bought Hapa as well as a packaging line security/inspection company called Laetus from an American company called Robbins & Myers for 26 Million Euros in 2006 [6]. In a press release, Robbins & Myers claim that they sold Hapa and Laetus to "reduce complexity and improve focus in key markets" [6], but since the well known and publicized economic downturn of the late 2000s hadn't hit by the time Hapa and Laetus were sold, it's possible that Hapa and Laetus were sold because they weren't making as much money as Robbins & Myers was hoping.

Conclusion/Interpretation

HAPA's strongest market is the blister market. They are the direct competitor to blister function embedded applications and products of the Linoprint series due to the fact that they hold the overall number market position. Their big segment competence is the

pharmaceutical business, where they actually have their only focus on, and with it the over the years strong relation to big companies like Pfizer, Merck, GlaxoSmithKline and AstraZeneca, just to name some. The experiences they have made over the years are a big benefit for them in the digital printing and packaging segment.

HAPA is a member of the Coesia Group who supports the company financially and strategically. They had a turnover of 798 million € in 2009 and about 3740 employees worldwide in the packaging industries. The next benefit is the distribution and therewith the after-sales service network worldwide that comes with being a daughter company of the Coesia Group.

As a result of the company's know-how and knowledge about various technologies (Piezo and Continuous Inkjet) and their usage in their applications and solutions and therewith their own developed technologies for their products they have achieved a big strength and ability to customize their products flexibly and individually to their customer needs.

3.4.4 Linoprint's Competitive Landscape in Blister

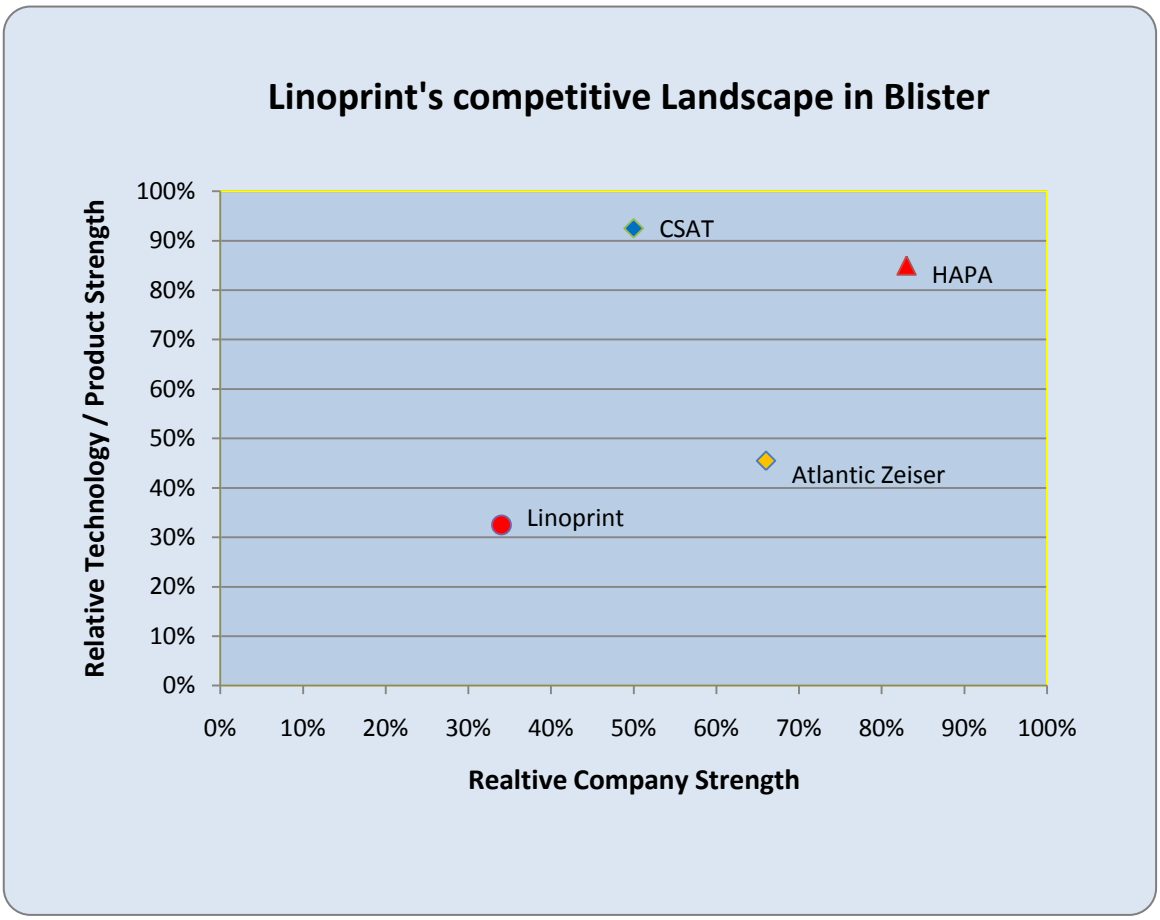


Figure 3.9 – Linoprint's Competitive Landscape in Blister

On this diagram Linoprint is contrasted with the highest ranked competitors of the blister segmentation.

HAPA is the leader of this segment with their already described focus on the pharmaceutical segment and their experience they have already earned through the years. The company stands alone in this comparison.

After a while CSAT and then Atlantic Zeiser follow with their products and solutions. None of these companies is bigger and their investors is bigger or stronger than Linoprint and HDM but it is well observable that the more focused the companies are the more they benefit on the market segment. Linoprint with no strategic focus, which shall not mean that they do not have any strategy, is left behind.

3.5 Competitors for Carton [36]

7 competitors of the segment of carton are introduced on the following pages:

- APS Printing Systems
- Bluhm Syteme
- Domino Printing Sciences plc
- Impika
- Paul Leibinger GmbH & Co KG
- Videojet Technologies
- Wolke – Ins and Printers

3.5.1 APS Printing Systems [64]

Introduction and Important Milestones and Achievements

In 1995 APS, Advanced Printing Systems, established and specialized in design and manufacturing of OEM thermal printer mechanisms or applications, customized thermal printer solutions and controller boards. They assume that they may be “the only company in the industry to offer built-in control boards” in their standard thermal printer lines reducing cost and footprint size. APS refers on their homepage to a lot of innovations that were brought to the market by them such as patented easy loading mechanisms and lever systems, flat mechanisms, compact kiosk modules, single flex cable connectors and high performance/low cost control board architecture. They offer a wide range of thermal printing solutions through their product spectrum. They act in the industries of automotive and medical sector and wherever they can adapt their customized products.

Conclusion/Interpretation

APS has competitive products to Linoprint's FixedLine. The company is innovative and builds its own technologies to compete on the market. Although they only offer thermal ink-jet solutions they address themselves and their products and applications to big variety of industries by being very flexible and the ability to customize their manufactures to the individual need of the recipient. The R&D of the company is in Italy where the headquarters are, too, and in France whereas the production takes place mostly in East Asia partly in house-owned factories. Their distribution network is not worldwide but big enough (North America, Europe and Pacific/Asia) to almost compete with the big players of the market.

A lot of APS products are not addressed to the segments which Linoprint is interested in like e.g. ticketing, parking meters, cash registers and ATM machines, just to name some.

3.5.2 Bluhm Systeme [65], [66]

Introduction and Important Milestones and Achievements

Bluhm Syteme is a member of the Bluhm Weber Group. Eckhard Bluhm found this company in 1968 and in 1980 contracted with US company Weber Marking Systems Inc. a joint venture through which that new development impulses for the markets. They call themselves an all-round business in labeling and marking.

In 1978 Bluhm Systeme brought out an electronically controlled labeling application that worked variably and individually aligned. In 1981 the next step follows with a mini computer in labeling machines. The company goes on with applications that are controlled with computer technology and with software that is attending by it. In 1983 they enter the continuous ink-jet market with a new system which can achieve higher speeds than ever followed by an ink-jet coding application that works with Drop-on-

Demand technology in 1986. In 1987 the company starts with thermal-transfer-label-printers and in 1995 they start integrating Piezo-ink-jet technology in their systems. Laser coding is established in 2000.

Conclusion/Interpretation

Bluhm Systeme's joint venture with the US company Weber Marking Systems Inc. to the Bluhm Weber Group has widened the company's knowledge and distribution channels. Although the company does not have any own technologies, but buys HP print heads, they are quite well situated in the business with their variety of products and experiences. Nowadays they have around 400 employees here in Germany and achieve a worldwide turnover of almost 100 million €. They give themselves a financial solution for leasing new investment products through the Bluhm Leasing which works like a Bank. The company's marketing model is a one face to the customer model to assure good contact and reliability for the customer by always having an available partner from the company which means that they are more concentrated on local activities that are close to their branches in Europe. The product variation and range in the printing and packaging industry is big compared to the size of the company. Bluhm Weber Group's products are mostly a competitive product to the Linoprint FixedLine.

3.5.3 Domino Printing Sciences plc [67]

Introduction and Important Milestones and Achievements

Domino Printing Sciences plc was founded in 1978 as a manufacturer of coding and printing technology company. The company started with ink-jet printers focusing on single jet technology. In the 90's Domino Printing Sciences plc introduced the use of sealed CO2 laser systems becoming one the largest international producers of this technology. The next step in 1998 was the launch of a continuous ink-jet system. In 2005 they introduce their K-Series product which is an inline ink-jet product printing with UV inks. Later Piezo ink-jet applications are manufactured.

Conclusion/Interpretation

25 subsidiary offices and 200 distributors in over 120 countries offering support and services worldwide have made this company and its products to a strong competitor for Linoprint's FixedLine series although their products are mainly in the segments of marking and coding. In 2009 the company had a turnover of 290 million €. 2.2380 employees worldwide assure the needs of the customers. With this knowledge of the market and their own technologies they are a very variable and valuable competitor with much experience, competencies and skills to Linoprint. The range of their technologies some of which are self achieved products is very widespread and contains Piezo Drop on Demand, continuous ink-jet and thermal ink-jet. Domino Printing Sciences plc can react because of their not so big size and their range of manufactures and applications very flexible and individually to the customer needs. The industries they provide with their products, applications and solution vary from beverage, binding, cable and wire over cosmetics and personal care, mailing, pharmaceutical plastics to tobacco – just to name some. They are in all market segments that Linoprint works too and even more but because of their already existing size it is not as difficult as it is for Linoprint to address these industries of which they are ranked no.1 in the carton segment.

By belonging to the Domino Group, to which 8 companies belong and are working in the packaging and printing market or are somehow connected to it, Domino is its own strategic investor.

3.5.4 Impika [68]

Introduction and Important Milestones and Achievements

Impika SA was found in 2003 in south of France. The company was started by eleven people with inkjet business knowledge. All these founders still belong to and work for

Impika. The competences of the fields of “electronics, software, mechanics, fluids, pneumatics and chemistry” which the workers of Impika import to the solution finding process shall be combined to the highest benefit of the company.

Their activity is the “development, manufacturing, marketing of Digital Printing and Material Jetting Solutions” as they say on their website.

They are exclusively working with Piezo Drop-on-Demand Inkjet Technology. Furthermore, Impika buys the printing heads and other electronics components from other companies like e.g. XAAR, Panasonic, and Konica. With their expertise, they integrate these components, creating different printing machines. They follow the same process with the inks.

Conclusion/Interpretation

With an impressive total revenue of 12 million € in the year 2009 and 11 million € in 2008 Impika SA is showing a real fast growth. The company has only about 60 employees, all of them in the headquarters in south France from where all distributional work, services and sales processes are carried out. The company’s solution or products are all externally made without any usage of own technology. Only Piezo inkjet technology is used in the applications. The company wants to address its products to as many markets as possible and has no real focus on any specific markets.

So the company is highly flexible in adapting to its customers but offers too few technologies for the provided solutions and has also no own developed technology which means they have to rely on external suppliers. Furthermore it is unsure how the customer satisfaction can be guaranteed worldwide only through the headquarters situated in France.

3.5.5 Paul Leibinger GmbH & Co KG [69], [70]

LEIBINGER

Introduction and Important Milestones and Achievements

Over five decades Paul Leibinger GmbH & Co KG has been working and producing in the precision mechanics and engineering, electronics and software development. This experience is now put into the products like lasers, high-resolution ink-jet systems, industrial small character ink-jet printers, numbering machines and camera systems for applications in the fields of marking, coding and controlling.

Conclusion/Interpretation

The Paul Leibinger GmbH & Co KG company's product is in the same market segment like Linoprint FixedLine. The company's support in strategic and financial forms is a very strong German company called Trumpf Gruppe. With their relatively long experience in related markets they have achieved good technological solutions in the continuous ink-jet market. But this is the only technology they have and use. The Paul Leibinger company is active in other markets that are not related to the digital packaging and printing industries but they are very focused in the ones they are to play off their competence. Their distribution network is compared to the big players of this market segment very small and describable with local or regional in Europe. Ignoring all these facts it is really impressive how this company has made a revenue of 240 million € in 2009 with about employees.

The company's success lays in the concentration on the few technologies and focus on specific industries.

3.5.6 Videojet Technologies [71], [72]

Introduction and Important Milestones and Achievements

The company Videojet has a more than 30 year old history in the marking business. First contracts for solutions were made in 1979 on the European market. The beverage industries brought the first successes to the Videojet. Nowadays they provide the industries with complete overall solutions in all marking segments with their systems. The products range from ink-jet printers and laser marking systems over thermal transfer print systems to labeling applications.

Conclusion/Interpretation

The company has competitive products to Linoprint's FixedLine and because of their history and them being a part of the whole digital printing evolution a good knowledge of the industry, strong skills and innovations combined with a big customer base.

In these 3 decades Videojet Technologies has installed over 300.000 appliances with different, individual solutions. The company has got 2.400 employees worldwide in 26 agencies. They focus on service by training skilled technical employees to provide a total satisfaction. Distribution and service all around the world shall guarantee such high quality service in almost every place on earth.

Videojet Technologies belongs to the Danaher Group just like "Wolke Inks & Printers". They have a strategic interest in Videojet Technologies and therefore are a big financial investor for them. To the Dahaher Group belong companies in the medical technological, professional instrumentational, industrial technological and tools and components industries. On the Danaher Group website it written that they had a turnover of 9.6 billion USD in 2006 with all their daughter companies.

Videojet addresses not all of the industries in which Linoprint tries to enter but concentrates on some which are sanitation, pharmaceuticals, food and beverage.

Providing individual solutions through their self developed technologies and their variety of technologies (Piezo, Thermal, Continuous) used make the company in combination with the concentration on their competences for specific industries a very flexible and custom orientated solution provider in the packaging and printing industry.
As a conclusion we must admit that Videojet Technologies with their background just like the one of Wolke Inks & Printers, which ever since the 2nd of November 2009 belongs to Videojet Technologies, do have a strong support with their mother company.

3.5.7 Wolke – Inks and Printers [72], [73], [79]

Introduction and Important Milestones and Achievements

Wolke was founded in 1992 as a thermal ink-jet marking vendor. In 2000 the company brings out a maintenance-free marking solution called “m600” using the Hewlett Packard standard ink cartridge. In 2007 Wolke starts to make variations in its products by splitting the “m600” series into “basic” and “advanced” lines. Wolke Inks & Printers becomes a part of the “Danaher Gruppe”, to whom companies like “Videojet” and “Alltec” already belong, in 2009. The company does not lose its independency and stays a specialist in marking variable, high resolution codes like 2D-Datamatrix-Codes on packages.

Conclusion/Interpretation

Wolke – Inks & Printers’ products are a competitive commodity to Linoprint’s FixedLine application. The company does not have their own printing heads and only uses one technology which is the thermal ink-jet, to code packages which is only one part of the abilities and functions that Linprint’s FixedLine B provides. Their distribution network is working, with the help of the network of the Danaher Group and Videojet Technologies, worldwide meaning they can provide their customers’ need within some days only.

The Danaher Group is a strong investor in strategically and financial matters for Wolke Inks & Printers. Danaher is a big and international company that has around 43.000 employees in 400 daughter companies worldwide with e.g. a turnover of 9.6 billion USD in 2006. The businesses belonging to Danaher include medical technologies, professional instrumentation, industrial technologies and tools and components.

With this background it is easy to understand that though this company is none of the bigger ones but may not be underestimated. Wolke Inks & Printers has a very clear and manageable range of products which makes it easy to understand the affectedly specialization in carton.

3.5.8 Linoprint's Competitive Landscape in Carton

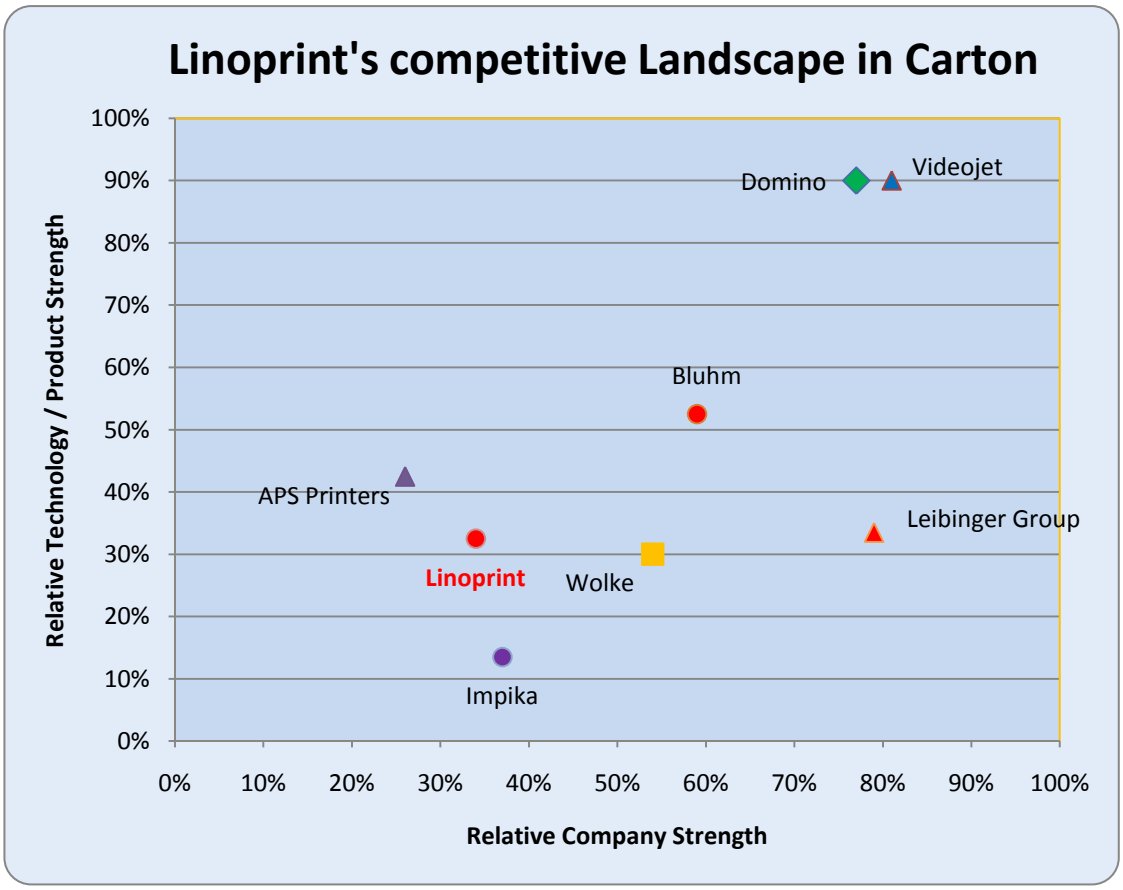


Figure 3.10 – Linoprint's Competitive Landscape in Carton

Overviewing the diagram and having the just explained results in mind it is very obvious which of the analyzed companies lead this segment. Domino and Videojet are strong forces in this field who profit from the benefit of their own technologies and the high level knowledge of the technologies they use. Also it is important take notice that both companies have strong supporters like for the case of Domino it is themselves and Videojet – who are already quite one of the largest companies in the digital printing and packaging industry with around 2400 employees worldwide – with the strategic investor called the Danaher Group from the USA.

The advantage of the Leibinger company is their focus on some industrial segments they address with a manageable amount of resources in forms of technologies.

The focus and aim of the APS Industrial Srl company is not the same markets like the ones of Linoprint. APS customers need small thermal printing devices that are integrated in cashier systems, vending machines and vending machines e.g.

Just like Linoprint Bluhm Syteme has no real focus either, but profits from its use of a wide range of technologies and its experience on the market for almost 40 years and with it the customer base through the four decades.

3.6 Competitors for Label [36]

An introduction of competitors of Linoprint in the technology segment of label will be shown in the following:

- Agfa Dotrix
- EFI
- HP Indigo
- JF Machines Ltd.
- Xennia Technology Ltd.

3.6.1 Agfa Dotrix [74], [75]

Introduction and Important Milestones and Achievements

Agfa AG was found in 1873 in Germany as an aniline fabrication company and going on producing photographic chemicals ever since 1897. In 1964 Agfa and Gevaert from Belgium merge to Agfa-Gevaert to become one of the leaders in standardization and automation of the graphic arts industry.

In 1980/81 Bayer AG, Germany, obtains 100% ownership of the Agfa-Gevaert company. Until 2006 Agfa-Gevaert was not concentrated on entering the industrial inkjet market when they took over Belgian specialist in digital color printing solutions for industrial inkjet applications called dotrix.

Dotrix was founded in 2001 as a spin-off from a company called Barco, Belgium. Dotrix offered in various market segments industrial printing workflow systems. In 2002 Dotrix introduced its new inkjet printing technology with their full color digital inkjet press named “the.factory” (read: "the dot factory"). In 2004 Barco and Agfa-Gevaert reached an agreement for the transaction or sell that took finally place in 2006. Barco’s main markets are the visualization solutions such as medical imaging, media and entertainment, infrastructure and utilities, traffic and transportation, defense and security, education and training and corporate AV.

Conclusion/Interpretation

Agfa Dotrix products are in the competitive market segment like the DriveLine B of Linoprint. Agfa-Gevaert has an over 140 year history in which they have made experiences in the chemical ink and color fields and in the fields of printing and pressing including pre- and post-press. The buying of the Dotrix company seems to have been a strategically important move for Agfa. With the knowledge, experience of the market segment and skills for the market of inkjet printing and packaging industry combined

with the power, financial support and knowledge of the whole printing industry through the mother company Agfa-Gevaert, Agfa Dotrix can be a big competitor to HDM's Linoprint. The products of Agfa Dotrix are all roll-to-roll and roll-to-sheet flexible packaging printing machines. The distribution and service network of Agfa Gevaert is operating worldwide which is a big benefit for Dotrix to guarantee customer satisfaction by being able to react to the their needs in short time periods. Dotrix only uses one technology, Piezo Inkjet, which is not self developed but bought from well-known external suppliers like Xaar, in their machines. The Agfa Dotrix's segmentation is focused on and addresses itself to the markets and industries which are, generally spoken, the whole packaging and printing companies who have to deal with short-runs and flexible and fast in these named industries.

3.6.2 EFI [77], [79]

efi print to win.

Introduction and Important Milestones and Achievements

In 1989 the first EFI company office opens in North Beach, San Francisco, California, USA with 18 employees by the founder Efi Arazi, also founder of Scitex. In this year the company already earns a revenue of 1.7 million $. From 1990 to 1994 EFI brings out EFI Color and concentrates more on pre press segments. During these years the company expands first to Europe and then to Japan. In 1994 EFI already has got 192 employees and their revenue reaches 130.4 million $. Meanwhile there are already OEM partnerships with Kodak and Xerox and the product with the name "Fiery", a pre-press software, are sold to Canon dealers followed by a an OEM partnership with Canon in 1995. In 1996 EFI enters the wide-format business with the creation of Fiery XJ-W. Beside software and colors wide-format printers becomes another core competence for the company and will be perpetuated with the acquisition of superwide inkjet format printing company VUTEk in 2005.

Finally in 2006 EFI takes over Jetrion LLC to expand its portfolio into the inkjet systems manufacturers and labels and packaging printers.
Today EFI has moved to Foster City, California.

Conclusion/Interpretation

EFI has grown since the foundation in 1989 from 17 employees and a revenue of 1.7 million $ to 1827 employees and a revenue above 500 million $. Their strength lays in the pre-press production and therewith installing customized printing software for the printing industry. But with their achievements and knowledge in implementation in the digital press industry and the acquisition of Jetrion LLC EFI has managed to become one of the leaders in the digital printing and packaging industry in the market segment of labeling. EFI is therefore a competitor to Linoprint's DriveLine B. The company has spent 110.8 million $ in 2009 in their R&D department consisting of 820 employees involved for their products. The usage of their own resources and technologies, such as self developed print heads, inks and colors and software, makes the company independent from distributors. Piezo Inkjet, Thermal Inkjet and Continuous Inkjet technologies are all used in the products of EFI. The focus is not very specific and ranges from markets such as food and beverage, over electronics and automotive to pharmaceutical markets but the company's concentration on the digital printing and packaging industry is given by the full development of only one product line, the already mentioned Jetrion products.

3.6.3 HP Indigo [80], [81], [82]

Introduction and Important Milestones and Achievements

The company "Indigo NV" was found in 1977 in Israel by Benzion Landa. Their lines of printers were made for short-runs with high speeds although the first focus of the company was on research of efforts for developing technology to be sold to other manufacturers. The start into the digital printing industry was a development of liquid ink products suitable for the market of digital plotters and printers. In the beginning of the 1980s Indigo NV announced their liquid ink which transforms ink into plastic when it is heated. This product was called ElectroInk. The first digital printer was introduced in 1993 called E-Print. After this entry product to the digital printing world the company's success increased even more than before until the end of the 1990s when Indigo started to struggle and was finally bought by HP in 2002.

Hewlett Packard company's history starts in the garage of Dave Packard in 1939 in Palo Alto, California, USA where Dave Packard and Bill Hewlett agreed to start a business. Their first products are audio oscillators which Disney engineers buy to analyze and test the various channels, recording equipment and speaker systems in the theaters where the Disney's Fantasia shall be shown.

HP does not enter the printing industry until the year of 1958 when the company called F.L. Moseley Company of Pasadena, California is bought.

It takes until 2002 when HP acquires Indigo to enter the digital printing and packaging industry.

Conclusion/Interpretation

Hewlett Packard has become a big global leader in almost all disciplines of the printing industries. The acquisition of Indigo NV brought a lot of innovations to the company. The combination of the knowledge of the whole digital printing and packaging market and the general experience of the printing and digital industry starting in the fields of B2C and especially B2B helped HP Indigo becoming the world leader in the labeling segment. HP Indigo's digital presses are competitive solutions to Linoprint's DriveLine B.

The company equips its products with its self developed technologies which are the methods EP, Thermal Inkjet and Continuous Inkjet for the digital printing and packaging industry. By having and using their own technologies HP Indigo can develop and produce independently without having to rely on any distributors or partners.

Their "relative technology/product strength" is a benchmark for the whole industry that manufactures machines in this segment.

Their focus is not on a specific industry such as e.g. food and beverage or pharmaceuticals but they address their products to all the industries that are in need of labels for their products. The Hewlett-Packard Development Company is one of the most well-known and one of the world's largest information technology companies which means that HP Indigo's products have a strong financial support with HP's total revenue in 2009 of 114.6 billion $. Furthermore it is important to know that HP has strategic interest in keeping the no. 1 position in the digital labeling and packaging industry and therefore will definitely invest more knowledge and money in the whole product range and its R&D.

HP themselves is a benchmark as a company in meaning of their overall market and technology strength.

3.6.4 JF Machines Ltd. [83]

Introduction and Important Milestones and Achievements

JF Machines Ltd. was found in 1989 in Kettering, England by John Furley as a company for the printing industry. The company was built together with a colleague from the printing press manufacturer Timsons Ltd. Kettering, England. These two men wanted to put their knowledge they gained through the years at Timsons to build practical and innovative machines and applications.

Conclusion/Interpretation

The products of JF Machines Ltd. are very close to the Linoprint DriveLine B. JF Machines operates directly from England but produces ever since the year 2000 in Thailand. With their very little size the company can adapt to the customer needs of the focused and small segment part of the whole packaging and printing market, very easily but is not yet able to sell products to countries that are too far away because of the warranty and the general service and support. Furthermore they do not have their own technologies so that they are reliant on their suppliers or subcontractors. The use of the Piezoelectric Drop on Demand inkjet technology makes their products reliable.

Thus the company's strengths are their small size combined with their flexibility to adapt to each customer's need and provide each with a customized and individual solution within the company's borders of potentials.

3.6.5 Xennia Technology Ltd. [84], [85], [86]

Introduction and Important Milestones and Achievements

Xennia Technology Ltd. was found in 1996 in England as an independent inkjet technology company. Their fields are material dispersion, inkjet ink formulation and UV

chemistry. The multinational company "Royal Ten Cate" becomes an investor in Xennia in 2008. In addition it is meaningful to mention that Xaar, a leading print head manufacturer for piezo inkjet heads, is one of the minority shareholders of Xennia and a close partner and provider to them.

Conclusion/Interpretation

Xennia Technology Ltd.'s product is in the same market segment like Linoprint's DriveLine B.

Although they only exist ever since 1996, they have a strong support with their shareholder Xaar and their investor Royal Ten Cate.

The print head producer Xaar is one of the market's leading and well-known companies worldwide. Their cooperation with Xennia s a big benefit to both because of the symbiotic effect both companies will achieve through their consolidated R&D departments. Furthermore is the investor Royal Ten Cate another strong part that supports the company and its aims and targets financially and strategically. Royal Ten Cate's market group are outdoor, protective and industrial fabrics, composites (space and aerospace), advanced armor and geosynthetics. With this pool of knowledge and experience Xennia may benefit with this investment partner. The revenue of Royal Ten Cate in past years was close or above one billion € each year which means that the British printing company is a strong financial support.

Regardless of all the benefits these co operations may bring, Xennia does not have an old history nor any own experience. Neither do they have good distribution channels through which they provide their customers with service and products if they do not make use of their partners'.

The company is not well focused on any specific markets but has a wide spread technology usage and knowledge in Piezo Inkjet, Thermal Inkjet and Continuous Inkjet.

3.6.6 Linoprint's Competitive Landscape in Label

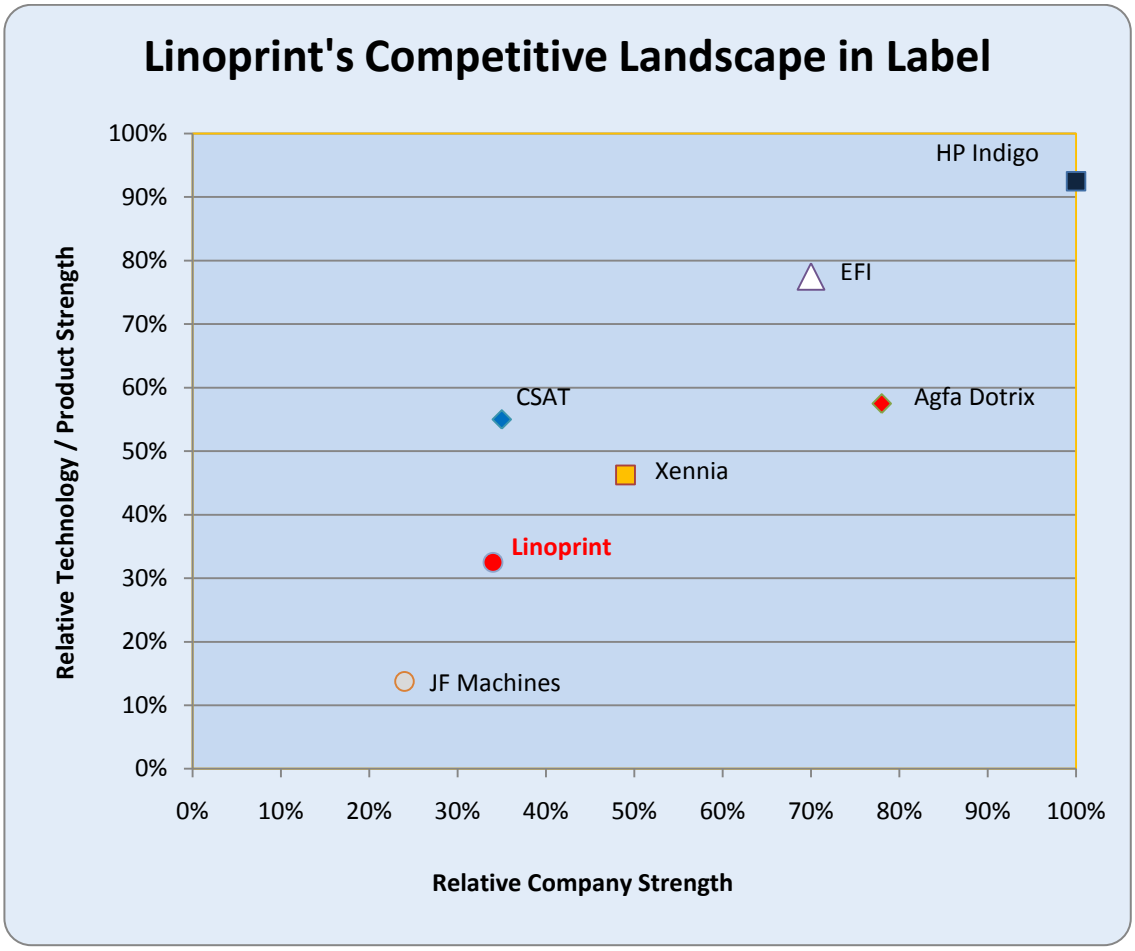


Figure 3.11 – Linoprint's Competitive Landscape in Label

It is to be clarified that there is no such thing like a "100%" well operating company whose strategy are perfect. But with the here chosen criteria there is one company that almost achieves an overall situation of 100% points.

The strong financial background, the more than 50 years old experience in the printing industry and the focus on one application form that is a direct competitor to the Linoprint DriveLine B, this focus on a narrow labeling machine needing customer base combined with a formerly innovative company which was bought and integrated into the group of business segments make it feasible that HP Indigo is the world ranking leader in labeling applications.

The company's followers are EFI and Agfa dotrix. EFI is one of the old days ambitious IT company's who found his segment in the area of pre-press and is now more and more entering the market of digital printing and packaging by acquisition of other companies. Agfa-Gevaert entered the market through the takeover of the Belgian company named dotrix who already was in the market of digital printing and packaging. Profiting from the very old company's experience Agfa dotrix has managed to become one of the leading companies in labeling.

CSAT is even here on this market which reflects the low focus on a specific technological based market.

The three leaders of this group have a strong financial background and histories with much experience and established knowledge about the similar markets or more precise which were and still are closely connected to the digital printing and packaging market like color/ production, pre-press software and applications and analogue printing. And all three companies bought themselves into the field of digital printing and packaging. Although Linoprint's investor is a company from the printing industry with a lot of experience and knowledge due to the fact of the long history of Heidelberger Druckmaschinen AG there are no similarities in the success of Linoprint and the position of them even in this segment stays like in the other two analyzed ones weak.

3.7 Choice of Strategic Alternatives [55]

The evaluation and choice of strategic alternatives for companies is connected to special difficulties because of complex situation which depend on many case specific different factors and therefore it is not possible to use given strategies.

In 1999 Michael E. Porter quoted five fields for the structural analysis to find out how to position the company or a product in a competitive environment:

1. Are there any existing entry barriers for the specific market?
2. How strong is the rivalry between the competitors?

3. Is there a chance of emerging substitute which could be a threat to our product?
4. How strong is the power of the distributors who may provide the company?
5. How strong is the power of the customers?

The SWOT-Analysis

SWOT stands for strengths (S), weaknesses (W), opportunities (O) and threats (T) whereas the strengths and weaknesses refer to the company, the product or service and opportunities and threats refer to the competitive environment. With the results of the preceding results in combination with the SWOT-analysis the qualities of Linoprint will be pointed out in relation to the market.

Strengths:

- Financial and strategic support through HDM AG and the Gallus Group
- Knowledge, experience and skills transfer with the mother company, its partners and other daughter companies
- Wide spread range of products for many segments and materials
- Possibility of using a broad distribution and service network through mother company
- Possibility of using mother company's name recognition
- Flexibility to adapt customer needs

Weaknesses:

- No focus on specific market segments such as pharmaceuticals, food or beverage
- No concentration on applications, machines or solutions
- No own developed technologies in forms of Piezo Inkjets or Thermal Inkjets, to name two
- Bad degree of brand awareness for Linoprint

Opportunities:

- Growing demand for digital printing and packaging applications, solutions and products worldwide

- Possibility of co operations with other companies
- Possibility of co operations with print head manufacturers like Xaar or others

Threats:

- Intense of competition on a new unknown market
- World economic slowdown
- Influx of cheap products like those from Far East

Strengths:

Linoprint is a brand of Heidelberger Druckmaschinen AG, Germany. The total revenue of HDM AG on March 31 2009 amounted at 2,999 million €. With this financially strong support Linoprint's chances of development on the market of digital printing and packaging industries are good as long as the mother company invests in Linoprint. Because of the long experience of HDM AG a knowledge transfer from the, in the analogue printing markets acting mother company, can occur to Linoprint of which both companies can benefit and a win-win-situation can result. Linoprint can make use of the Heidelberger Druckmaschinen worldwide brand and name recognition in the printing industry in forms of referring to it and signalizing potential customers of their quality guidelines which made them to what they are nowadays. Furthermore there is a possibility of making use of the existing distribution and service network of the owning business company like HP does with "Indigo" or AGFA with "Dotrix" though these two companies bought "Indigo" and "Dotrix" and integrated the brands into their range of products.

Linoprint has a wide range of different products for the digital printing and packaging industries which can provide the customers with printing solutions on many different surfaces and materials.

The small size can be used as a benefit in forms of being more flexible and therewith having the ability to adapt customer needs and provide them with individually manufactured solutions.

Weaknesses:

In comparison to successful competitors in the digital printing and packaging market, Linoprint has neither focus nor concentration on either an industrial segmentation like providing only the market of food and beverage with customized and individual solutions or on a specific product to develop this to very high levels.

Linoprint has at this stage no own developed technology like a self engineered Piezo Inkjet technology or anything comparable but buys his print heads for instance from 3rd parties and embeds them in its application for further sales resulting a dependency towards the print head distributors.

Linoprint with its not very long history has very little brand awareness on the digital printing and packaging market.

Opportunities:

The demand of the digital printing and packaging market for new and innovative solutions is still growing worldwide which is a big opportunity for Linoprint to develop and increase the sales with a good strategy of market penetration. Many industries look for digital printing and packaging solutions with which they work flexible and market adapting to change the image of their products easily and fast and even occasionally.
Furthermore there are possibilities to contract competitors or print head manufacturers in forms of co-operations to achieve symbiotic results in transferring expertise or experience to cause positive outcomes of which both partners can benefit

Threats:

The intensity of the emerging market of digital printing and packaging is very high. Innovative companies like “Jetrion” and “Indigo” were bought out by giants of market related companies.

The still faced world economic slowdown can harm small, upcoming and still developing companies like Linoprint because customers may invest in well-tried solutions and applications from longer existing companies with more experience.

As long as the Linoprint company and its name are not well-known on the market, the possibility of having to face replacement or more precisely that the customer may decide to buy cheap comparable products from other businesses that produce in low wage countries, is big.

3.8 Recommendations

The analysis of this chapter gives us the conclusion that any company that has a focus either on specific industrial segments like food and beverage or pharmaceuticals, as seen in the case of HAPA from Switzerland, or a concentration on only one product, like the case of EFI, USA who target the digital printing and packaging market with one product named Jetrion, are the most successful ones. This may be the key to success for Linoprint, too. As in chapter six an example will be given why focusing on one segment by comparing HAPA and Impika and their strategies may lead to efficient results and a real payoff, at this point an elaborated analysis for marketing concept is left out.

Notwithstanding it is to be mentioned that the profile of Linoprint and its mother company HDM AG have some featured similarities with companies like e.g. AGFA and EFI that are not to be ignored and may be a good advice or conclusion for a marketing concept.

These companies may have embedded their digital printing and packaging products into their range of products but they concentrate on only one or two labeling applications which are competitive products to Linoprint's Driveline B. Both companies have their strategic and financial investor in form of themselves in one just like Linoprint with HDM AG.

Thus another advice, as in chapter six is mentioned, could be to focus on a specific product instead of trying to address a wide range of products which may all not be accepted by the industry because of beliefs that the company may have a lack of knowledge and experience.

Chapter 4: Analysis of Distributors

4.1 Introduction

The next step after studying competitors is research on distributors. This chapter includes information about Linoprint's current and potential distributors collected by the project team. The information was collected in order to do the analysis of distributors based on internet research and show how Linoprint is represented by its distributors and how good Linoprint´s representatives may be potential distributors in future.

In this matter, the project team had 3 main tasks. Firstly, to get information about current and potential distributor's businesses. Secondly, to choose an analysis method and then to assess the companies.

4.2 Overview of Current Distributors

Before the description of analysis methods and tools which were used to illustrate the scores and the results, it would be good to introduce shortly the distributors.

At present, Linoprint has 8 distributors, each located in a different country [36]:

- Köra Packmat – Singapore
- Sigtech AG – Switzerland
- Baccella Commerciale – Italy
- Griffin-Rutgers – USA
- CC Intermedia – Spain
- Koding – Slovenia
- Secutech – Mexico
- Kefalonikis – Greece

Some of the distributors are introduced in a very short way in comparison with others because of lack of necessary information on their websites.

4.2.1 Köra Packmat

Köra Packmat Maschinenbau GmbH was established in 1997 and is located in Villingendorf in Germany. The company was formed as a result of the merger of Packmat Maschinenbau and Köra Verpackung. Köra Packmat Maschinenbau is a manufacturer and service provider of wrapping, feeding and personalization systems so it addresses the packaging industry by offering different solutions than Linoprint. Until now the company has partners in more than 20 countries. Nevertheless, this is the only information about Köra Packmat's partners available on its website.

Additionally, Köra Packmat has a subsidiary in Singapore called Köra Packmat Asia Pte Ltd. It was established in 2001 to provide efficient sales and support service to the customers in the Asia Pacific region. The Asian subsidiary is fully-owned by Köra Packmat Maschinenbau. It started on a small-scale offering after-sales service (e.g. technical support, spare parts). Now it has own sales team (3 employees [12]) working on expanding the sales network in the region [86]-[88].

The Asian subsidiary offers 3 solutions form Köra Packmat: packaging machines, personalization machines and feeding systems.

Packaging machines offered by Köra Packmat are 10 different models of wrapping and overwrapping machines mainly for cards, telephone cards, greeting cards, leaflets, envelopes, CDs and DVDs.

Personalization machines provide Köra Packmat's customers with economical personalization of ISO cards (cards which help in users' identification) and security. Köra Packmat provides the solutions for the personalization of prepaid cards which can produce up to 12.000 cards per hour (Print S model) and 30.000 cards/hour (Print M model).

Feeding systems offered by the company includes:

- Friction feeders for handling most kinds of flat products (e.g. envelopes, telephone cards, carton blanks),
- Vacuum feeders, which separate products by means of vacuum, for handling folded and stitched brochures and for separating and counting very thin products [89].

4.2.2 Sigtech AG

Sigtech AG was found in 1996 and is located in Suhr in Switzerland. In 1997, the company started to distribute products of other companies. Nowadays it distributes 11 different brands. Aside from Linoprint, Sigtech is the representative of KBA-Metronic AG, Macse, Bofa, BBK-Intermec, Intermec, Cab GmbH, Easyprint, Alphadot, Rea Elektronik GmbH and MSSC Marsh Shipping Supply Company [50]. It employs 17 people [36].

The company offers several kinds of solutions for marking products and packages: inkjet printing systems, laser coding systems, label printers and labeling systems, and foil printers. Additionally, it offers:

- Automation and integration into the production line by means of special machines, handling equipment, and feeding and positioning of the packages.
- Service and engineering consulting [91].

Among inkjet printing systems, which is where Linoprint's products are placed, Sigtech offers 7 other products:

- AlphaJet C printer – KBA-Metronic's product for labeling of folding carton, lids, cans which allows printing on plastic, glass, metal, and paper.
- Merlin – Alphadot's printer suitable for final packaging which prints on corrugated cardboard, solid cardboard, wood and textiles.
- SigJet coder – Product of Sigtech using DoD technology which enables to print on carton.
- BetaJet – Printer from KBA-Metronic for the newspaper front page caption.

- Rea-Jet – Printer from Rea Elektronik GmbH which allows printing on porous and non-porous surfaces like concrete, wood, steel and plastic film [92].

4.2.3 Baccella Commerciale

Baccella Commerciale is the Italian company established in 1979 which has 10 employees [36]. It offers solutions for marking, coding, overprinting, identifying and labeling on different types of products.

Baccella distributes products of Linoprint and of 3 other companies: KBA-Metronic, ALE and Bluhm Weber Group [93].

4.2.4 Griffin-Rutgers

Griffin-Rutgers is an American company established around 40 years ago in New York. It has 10 employees [36]. The company provides solutions for printing, marking, bar coding, and labeling. Griffin-Rutgers offers: web printers, label printers, thermal transfer printers, industrial inkjet printers, carton coders, labelers and print and apply label systems [94]. The company is the distributor for following companies:

- Sauven – Inkjet printers for coding primary or secondary packaging or shipping containers.
- Re-Pack – Various labeling solutions, e.g. labeling systems for the identification of shipping cases, containers and pallets.
- Markem – Inkjet printers for coding primary and secondary packaging of shipping containers, laser printers for coding on webs, labels and packaging materials.
- Accufast – Multi head inkjet printing systems for complete text, bar code and variable information.
- Sato – thermal printers which print label equipments including bar codes, graphics and text [95].

Griffin-Rutgers is also the manufacturer of Truflex UV. This is a flexo UV-printing system for in-line printing on various types of webs [96].

The company representatives affirm that all solutions that they offer are more understandable for customers and easier to use than similar products available on the market.

4.2.5 CC Intermedia

CC Intermedia is a small Spanish company employing 4 employees and achieving annual revenue at the level of 0,5 mil euro [36].

4.2.6 Koding

This is the Slovenian company located in Celje with 12 employees and revenues of 1,25 mil euro [36].

4.2.7 Secutech

Secutech is the Mexican company. At present 10 people is working for it and their work generates almost 1,5 mil euro revenue [36].

4.2.8 Kefalonikis

Kefalonikis is the company from Greece which has 4 employees and revenues amounting to 0,6 mil euro [36].

4.3 Overview of Potential Distributors

The potential distributors are companies chosen by Linoprint managers in order to start a distribution in new countries, which are: Russia, Poland, Romania, Uzbekistan, Turkey, Thailand and the South Korea.

4.3.1 SKK SA

SKK SA is the Polish company, located in Cracow, which appeared on the market in 1992. SKK SA has 10 employees [36]. The company offers computer systems for automatic identification. SKK's offers include:

- Consulting: how to create the system and technical support in installation

- Software
- Machines – Scanners, label printers, labeling machines
- Promotional labels [97]

It cooperates with companies form logistic, metallurgic, FMCG and pharmaceutical industries. Together, it has 15 partners in Poland and in other countries as well [98].

4.3.2 Vivo Health & Food Packaging

Vivo is the Turkish company which has 5 employees. Vivo supplies primary packaging materials (different types and thicknesses aluminum foils, laminates, medical films, sterilization papers, disposable pouches & wrappings) from controlled production floors. Vivo's quality system is ISO9001 certified, as well. They also supply, sell and distribute pharmaceutical delivery forms (liquid, solid and aerosol products) and medical components to industry [99].

4.3.3 Q II S CO Ltd.

Q II S CO Ltd. is the company from Thailand which has 20 employees. Q II S Company was found in 2002. Its aim was to promote Coding and Marking business unit of Harn Engineering Company. Company Q II S distributes a wide range of high quality products which are currently distributed and serviced by this company including: Laser Coders, Continuous Inkjet Printers, Drop-on-Demand Inkjet Printers, Hi-Resolution Inkjet Printers, Thermal Transfer Printers, Hot Printers, Hand Stamps and other manual coding and marking devices.

Principals:

- Domino UK Limited, UK
- Marsh Shipping Supply LLC, U.S.A.
- Korthofah, Holland
- API Foils Limited, UK
- EDM Corporation, Japan
- United RIBtype Company, U.S.A.

- Open Date Limited., UK

These companies are the world-class high quality manufacturers and industry product leaders. Q II S is also certified to quality standard ISO9001 [100].

4.3.4 AT Design

The company from Russia which has 4 employees [36].

4.3.5 Bio Naturelle Ltd.

Bio Naturelle is located in Uzbekistan and has 4 employees [36].

4.3.6 Koreaunicom

This is the company from the South Korea which has 5 employees [36].

4.3.7 Eucora Distribution SRL

Romanian company which has 3 employees [36].

4.4 Analysis and Assessment

The current distributor base of Linoprint was created on the strength of the list of contacts that Linoprint had already had. It was thought that for the brand entering the market, it would be good to start product distribution by means of partners that were known before.

Nevertheless, the cooperation with the distributors is not as successful as it could be. The result of this situation is that Linoprint products are mostly being sold by Linoprint on its own and not by distributors. The aim for the team in this matter is to analyze how well the current distributors represent Linoprint.

Moreover, Linoprint is searching for some new distributors in other countries. The list of potential distributors created by Linoprint managers was given to the project team to

analyze it and check whether or not it will be a good movement for Linoprint to start cooperation with those companies.

4.4.1 Concept of Score Model

It was decided to analyze the distributors by means of two tools: a decision matrix and a diagram. The decision matrix enabled the ranking of current and potential distributors. Afterwards, two diagrams based on the matrix helped to illustrate the final scores and present the differences between companies lucidly.

A decision-matrix method is a quantitative technique used to rank the multidimensional options. It can be used e.g. to rank investments options, product options or any other group of multidimensional options [101].

A decision matrix allows the structuring and solving of a problem by [102]:

- specifying and prioritizing their needs with a list of criteria
- evaluating, rating, and comparing the different solutions
- selecting the best matching solution

A decision matrix is basically an array presenting on one axis a list of alternatives, also called options or solutions, which are evaluated regarding, on the other axis, a list of criteria, which are weighted dependently of their respective importance in the final decision to be taken [102]. Usually the weights together give a sum of 100%.

The main advantage of this method is the fact that subjective opinions about alternatives can be made more objective.

4.4.2 Criteria

The first point in the analysis was creating the criteria to analyze current and potential distributors. The analysis is based mainly on information available on the company websites. For this reason it was necessary to create the criteria which would allow for the comparison of the companies based mostly on internet information.

In the analysis the project, the team tried to evaluate sales and service potential, and company strengths of each current and potential distributor. According to sales and service potential, the criteria had to give the answers for 3 main questions:

1. Do the distributors address the same segments as Linoprint does?
2. How are Linoprint products and competitive products presented on distributors' websites?
3. What potential does each distributor have according to the company website?

Some criteria in this part are soft criteria so the criteria related to company strengths were based on numbers to give more objective picture of distributors. All criteria were placed in two tables, the first one for current distributors and the other one for potential distributors.

To analyze current distributors 7 criteria were created and put into 2 groups – sales and service potential and company strength, as was already mentioned (Table 4.1).

In the first group there are situated segments and service, explanation of Linoprint and competitive products, and website analysis.

Firstly, it is important to know if Linoprint's distributors address the same technology segments as Linoprint (blister, label and carton) and if they offer additional service in addition to the products that they present on the webpages. It is good to have this information because for a company entering the market like Linoprint it is better to cooperate with a representative that already knows this business area. Such a company knows how to present the product on the website to be sold and can easier understand details and specification of the product.

Secondly, the explanation of the products (both Linoprint and competitive products) is the criterion to figure out if the distributors are providing any information about the distributed products, how are they doing this and whether or not they understand the products, especially Linoprint products. As to the explanation of the competitive

products, the websites will be evaluated if the distributors present information about the products of Linoprint main competitors.

Table 4.1 - List of Criteria to Analyze Current Distributors

	criteria
sales and service potential	**1.segments**
	label blister carton
	2.service
	(does the company offer the service additionally to the product?)
	3.explanation of the products
	explanation of Linoprint products
	(pictures of the products) (basic information about the products) (explanation how the products work) (specification)
	explanation of competitive products
	(pictures of the products) (basic information about the products) (explanation how the products work) (specification)
	4.website analysis
	information
	(is the information current? e.g. last updates) (information about the company: basic and characteristic) (clear and full information in all subsections) (english version)
	readability and friendly layout
	(is it easy to find main sections of the website) (student job or made professionally) (cohesion of all subsections)
company strength	**5.size of the company**
	total of employees
	6. revenue (in Mil €)
	7.profitability

In explanation of the products, 4 aspects will be estimated:

- product pictures
- basic information about the product
- explanation how the product works
- whether or not there is specification information about the product

The last criterion in the group of sales and service potential is website analysis. It was created to get an impression of how the distributors present themselves on the internet. This criterion consists of 2 elements: information analysis, as well as readability or friendliness of the layout.

The other group of criteria – company strength – includes 3 points: size of the company related to the number of employees, revenue and profitability.

In the analysis of potential distributors, almost the same criteria were used as in current distributors' analysis (Table 4.2). The only difference is in 2 criteria which are missing in this new table:

- explanation of Linoprint products (sales and service potential) – potential distributors' websites do not have any information about this,
- profitability (company strength) – neither project team nor company representative helping with the project could provide information about profitability for all potential distributors.

Table 4.2 - List of Criteria to Analyze Potential Distributors

	criteria
sales and service potential	**1.segments**
	label blister carton
	2.service
	(does the company offer the service additionally to the product?)
	3.explanation of the products
	explanation of competitive products
	(pictures of the products) (basic information about the products) (explanation how the products work) (specification)
	4.website analysis
	information
	(is the information current? e.g. last updates) (information about the company: basic and characteristic) (clear and full information in all subsections) (english version)
	readability and friendly layout
	(is it easy to find main sections of the website) (student job or made professionally) (cohesion of all subsections)
company strength	**5.size of the company**
	total of employees
	6. revenue (in Mil €)

4.4.3 Matrix

Table 4.3 - Rating Matrix for Distribution Analysis

		1.current distributor			1.potential distributor	
criteria	**weight**	**rating**	**score**[1]	**weight**	**rating**	**score**[1]
1.segments	**0,4**			**0,4**		
label	0,4/3=0,13	yes/no		0,13		
blister	0,13			0,13		
carton	0,13			0,13		
2.service	**0,1**	yes/no		**0,1**		
3.explanation of the products	**0,3**			**0,3**		
Linoprint products	0,15	4 elements explained in Tables 4.1. and 4.2.=4				
competitive products	0,15			0,3		
4.website analysis	**0,2**			**0,2**		
information	0,1	4 elements explained in Tables 4.1., 4.2.+ general impression=4 (average for 3 team members)		0,1		
readability and friendly layout	0,1	3 elements explained in Tables 4.1, 4.2. + general impression=4 (average from 3 team members)		0,1		
Grade 1[2]	1=100%			1=100%		
5.size of the company (no of employees)	**0,3**	... to 5 (1point); 6 to 15 (2); 16 to 30 (3); 31 and more (4)		**0,44**		
6.revenue	**0,3**	... to 1,0 (1); > 1,0 to 1,5 (2); > 1,5 to 2,0 (3); > 2,0 (4)		**0,55**		
7.profitability	**0,4**	company information: o (1); + (2); ++ (3)				
Grade 2[2]	1=100%			1=100%		

[1]score=rating/4 x weight; [2]Grade=SUM(scores)

Table 4.4 - Rating Model for Distribution Analysis

rating	description	percentage
no/0	no fit	0%
1	low fit	25%
2	fit	50%
3	good fit	75%
yes/4	excellent fit	100%

The matrix created for Linoprint distribution analysis is different than a typical decision matrix. Instead of options or alternatives to decide between, there are companies. The

weights together give 200%: 100% for each group of criteria instead of 100% for the all criteria.

A reason for this weighting was for creating diagrams presenting the results of analysis. Final grades for each of the group provided data to create the axes of the diagrams.

The weights were assigned to the criteria in a way presented in Table 4.3. There are some differences between criteria for current and potential distributors, because potential distributors were analyzed with fewer criterions. Nevertheless, conception of weighting in both cases (current and potential distributors) was the same. In the first criteria group, the most important ones are: segments and explanation of the products, than website analysis, and service. The most important in the analysis is information about whether or not the distributors are focused on the same technology segments as Linoprint and how well they represent the distributed products.

The criteria in the other group have almost the same importance. The number brackets proposed for putting rates in order to estimate company strength is reasonable for Linoprint's distributors because they are small companies with less than 20 employees and revenues lower than 3 mil euro. Data used to analyze this group of criteria were provided by Linoprint.

Rating of the criteria was defined in numerical order form 0 to 4 (Table 4.4.) where 0 means no fit (0%) and 4 means excellent fit (100%). The rates in different criteria were given to the distributors according to the explanation in Table 4.3. (column current distributor/rating). All aspects of the website analysis (see Table 4.1. and Table 4.2., point 4. website analysis) could be evaluated very subjective. For this reason it was decided to put average scores form 3 team members for these criteria.

4.4.4 Assessment

The assessments of the current and potential distributors were placed in 2 matrices which are enclosed in Appendix A2 and the results are illustrated on Figure 4.1 and Figure 4.2, which are described below.

4.4.5 Current Distributors

On the diagram illustrating current distributors´ results (Figure 4.1.), it is easy to notice 3 groups of companies. Two of them are definitely better than the others. Another 3 reached average scores according to relative sales and service potential as well as according to relative company strength. They are situated in the middle of the diagram. There is also a third group of companies which have relative sales and service potential lower than 20%.

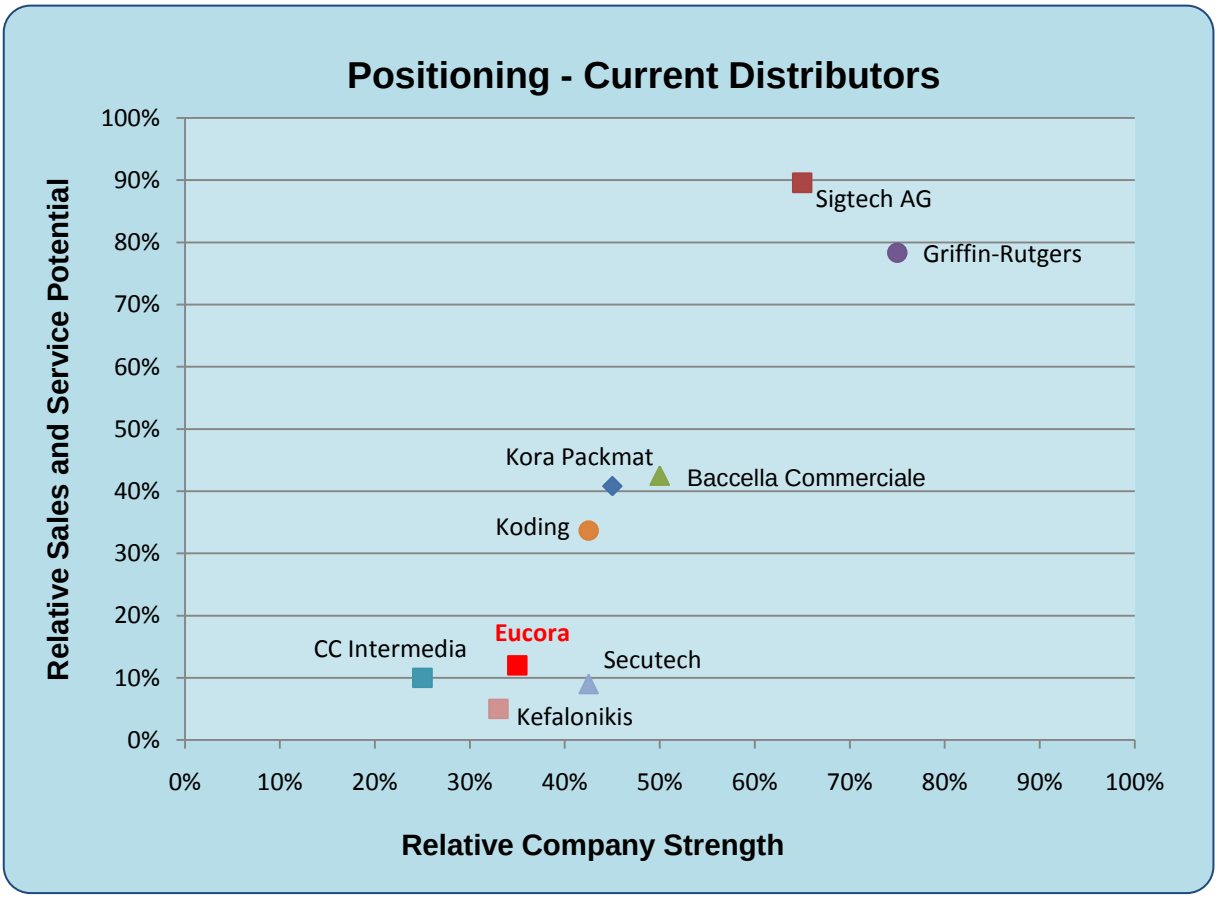


Figure 4.1 - Positioning Diagram for Current Distributors

The best results were reached by Griffin-Rutgers and Sigtech AG. Both companies scored high (Sigtech – 90%, Griffin-Rutgers – 78%) because both of them address all of Linoprint´s technology segments, offer additional services, and provide perfect explanation of Linoprint products. Moreover, Sigtech distributes competitive products. It has its own product which is competitive to DriveLine C and D- SigJet - because the company is also Linoprint´s competitor. As to the website, Griffin-Rutgers has a very

good content. However, the layout is not really eye catching and home website seems to be overloaded. The english version of Sigtech website still has some technical problems. Going into subsections, it is necessary to check the website via Google translator suggested on the website because the English version of the website shows no information.

In relative company strength, Sigtech with its 1,6 mil euro of revenue, 17 employees and quite good profitability [12] received a grade of 65%. Griffin-Rutgers is the most profitable distributor and with a revenue in the highest bracket in the analysis (more than 2 mil euro [12]) and received grade 75%.

In the second group, there are Köra Packmat, Baccella Commerciale and Koding.
Köra Packmat addresses 1 of 3 Linoprint segments (label) and offers additional services which are: project management, system installation and after-sales services. Its website contains complex information about the company and full information in all subsections. It is done professionally. Minimalization, lightness of a form, and blue color symbolizing quality prove that. Nevertheless, it is impossible to find any information about Linoprint products. Probably, the company does not offer any competitive products because there is nothing about this on the website. Mainly because of this the first grade (sales and service potential) for the company is close to 50%. The other grade is even lower because Köra Packmat is a small company located in Singapore with a revenue around 0,5 mil euro, which is rated in the analysis as a very low. Nevertheless, profitability of the company has the highest possible score and grade 2 (relative company strength) for the company is 45%.

Baccella addresses label and carton segments. On the company website, there is short information that it distributes Linoprint products and products of one of Linoprint's competitors – Bluhm. Nevertheless, it is impossible to find any explanation of Linoprint's or competitive products. Moreover, the website has no english version so the company in the received 43% in grade 1. Relative company strength of Baccella was scored a little bit higher than Köra Packmat's – 50%.

Koding addresses only the label segment. The company has only very short information about Linoprint products. Its website is not available in english and the Slovenian version doesn't work properly either because of technical problems or because it is not updated. It seems to be still under construction so final grade for Koding as to relative sales and service potential is 32%. For relative company strength company received 42%.

The group of the lowest scored distributors includes another 3 companies. CC Intermedia, Secutech and Kefalonikis' sales and service potential were scored only at 10% because of lack of the websites. As to company strengths, these companies received a bit different scores. Secutech has the highest grade (43%) because it is twice as large and received higher revenue than the other companies in this group.

In this group of companies there is also placed one potential distributor – Romanian company Eucora Diastribution SRL. It was put on the diagram to give an impression how good of a current distributor it could be. There was more information available about this company according to the relative company strength in comparison with other potential distributors so it was possible to compare it together with current distributors.

4.4.6 Conclusions about Current Distributors

To sum up, the diagram illustrating distributor's scores shows clearly that mostly they are not good representatives of Linoprint.

Only Griffin-Rutgers and Sigtech are really promoting Linoprint products. They are the only ones who present Linoprint products clearly on their websites. Additionally they are relatively much stronger than other distributors.

Other companies provide almost no information that they are Linoprint's distributors and do not promote themselves very well because their websites are not good examples of marketing. Maybe the reason for lack of professional information on Köra Packmat, Baccella Commerciale and Koding's websites is lack of product understanding? Maybe the explanation given to them by Linoprint was not understandable enough or contact

between these 3 companies and Linoprint is not good enough to cooperate effectively? Maybe it would be good to arrange a meeting with Köra, Baccella and Koding's representatives in order to explain Linoprint business one more time to have a certainty that they understand it.

Another thing is the answer for the question - are these companies communicating Linoprint's products to the market instead of just giving some internet information, or are communicating them at all?

The general conclusion about Köra, Baccella and Koding is that despite the fact that cooperation with these 3 companies is not as efficient as it could be, it is still possible to improve it because they have at least some information about Linoprint on their websites.

The conclusions about the group of companies which are scored very low according to sales and service potential are:

- they are such small companies that they are only focused on the local market and are not actually interested in international cooperation
- it is not a good idea to continue cooperation with these companies because in the 21st century it is very difficult to survive on the market, even on the local market, if the company is not available on the internet.

According to promoting competitive products, companies which distribute competitors' products show the same tendency like with Linoprint products:

- Sigtech provides goods explanation of Linoprint and competitive products
- Baccella Commerciale has no information about Linoprint products and about Bluhm Weber Group's products.

4.4.7 Potential Distributors

The positioning diagram for potential distributors does not show very optimistic perspectives for Linoprint's cooperation with the presented companies (Figure 4.2).

One company – Q II S - is definitely better than the others. This company is relatively large in comparison with the other distributors. The webpage also has an English version. It has full information about the company, its activities, and services. The customers are presented very well, with full information about their products, including pictures, products specifications, and explanation about them. The best example of that are Domino's products, which are explained very well on Q II S's website. The company is showing a big interest in representing the customers, which creates a good distributors image. For these reasons it received 97% for relative sales and service potential. Moreover, it is the biggest potential distributor with the highest revenue which result in score 89% for relative company strength.

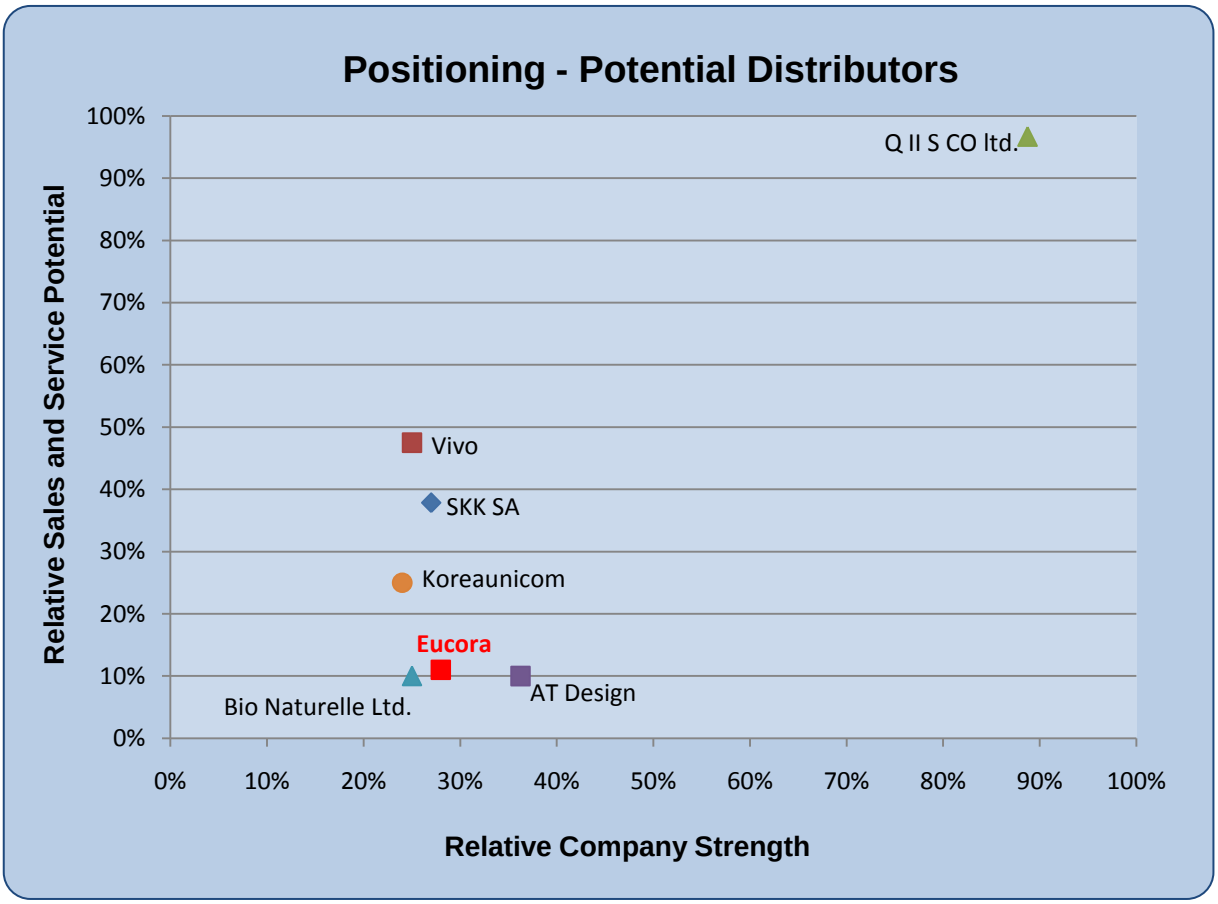


Figure 4.2 - Positioning Diagram for Potential Distributors

Vivo Health & Food Packaging is a small company (25% for relative company strength). It has an english version of the webpage. The webpage provides minimal information about the company and its activities and products. Information is general, no actual data

about customers and their products. Nevertheless, the company addresses two of Linoprint's segments (blister and label), so its relative sales and service potential was scored at 48%.

AT Design, SKK SA and Koreaunicom have websites. However, their web pages are only in their native languages, which gives only minimal access to the information for foreigners which is considered as a not so good distributors' image. The companies don't show much interest to customers from foreign countries. However, the korean company is creating an english version of the webpage which could give significant changes in the company's ratings and positioning. Nevertheless, in this analysis its relative sales and service potential was scored as 25%. SKK SA received 36%. AT Design got the lowest grade – only 10%. As to relative company strength, AT Design was better than other 2 companies. It received 36%. SKK SA and Koreaunicom both got 25%.

The lowest scoring companies are Eucora Distribution SRL and Bio Naturelle. Eucora's website contains only contact data, which leads to a bad ranking with the first company (11% for relative sales and service potential). Bio Naturelle is the worst of the potential distributors (10% - grade 1). The company shows no information on the internet about their products, clients, or about the company itself. Both companies received 25% for relative company strength.

4.4.8 Conclusions about Potential Distributors

The conclusions from the analysis and interpretation of the diagram are the following:

- Only Q II S and Vivo seem to be really good candidates to become Linoprint distributors. They are already distributing competitive products and have english websites. However, Q II S has scored better because it is explaining distributed products better than Vivo and is a relatively stronger company so it may be the best new distributor for Linoprint at the moment.
- SKK SA and Koreaunicom also can be attractive candidates for Linoprint as new distributors. As to relative company strength they are almost at the same level as Vivo. According to relative sales and service potential they are scored lower because:

- SKK SA – not distributing any competitive products
- Korea Uni Com – lack of English websites, language difficulties in Korean made it impossible to provide full information about the company.

The suggestion for Linoprint in order to consider these companies is that Linoprint managers should judge by means of some other analysis whether these two companies will be good distributors of Linoprint.

- Again, like on the positioning diagram for current distributors, there is a group of companies that scored very low because of lack of websites or lack of any valuable information. So, according to bad experience with current distributors, maybe it is better for Linoprint not to start cooperation with AT Design, Eucora and Bio Naturelle but look for some other candidates who could be Linoprint's distributors.

4.5. Summary of Findings

The results of the analysis clearly show that, in both cases, current and potential distributors, there are only a few companies that either are good distributors or can become good representatives of Linoprint.

Linoprint's distributors, apart from Griffin-Rutgers and Sigtech, are not good representatives of Linoprint products. Even if they address the same technology segments as Linoprint, they do not communicate Linoprint products to the market by their websites. Moreover, only 3 distributors (Köra Packmat, Sigtech and Griffin-Rutgers) have websites available in english. This means that most of the distributors do not use the marketing potential of the internet effectively.

Positive observation from the analysis is that there are still some distributors (Köra Packmat Asia, Baccella Commerciale, Koding) with whom cooperation can be improved, and this is recommended for Linoprint.

The general result for potential distributors shows that Linoprint might not be satisfied with such partners when they become current distributors. At first impression, only Q II S seems to be attractive for Linoprint as a new distributor. However, looking deeper to analyzed companies, it may be worth thinking about cooperation with some of them (SKK SA and Korea Uni Com).

What was noticed as a one possible cause of unsuccessful cooperation with current distributors is Linoprint's marketing material. Maybe Linoprint is not explaining its products in an understandable way for the distributors? This will be taken account in creating marketing concepts for Linoprint and suggestions for its website.

Chapter 5: Tools

5.1 Introduction

As a part of this project for Linoprint, two excel-based marketing tools were created, and a third was started to be finished after the report. The ultimate goal of this part of the project is to have tools which can be used by Linoprint distributors or sales representatives in actual discussions with potential customers. These tools should assist the sales representative in presenting the advantages of Linoprint's products in a clear and objective way.

5.1.1 Criteria

Linoprint has four tools in mind: an ink consumption calculator, a total cost of ownership (TCO) calculator for a digital printing machine, a profit & loss calculator, and a pay back time calculator. They must be well thought out so that anybody can use them with minimal training. They also must feature input masks or user forms to make input intuitive and to keep normal users from modifying the tool. Ideally these tools would be web based or stand-alone programs.

5.1.2 Role of the EPS Team

The criteria and the theory behind the tools were looked at, and it was decided to make the tools based on Excel, using Excel formulas and VBA (Visual Basic for Applications). Initially, all of the tools were going to be created, but as the project went on it became clear that there would not be enough time for this. Therefore, three of the tools were focused on: ink consumption, pay back, and profit & loss.

Schemes for all of these calculations existed, but they could not be used as marketing tools because they were spreadsheets with no usable interface. The ink consumption tool was completely redesigned with a full understanding of how the calculations are done, and dialog boxes were created to facilitate easy usage of the tool.

For pay back time, the scheme from Linoprint was not redesigned, but simply adapted into a working tool. Dialog boxes were created to allow input parameters to be entered easily and to keep users from modifying the sheets, but the overall workings and feel of the tool was more or less kept the same. The profit & loss calculator turned into a tool in a similar way.

TCO was not created at all, but the calculations for TCO are very similar to some of the calculations in the pay back tool. This tool could potentially be expanded to include a TCO calculator at a later date.

5.1.3 VBA

All of the tools were created in Microsoft Excel 2007, with VBA (Visual Basic for Applications) and cell formulas used to implement the functionality of the tools.

5.1.4 Sheet Protection and Administrator Log-In

It is important to be aware of how the protection scheme on these tools works, so that an administrator is not locked out of the tool. When the excel files are opened, they open in a protected state to keep normal users from being able to modify the sheets. This means that none of the cells can be selected and no formulas can be modified.

To modify the sheet, an administrator must log into the sheet using the buttons marked "Administrator Log In". It is not possible to unprotect the sheets any other way. The default username is "administrator" and the default password is "1". This log in information can be changed by clicking the appropriate button, entering this log in information, and entering a new username and password. There are no limitations on what these can be except that the username or password cannot be blank.

In addition, the VBA code itself is protected from modification by a password, which is also "1". In order to view the VBA code, follow the instructions illustrated by Figure 5.1 and described below:

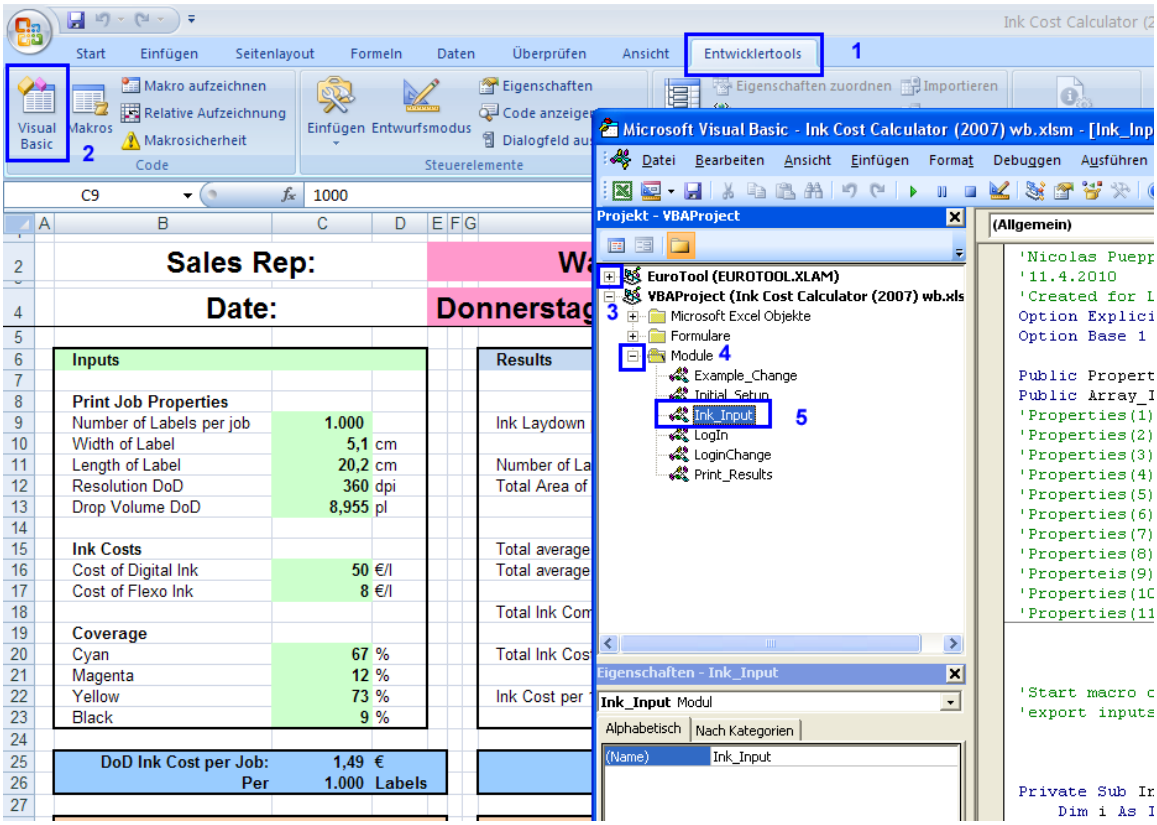


Figure 5.1 - Viewing VBA Code

1. Go to the Developer Tools tab. If this tab is not visible, then it needs to be enabled. Enable it by pressing the Office button, going to Excel options, and enabling the developer tools ribbon, as shown in Figures 2 and 3.
2. Click the button labeled “Visual Basic”
3. Open the VBA project. Excel will prompt for a password here, which is “1” by default.
4. Open “Modules” (or “User Forms”) and
5. Click on the desired object to view the code behind it.

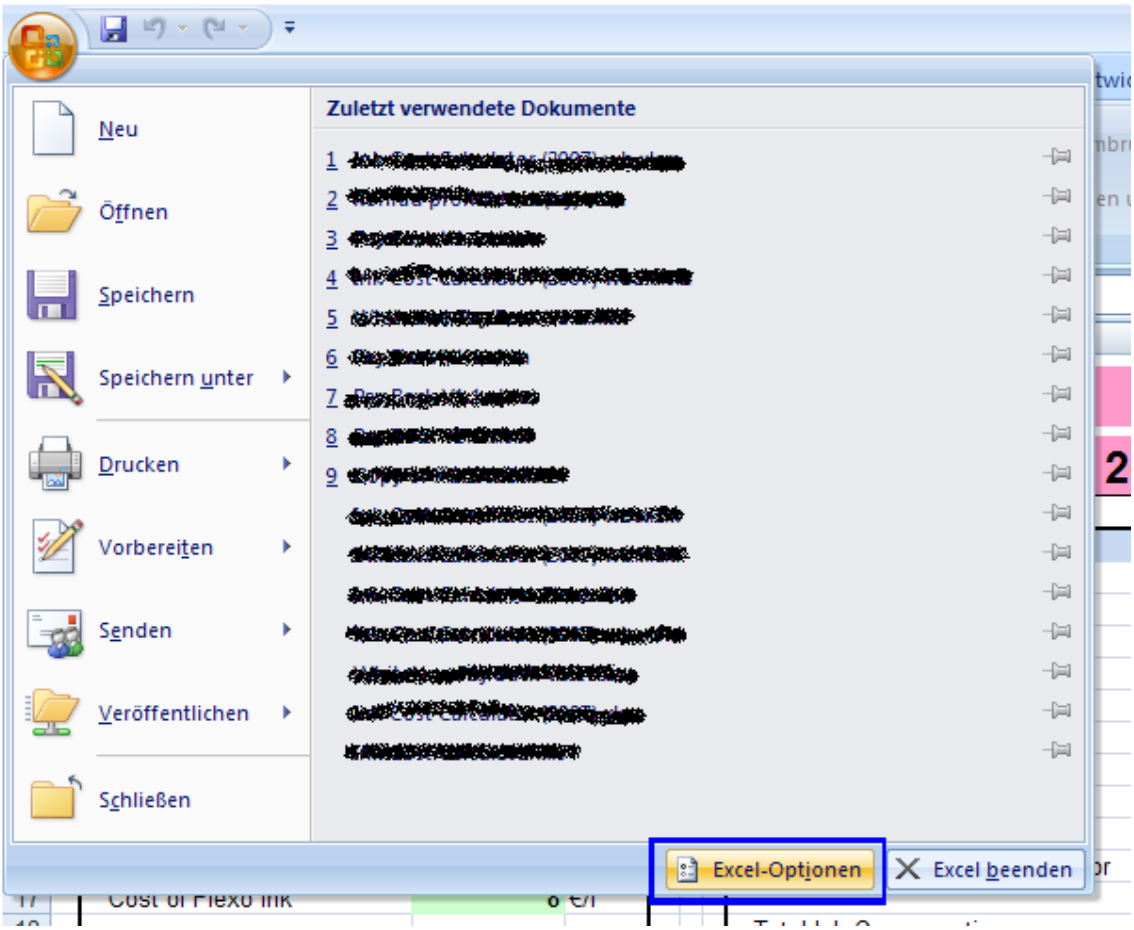


Figure 5.2 - Accessing Excel Options

To enable the developer tab, first access Excel options by pressing the Office button and clicking on “Excel Options” button as shown in Figure 5.2.

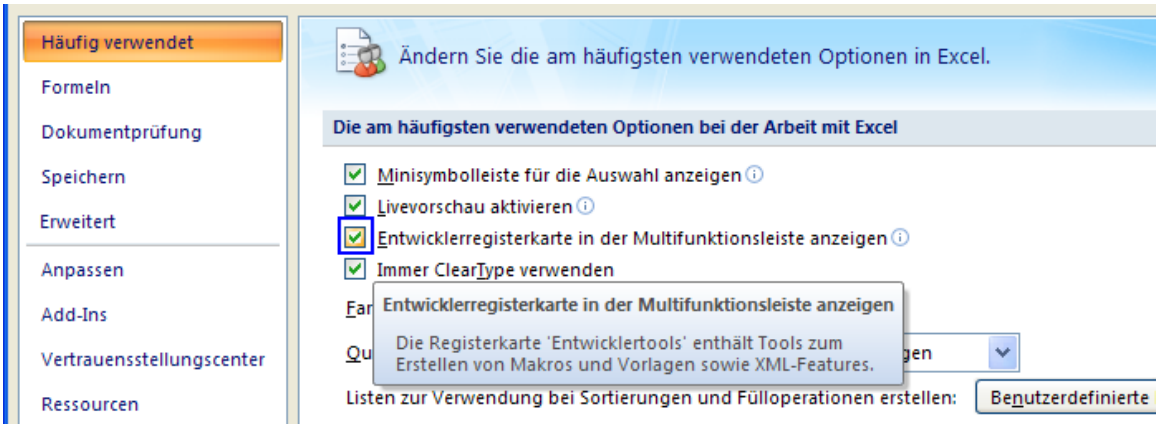


Figure 5.3 - Enabling Developer Tab

Then, simply enable the developer tab by clicking the appropriate checkbox, as shown in Figure 5.3.

5.2 Ink Consumption

The first marketing tool developed was an ink consumption and cost calculator. This is a tool which calculates the ink consumption and cost of a label printed with Drop on Demand (DoD) technology and compares it to the ink consumption and cost of the same label printed with Flexo printing.

5.2.1 Theory and Purpose

The ink consumption calculator is very simple. It is basically a unit conversion from dots per inch to grams per square meter. From this, based on the run length, the total ink consumption can be calculated. Multiplying this result by the ink cost in euros per kilogram gives the final cost of ink for that print job.

This is useful information for a customer because it gives them a first overview of the costs of operating a digital print machine as compared to a flexo machine. In general, flexo ink is far cheaper than digital ink, but this is made up for by the high cost of creating printing plates, especially for short run lengths. These higher costs are normally made up for by savings that come from reduced make ready time, possible reduction in the amount of employees required, and reduced time from product conception to market.

5.2.2 Layout of the Spreadsheet

The ink cost calculator consists of three regular sheets, plus one hidden sheet that can only be seen if an administrator logs in. This is one of the least involved tools requested, with only 8 inputs and very straightforward calculations, but it is very refined, with a nice interface and a lot of useful features that go above and beyond the needs of the user of this tool.

As with all tools, parameters can only be entered through the input dialog boxes. The rest of the sheet, including cell formulas, is protected unless the administrator logs into the sheet, which unprotects everything and makes the fourth sheet visible.

5.2.3 Ink Consumption

This sheet is the main interface of the ink consumption tool. As shown in Figure 5.4, it consists of two columns: one for inputs, and one for results. The results are color-coded, with any results pertaining to flexo are highlighted in orange and any results pertaining to Drop on Demand highlighted in blue. The final result is displayed underneath these two columns.

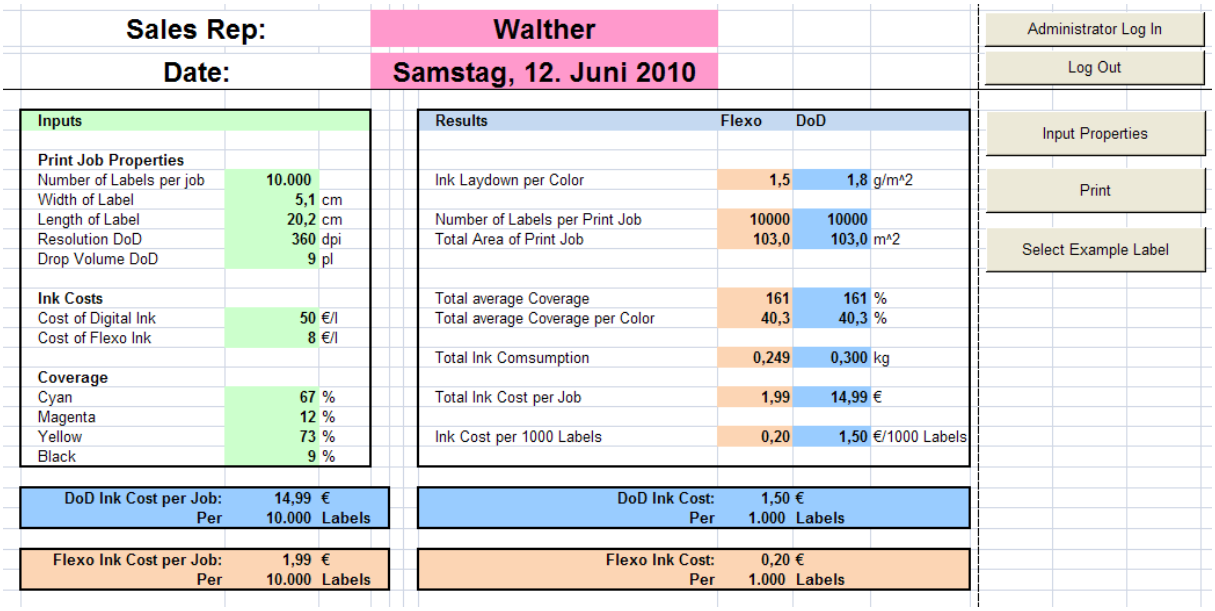


Figure 5.4 - Ink Consumption Main Interface

In order to enter parameters on the sheet, the input dialog boxes can be shown by pressing the "Input Parameters" button. This brings up a series of dialog boxes which allow the user to enter all of the required parameters: print job properties, ink properties, and ink coverages. Last but not least, the editor of the sheet is asked for his or her name, which is important for documentation if the sheet is printed and given to a customer.

All of the print job parameters are self explanatory, except for resolution. In this case, the resolution that can be entered by the user is in track resolution, because it is the resolution that the customer is free to vary during printing. Cross track resolution can be adjusted by an administrator.

The ink coverages are the amount of the label that is covered by each of the print colors in percent. Since the colors can be overlaid on top of each other, the maximum coverage possible is 400%, 100% for each of the four colors.

The ink coverages can simply be keyed in on the last input dialog box, but the unique thing about this tool is that it also has a database of example labels built in, which can be selected to use the ink coverages associated with that label. This is valuable because it allows a salesperson to compare an example label to the typical sort of label a customer prints, and give them a meaningful ink consumption result. The dialog box created to select an example label is shown in Figure 5.5.

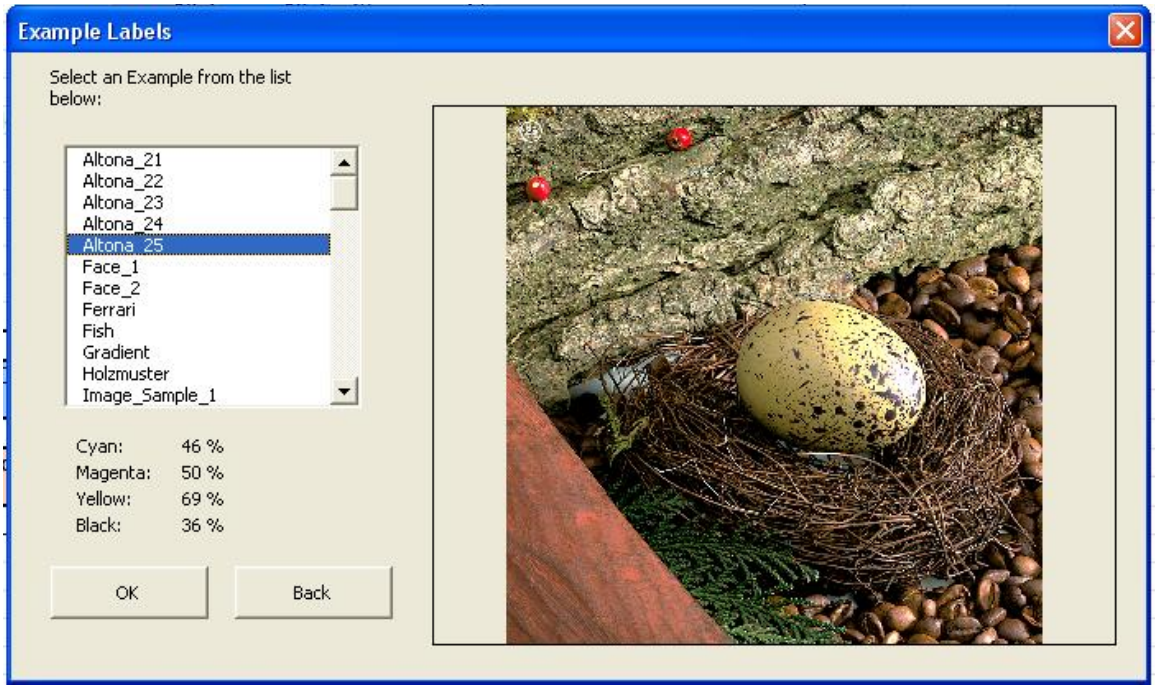


Figure 5.5 - Example Label Selection

Once all of the parameters have been entered with the dialog boxes, the result is immediately displayed in the results column, and the result fields below the input

column. The calculations for the results are performed on sheets 2 and 3, and will be discussed in the next sections.

5.2.4 Flexo

The second sheet calculates the results of the ink coverage of flexo printing. The layout of the sheet can be seen in Figure 5.6.

Flexo		
Print Job Properties		
Number of Labels	1000	
Width of Label	5,1	cm
Length of Label	20,2	cm
Coverage		
Cyan	67	%
Magenta	12	%
Yellow	73	%
Black	9	%
Ink Properties		
Specific Density	1	kg/l
Ink Laydown	1,5	g/m^2
Ink Cost	8	€/l

Constants		
Specific Density of Ink	1	kg/l
Ink Laydown	1,5	g/m^2

Ink Cost:	0,20	€
Per	1000	Labels

Calculations					
Number of Labels	1000				
Width of Label	0,051	m			
Length of Label	0,202	m			
Area of Label	0,0103	m^2			
Total Area of Print Job	10,30	m^2			
Colors	***Cyan***	***Magenta***	***Yellow***	***Black***	
Ink Lay Down	1,5	1,5	1,5	1,5	gr/sqm
Coverage	0,67	0,12	0,73	0,09	
Printed Area	6,90	1,24	7,52	0,93	m^2
Ink Consumption	0,010	0,002	0,011	0,001	kg
Ink Cost	0,083	0,015	0,090	0,011	€

Figure 5.6 - Flexo Calculations

This sheet is not modifiable by the user, but it is visible and may be printed to give a customer more information about the print job. The green inputs in the left hand column are the inputs from the main page, and the purple inputs are constants which can be adjusted by an administrator on the set up page, but not by a normal user. This is because they are constants which depend on the technology and don't usually vary between print jobs. It would also unnecessarily complicate the tool if they were user editable.

The right hand column simply calculates the ink consumption and cost from these input parameters. The process can be understood by taking a look at the formulas in these cells to see how each pink result was calculated.

5.2.5 DoD

The other calculations sheet is a sheet to calculate the ink consumption of DoD printing. The layout of the sheet is the same as the flexo sheet, but it has been adapted to give a meaningful result for drop on demand printing. The layout of this sheet can be seen in Figure 5.7.

Sales Rep:			**Walther**						
Date:			**Samstag, 12. Juni 2010**						
Drop on Demand			**Calculations**						
Print Job Properties			Number of Labels	10000					
Number of Labels	10000		Width of Label	0,051	m				
Width of Label	5,1	cm	Length of Label	0,202	m				
Length of Label	20,2	cm	Area of Label	0,0103	m^2				
			Total Area of Print Job	103,02	m^2				
DoD Inputs									
Printer Properties			Intrack Resolution	14173,2	dots/m				
Intrack Resolution	360	dpi	Crosstrack Resolution	14173,2	dots/m				
Crosstrack Resolution	360	dpi	Density of Dots	200880402	dots/m^2				
Drop Volume	9	pl							
Drops per Dot	1	/dot	***Colors***	***Cyan***	***Magenta***	***Yellow***	***Black***		
Coverage			Coverage	0,670	0,120	0,730	0,090		
Cyan	67	%	Printed Area	69,02	12,36	75,20	9,27	m^2	
Magenta	12	%	Ink Laydown	1,8	1,8	1,8	1,8	g/m^2	
Yellow	73	%	Ink Consumption	0,125	0,022	0,136	0,017	kg	
Black	9	%	Ink Cost	6,2395	1,1175	6,7982	0,8381	€	
Ink Properties									
Specific Density	1	ng/pl	**Constants**						
Ink Cost	50	€/l	Crosstrack Resolution	360	dpi				
			Drops per Dot	1	/dot				
Ink Cost:	14,99	€	Specific Density of Ink	1	ng/pl				
Per	10000	**Labels**							

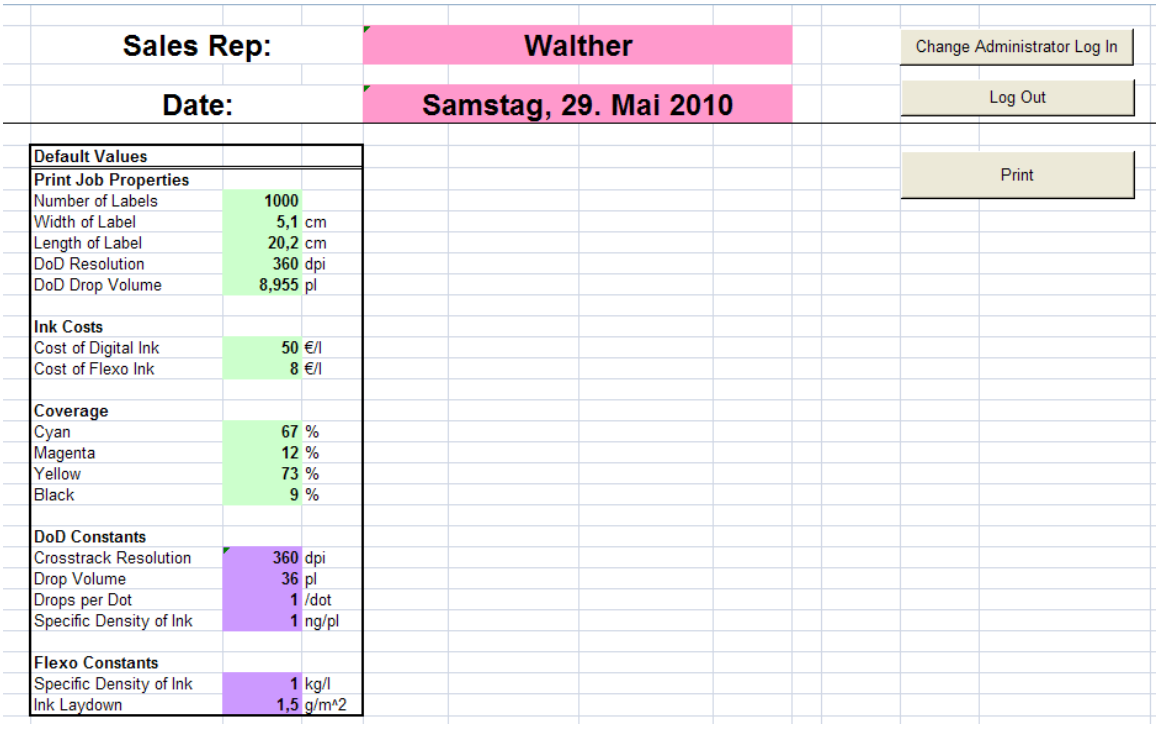
Figure 5.7 - DoD Calculations

The additional complication of DoD printing is that the ink laydown depends on the resolution of the printer. However, the calculations are very similar, and can be followed by viewing the formulas in the results column on the right. Again, the purple areas are constants which depend on the specific printer and can be modified by an administrator on the set up page.

5.2.6 Set Up

The last section of this tool is a set up sheet. This sheet is only visible if an administrator logs in. As seen in Figure 5.8, this sheet is very similar to the main inputs and results sheet. The green parameters here are the default parameters that are displayed when

the input dialog boxes are shown, and might be changed for different printing machines, a new application such as blister or carton printing, or if the cost of ink changes.



Default Values		
Print Job Properties		
Number of Labels	1000	
Width of Label	5,1	cm
Length of Label	20,2	cm
DoD Resolution	360	dpi
DoD Drop Volume	8,955	pl
Ink Costs		
Cost of Digital Ink	50	€/l
Cost of Flexo Ink	8	€/l
Coverage		
Cyan	67	%
Magenta	12	%
Yellow	73	%
Black	9	%
DoD Constants		
Crosstrack Resolution	360	dpi
Drop Volume	36	pl
Drops per Dot	1	/dot
Specific Density of Ink	1	ng/pl
Flexo Constants		
Specific Density of Ink	1	kg/l
Ink Laydown	1,5	g/m^2

Figure 2.8 - Ink Consumption Set Up

In addition, the constants used in the flexo and DoD calculations can be adjusted on this sheet, by changing the values of the purple fields. These are linked to the flexo and DoD sheets with formulas, so they should always be adjusted on the set up sheet instead of on the calculation sheets.

Finally, the log in information of the administrator can be changed on this sheet by pressing the “Change Administrator Log In” button.

5.2.7 Adding Example Labels

More example labels can be added to the database of example labels in this tool. Any .jpg image can be used as an example label, and Adobe Photoshop can be used to find the coverages of the image. Detailed instructions for doing so can be found in Appendix A3.

5.2.8 Summary

This spreadsheet is a refined excel tool to calculate ink cost and consumption, to give a potential Linoprint a customer of the ink costs that should be expected with a new digital press as compared to a conventional printing machine. It is also designed to be easy to use and display results in an intuitive manner, in order to be used by people with no training or people outside of the company, and to display results which are easy to understand by a potential Linoprint customer.

5.3 Pay Back

Another marketing tool created for Linoprint was a pay back time calculator. An Excel scheme provided by the company was expanded, input dialog boxes were added, and the excel sheet was protected so that people using the tool are not be able to change the way it works. Finally, a log in function was added, allowing administrators to unprotect the sheet for editing. For information about how the log in works, see section 5.1.4.

In addition, an example calculation has been performed, which can be found in Appendix A4.

5.3.1 Theory

Pay back time is the time it takes for a new piece of equipment to become profitable. It is the time it takes a company to 'pay off' a new piece of equipment. If the pay back time is short, then the company can start making money off of its investment quickly. If the pay back time is long, though, then it will take more time for the company to start making money.

The pay back calculator also provides a scheme to visualize the cost savings that can be realized with digital printing compared to sticking with conventional printing. The basic premise of this is that digital printing allows a packaging line to save money by eliminating specific process steps which would be necessary if conventional printing were to be used or reducing the costs associated with these process steps.

The main types of costs that can be eliminated with digital printing are storage and storage related costs. Conventional printing requires long run lengths to be cost effective, and also can't be switched to print a different label on request, because it requires the creation and installation of a new set of printing plates for each different label or packaging design. In the real world, where companies are printing packaging for several different products on the same machine, the printed packaging has to be stored somewhere before it can be used by the packaging machine. Of course, if a lot of different products have to be accommodated, this results in an excess of different labels which must be stored somewhere. Digital print machines can be switched to print anything on demand, which means that there will never be any excess labels to store.

These storage related costs are comparatively minor, but even small costs become significant over years or over the life of the machine. However, printing on demand also leads to the elimination of other storage costs. Not only can the storage costs associated with printed materials be eliminated, but warehousing costs associated with final products can be eliminated as well.

If a company produces different products on the same production line, or packages the same product with different labeling, for instance, then it is typical to produce a long run of each product-package combination and place all of the excess products into storage. This is because conventional printing machines can't print on demand if labels must be switched, and because it is not worth the time to retrieve a web of labeling from storage and set up the packaging equipment if a long run of product isn't going to be packaged and the labeling is just going to be switched out again. It is obvious that if these storage costs can be eliminated through just in time production, which is only possible if the printing machine can print on demand, that quite a bit of time and money can be saved.

The pay back calculation scheme also takes into account any cost savings of steps which aren't eliminated. This might be due to a reduction in electricity consumption, reduction in manpower required, increase in reliability of production line, increase in production speed, etc. Again, all of these costs can be significant over a year or over the life of a digital printing machine.

Total Cost of Ownership is another scheme which takes all of these 'running costs' into account and boils it down to the cost of printing a specific run length of packaging material, but the pay back calculator uses a simplified scheme because the main focus of this tool is on savings associated with the elimination of process steps, which are a lot more significant than integrating every cost associated with owning and operating a digital printing machine.

5.3.2 Purpose of Pay Back

The purpose of the pay back calculator is to help a company decide whether or not to upgrade equipment by comparing the time and monetary benefits of production with a new machine to the lower costs of keeping an older machine in production, and calculating how long it will take using a more efficient machine to recoup its initial investment. It does this by calculating the pay back period, which is the time it takes the machine to pay for itself in production.

A secondary result of this tool is calculations to determine cost savings realized through the elimination of specific process steps, and through a change in the hourly cost of operating the production line.

5.3.3 Layout of the Spreadsheet

The payback spreadsheet consists of ten separate pages, eight of which are involved with the calculation of pay back time. The other two are one page for instructions as a type of readme, and one page for administrator log in. Four of the remaining sheets allow users to input parameters, while the other four are reserved for calculations.

5.3.4 Input Sheets

As with all sheets in this tool, the input tabs are protected unless the administrator logs in. In order to allow parameters to be input, VBA was used to create input dialog boxes, which the user accesses with a button on each sheet.

5.3.5 General Inputs & Lot Sizes

This is the main control, where parameters relating to the overall production process are entered. Most of these parameters are values which must be known by the customer, because it is beyond the scope of the program to calculate them, but the program does include a scheme to calculate the hourly cost of running the production line for digital vs. conventional printing (hourly rates).

General Inputs and Set Ups		Units	Values
Name of Editor:			Walther
Date:			Montag, 24. Mai 2010
Kind of Business:			Blister
Invested Capital for Inline Printing Units		Euros	11.950.000
Time Invested Equipment Will Be Used		Years	10
Interest Rate for Calc. Interest		%	6,5%
Hourly Rate Packaging Line Convenrional		Euros	302
Hourly Rate Packaging Line with digital Inline Printing		Euros	514
Production Weeks per Year			50
Production Cycle (Speed) of Packaging Line		Cycles/Hour	14.400
		Cycles/Min	240
		Blister/min	480
Number of products produced per cycle		#/cycle	2
Width of Substrate in Production (Print) Direction	in track	mm/unit	200
Unprinted Space in Production (Print) Direction	in track	mm/unit	25
Width of Substrate Cross Production (Print) Direction	cross track	mm/unit	50
Printing Speed of Inline Printing Unit		m/min	60
Theoretical Printing Speed (Cycles/Minute)		Cycles/Min	267
Real (possible) Production Speed due to Packagine Line Speed Limitation		Cycle/Min	240
Real (possible) Production Speed due to Packagine Line Speed Limitation		Cycle/Hour	14400
Set Up Time (Make Ready Time) for Conventional Production		min	10
Set Up Time (Make Ready Time) for Production with Digital Printing Machine		min	2
Set Up Time is Time Between Two Orders			
Production Time Faktor (Set Up Time multiplied with this factor gives		Conventional	0,5
production time if production time is less then Set Up Time,		Digital	1,0
digital production use the same speed sequence like conventional production)			

Figure 5.9 - Pay Back General Inputs & Lot Sizes

Figure 5.9 is a screen capture of the "General Inputs & Lot Sizes" tab. There are three control buttons, which bring up dialog boxes to define the general inputs, define the lot sizes, and to print the page. The parameters are not directly editable on the spreadsheet unless the administrator has logged into the program.

5.3.6 Definition of General Inputs and Set Ups

The input dialog box for the general inputs is accessed by simply pressing the "Define General Inputs and Set Ups" button on the spreadsheet. Not all of the parameters are asked for on the first user form, because the spreadsheet includes a scheme to calculate these parameters if the user so desires, but the user has the option to key in these values manually, as shown in Figures 5.10 and 5.11.

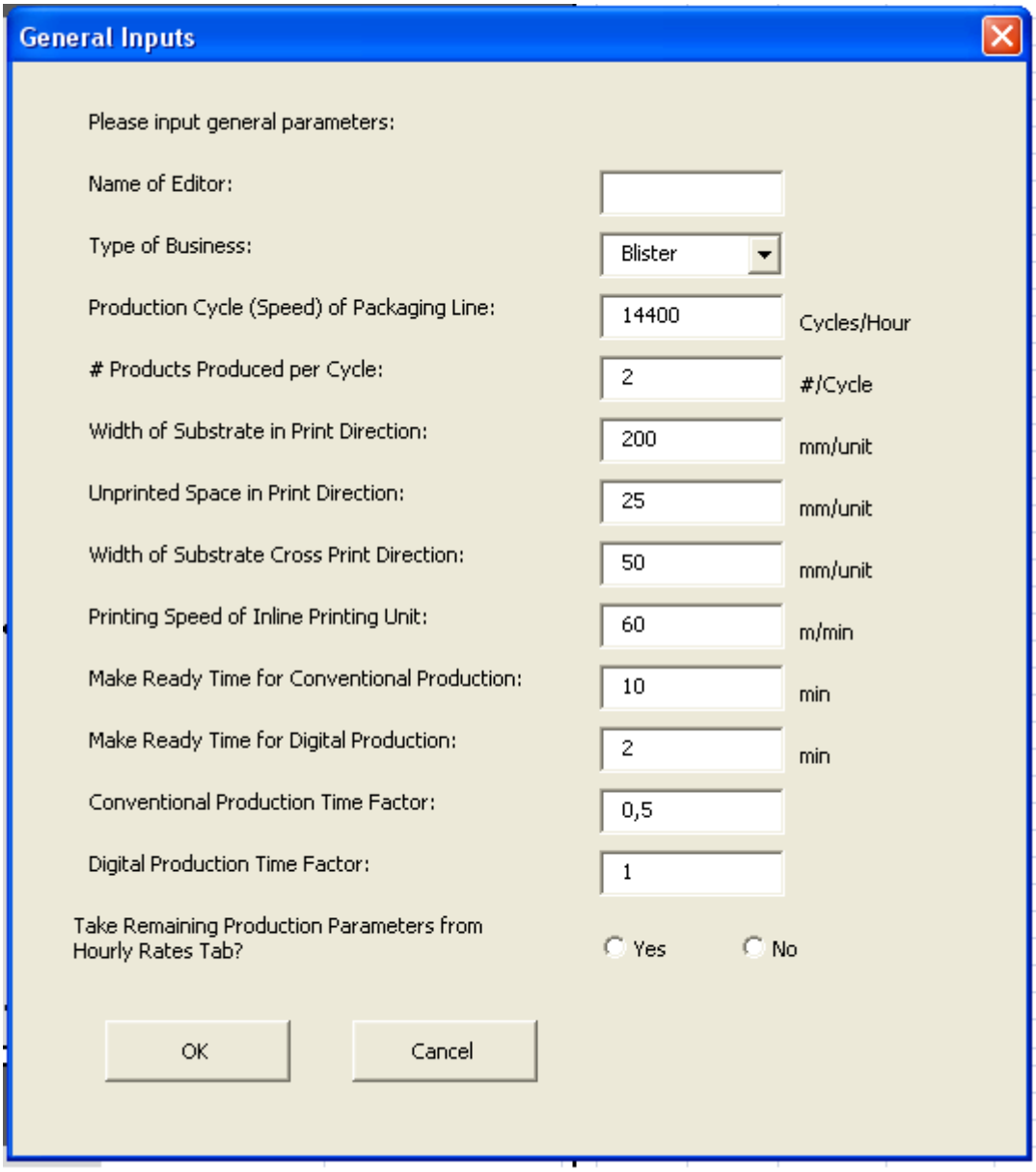


Figure 5.10 - General Inputs User Form

Figure 5.11 shows the dialog box that pops up when "no" is selected where it is asked whether or not to take the remaining parameters from the hourly rates tab. If no is selected here, then the user is not required to go to the hourly rates tab and input the parameters there. However, if yes is selected, then the spreadsheet will only give a correct result if the hourly rates tab is used to calculate the hourly rate of digital vs. conventional production. If yes is selected and the hourly rates tab is not updated, the results will be based on default values of hourly rates, which may not be accurate because they won't fit the specific situation of the production line in question.

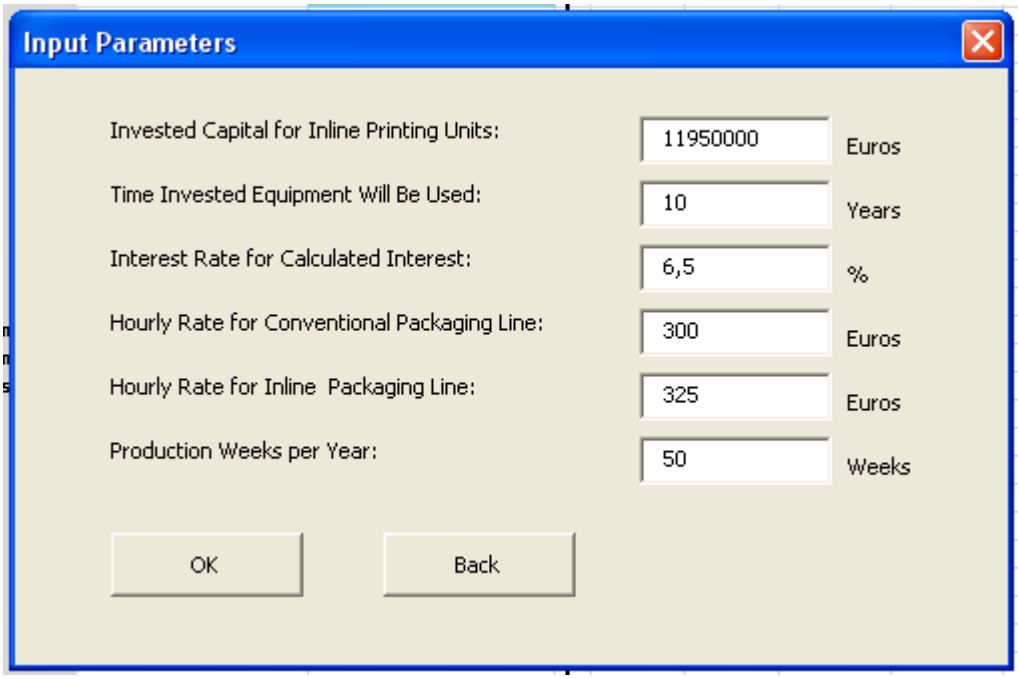


Figure 5.11 – Hourly Rates Input Form

5.3.7 Definition of Lot Sizes

The other information that may be input on this tab is the definitions of the lot sizes. The lot sizes are used to compare the cost savings of implementing digital printing for different run lengths, which can be real run lengths or simply theoretical run lengths to generate a curve of cost savings. This information can estimate the run length at which it becomes cost effective to implement digital printing as opposed to conventional printing. A more accurate calculation can be achieved using a TCO calculator, which takes the costs of owning and operating the printing machine into account in more detail and calculates the 'break even' run length.

All of the parameters entered on this sheet are parameters relating to the production process as a whole, which are the same parameters that would be used to come up with a total cost of ownership figure. The user has a chance to enter information about the individual production processes on the other tabs in the spreadsheet.

5.3.8 Definition of Process Steps

The Definition of Process Steps sheet is where the user may indicate which process steps are eliminated through the use of digital printing, which are typically storage costs. In addition, the user has the chance to enter the costs associated with each process step- either on a per lot basis, or on a per 1000 units basis. A screenshot of the Definition of Processes sheet, as well as the dialog box interface for entering process steps, is shown in Figure 5.12.

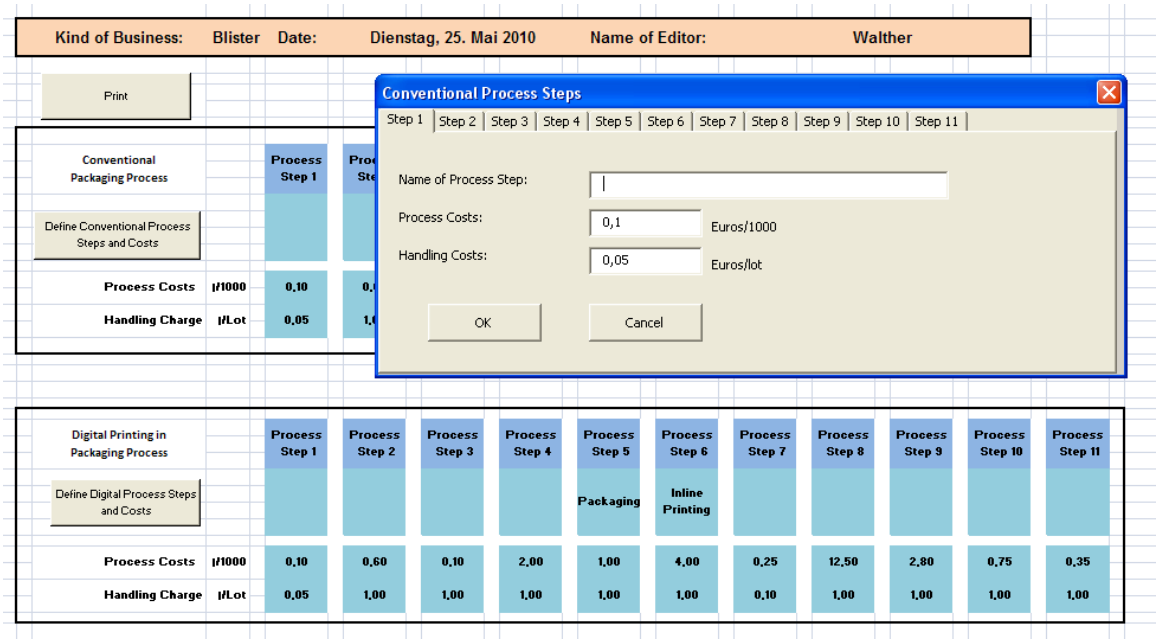


Figure 5.12 - Definition of Process Steps

Typically, one process of both conventional and digital printing is packaging. Because packaging is a cost which heavily depends on lot size, step 5 has been designated packaging, because a scheme has been provided to calculate the packaging costs for a production line for this step.

This interface allows for a maximum of 11 process steps, but this is enough for even complicated production processes. Because the costs associated with all steps aside from packaging are fixed on a per lot or per 1000 units basis, if there are more than 11 process steps, some steps can simply be combined and the associated costs added together.

5.3.9 Order Structure

The next input window is called order structure, which is where the user can input the 'daily requests' for a product. This is significant for companies who are commissioned to produce differing amounts of product on different days on the same production line. As shown in Figure 5.13, this spreadsheet is capable of supporting 6 day per week production of up to 5 packages of 8 different brands. This allows for 40 possible different requests per day, or 240 per week, to be handled.

Daily Requests		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Product or Brand 1	Package 1	250	500	500	100	750	500
	Package 2	10.000	10.000	5.000	10000	6500	25000
	Package 3	3.000	2.750	2.500	3.000	2250	5000
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 2	Package 1	500	250	500	750	750	1.000
	Package 2	5.000	100	5.000	6.500	6.500	10.000
	Package 3	2.500	1.500	2.500	2.250	2.250	4.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 3	Package 1	4.500	500	250	500	250	4.500
	Package 2	10.000	10.000	8.000	5.000	8.000	10.000
	Package 3	7.500	2.750	1.000	2.500	1.000	7.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 4	Package 1	250	250	250	250	250	250
	Package 2	8.000	8.000	8.000	8.000	8.000	8.000
	Package 3	1.000	1.000	1.000	1.000	1.000	1.000
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 5	Package 1	750	750	250	750	500	1.500
	Package 2	6.500	6.500	6.500	6.500	6.500	13.000
	Package 3	2.250	2.250	2.250	2.250	2.250	4.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 6	Package 1	1.000	1.000	500	1.000	1.000	2.000
	Package 2	12.500	12.500	5.000	12.500	12.500	17.500
	Package 3	4.500	4.500	2.500	4.500	4.500	7.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 7	Package 1	250	250	250	250	250	500
	Package 2	7.500	7.500	7.500	7.500	7.500	12.500
	Package 3	1.500	1.500	1.500	1.500	1.500	300
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 8	Package 1	500	250	750	250	500	1.250
	Package 2	7.500	10.000	7.500	7.500	5.000	10.000
	Package 3	1.500	1.500	2.500	1.500	2.500	2.750
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0

Figure 5.13 - Order Structure

The more different types of packaging a company has to deal with, the more money a company will save by moving to just-in-time production and digital printing, because storage costs and logistics increase as the number of products increases.

In this case, product or brand could be the same product packaged or labeled with different branding by a wholesaler, or it could be different products produced by the same production line. Packages 1 through 5 provide more flexibility when there are

variations within a product or brand. For example, each product or brand could be milk with a different retailer's labeling. Packages 1 through 5 are where variations such as full fat milk, skim milk, and semi skimmed milk may be entered.

Of course, if a production line is only producing variations of one product, or different products with no variation, the unneeded product inputs can simply be ignored.

5.3.10 Calculation of Hourly Rates

The Calculation of Hourly Rates sheet is a scheme to calculate the hourly rate (hourly cost) of operating the production line. It is basically a scheme to calculate TCO for the packaging line: The production per hour could be divided by the hourly rate to get the cost to produce one unit, and this could be multiplied by the lot sizes to give the cost of producing that lot size. A screenshot of the hourly rate scheme is shown in Figure 5.14.

	Annahmen Investitionsrechnung (all values in €)				Conventional	Inline Printing
1.	**Equipment Costs**	# of units	Invest per Unit			
	Investment	1	7.100.000	Euros	7.100.000	7.100.000
	Number of additional eaquipent needed Conventional	1	250.000	Euros	250.000	
	Number of additional eaquipent needed Inline Printing	1	350.000	Euros		350.000
	Inline Printing Unit	1	450.000	Euros		450.000
	Total Investment	**Total**		Euro	**7.350.000**	**7.900.000**
	Depreciation Period			Years	10	10
	Depreciation per Year			Euros/Year	735.000	790.000
	Calc. Interest Rate f. Calc. Interest	6,5%		Euros/Year	238.875	256.750
2.	**Cost of Labor**					
	Mannpower				2	2
	Costs per FTE			Euros	40.000	40.000
	Total Costs Manpower			€	200.000	200.000
	Number of Shifts				2	2
	Number of working hours per shift			Hours	7,5	7,5
	Number of working Days per Week			Days/Week	6	6
	Total average Working Days of FTE per Year			Days/Year	240	240
	Total working hours of FTE per year				1.800	1.800
	Up Time of the Equipment			%	95%	95%
	Number of working weeks per year	50		Weeks/Year	50	50
	Total of production days			Days	300	300
	Total production hours per Year			Hours/Year	4.500	4.500
3.	**Misc. Production Costs (Running Costs)**					
	Cost of service / maintanance of	**Blister-Line**	in % of Invest	2,0%	142.000	142.000
	Cost of service / maintanance of	**additional Equipmen**	in % of Invest	3,0%	7.500	10.500
	Cost of service / maintanance of	**Inline Print Unit**	in % of Invest	7,50%		33.750
Σ	**Total of Service and Maintance**				**149.500**	**186.250**
	Average Power Consumption of Equipment in use			kW	27	33
	Average Energy Consumption			kWh	121.500	148.500
	Cost of electrical Energy	0,12	€/kWh	Euros/Year	14.580	17.820
	Cost space	15,0	€/sqm/month	€/sqm/month		
	Space needed for equipment in use			sqm	75	75
	Total Cost of space per year			€/year	13.500	13.500
	Water Consumption			m3 pro Jahr	4.500	4.500
	Cost of Water per Year	2,0	€/m3	€/Year	9.000	9.000

	Ergebnisse der Investitionsrechnung	Units	Conventional	Inline Printing
	Total of Investment	€	7.350.000	7.900.000
1.	**Cost of Equiment per Year**			
	Depreciation per Year	€/Year	735.000	790.000
	Calc Interests per Year	€/Year	238.875	256.750
2.	**Running Cost of Equipment per Year**			
	Cost of Labor	€/Year	200.000	200.000
	Cost of Energy	€/Year	14.580	17.820
	Cost of Space	€/Year	13.500	13.500
	Cost of Water	€/Year	9.000	9.000
Σ	Cost of Service and Maintenance	€/Year	149.500	186.250
	Total Production Hours per year	Hours	4.500	4.500
	Total of Production Costs per Year	€/Year	1.360.455	1.473.320
3.	**Hourly Rate of Production Line incl. Printing System**	€/Hours	**302**	**327**

Figure 5.14 - Calculation of Hourly Rates

The hourly rate scheme is not required to use the tool, because if the hourly rate is known, it can be keyed in on the General Inputs tab. But because the editor of this sheet probably does not know the hourly rate of a digital production line, it is there to give an estimate of this rate to compare with their current situation.

As with the other input sheets, dialog boxes were programmed to allow the user to input the required parameters.

5.3.11 Calculation Sheets

Most of the calculations in this tool are performed using excel formulas rather than VBA code, and the three sheets needed for this were not updated from the original sheet.

5.3.12 Packaging Costs

Packaging costs are unique because they depend on the lot size produced. The packaging costs tab is a scheme to calculate these costs. No inputs are required because the packaging costs depend on inputs from the general inputs & lot sizes tab, and they are automatically calculated behind the scenes after these parameters have been entered.

5.3.13 Production Costs

Production costs are literally the costs to produce a specified lot size (run length) of product. Production costs are calculated by simply dividing the per 1000 units process cost by 1000 to get the cost per unit, multiplying this result by the lot size to get the process cost per lot, and adding the per lot handling charge if there is one. This distributes the process costs over the size of the lot to come up with a total cost of production.

The exception to this is packaging costs, which have costs that vary depending on lot size. The packaging costs are simply copied from the packaging costs tab and displayed as the production costs for that process step.

Before any VBA code was added, these calculations were done using formulas directly on the excel sheet. This is one exception in the entire spreadsheet where some cells are manipulated through VBA instead of excel formulas. When the process steps are entered on the definition of process steps tab, VBA code calculates the cost per lot for all of the lot sizes and displays the results on the production costs tab. For the packaging process step, the results of the packaging costs tab are displayed as the production costs for that step.

5.3.14 Overall Time & Cost Savings

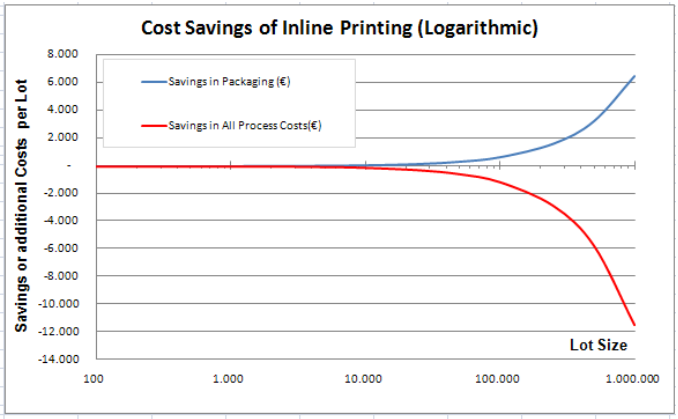
This sheet is a scheme to calculate the overall savings that can be achieved by implementing digital printing. The result of this sheet is the savings per year which could be achieved by implementing digital printing, which can also be interpreted as the profit generated by the digital printing machine per year.

5.3.15 Results & Diagrams

Figure 5.15 shows the layout of the results tab. There are two parts to this page: a table and two graphs which show the total savings for the different lot sizes, and the actual pay back time calculation.

It is important to note that in "controller's notation", which this tool uses, savings are negative. Hence the red lines in the graphs, which show the savings due to all process costs, increase as the run length increases, but the blue lines, which are the savings only due to packaging, actually decrease as run length increase.

Total Savings		
Lot Sizes	Savings in Packaging (€)	Savings in All Process Costs(€)
100	- 54	- 56
250	- 53	- 58
500	- 51	- 60
1.000	- 38	- 56
2.500	- 24	- 69
5.000	- 8	- 97
10.000	25	- 155
25.000	123	- 326
50.000	285	- 613
100.000	610	- 1.185
250.000	1.585	- 2.903
500.000	3.210	- 5.765
1.000.000	6.460	- 11.490



Pay Back Calculation		
	Units	Values
Invested Capital	€	7.900.000
Use Period	Years	10,0
Interest Rate	%	6,5%
Calc Interest Rate	€ / Year	5.135
Depreciation	€ / Year	790.000
Earings (Profit)	€ / Year	- 745.440
Cash Flow	€ / Year	1.540.575
Pay Back Period	Years	5,1
	Month	61,5

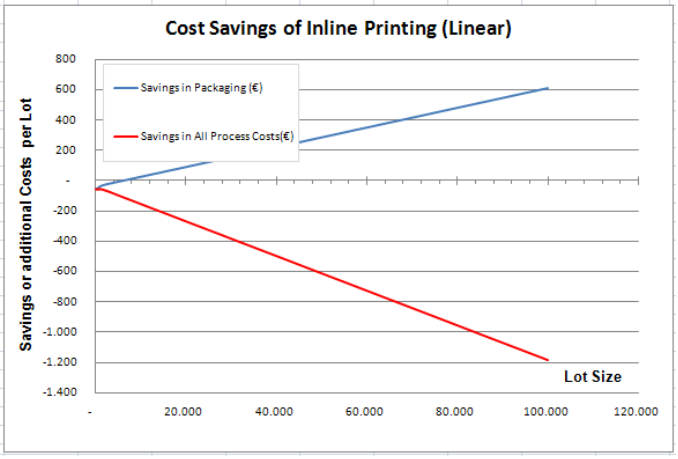


Figure 5.15 - Results

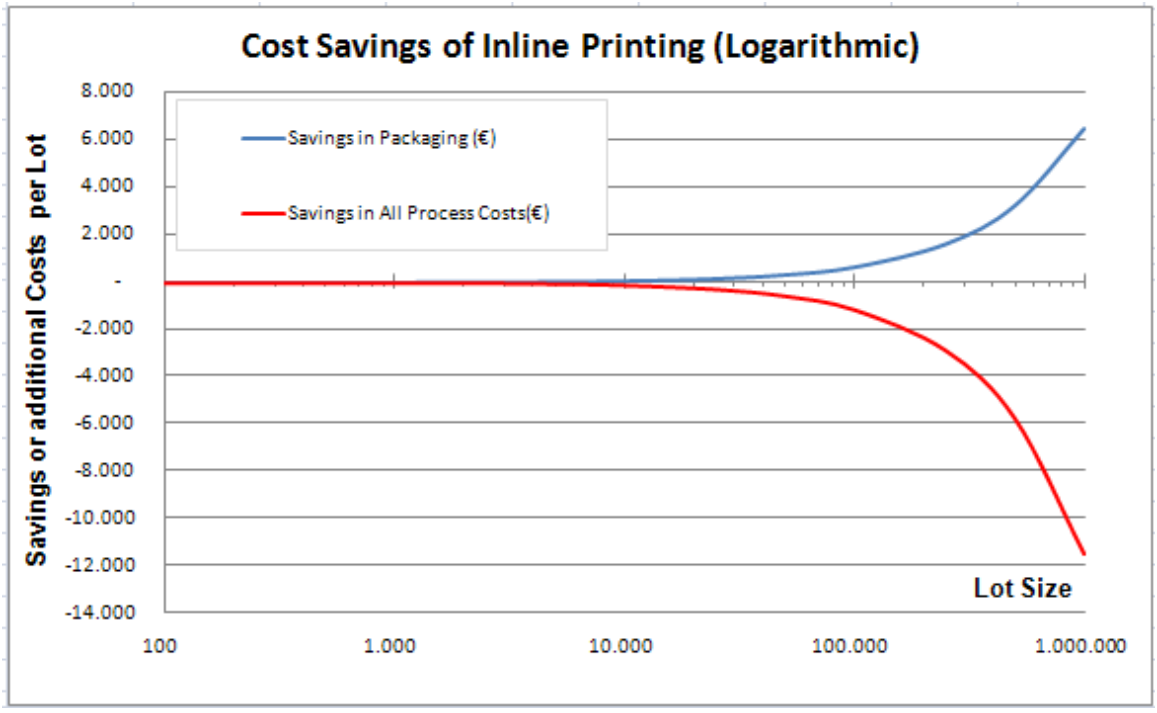


Figure 5.16 - Cost Savings of Inline Printing (Logarithmic)

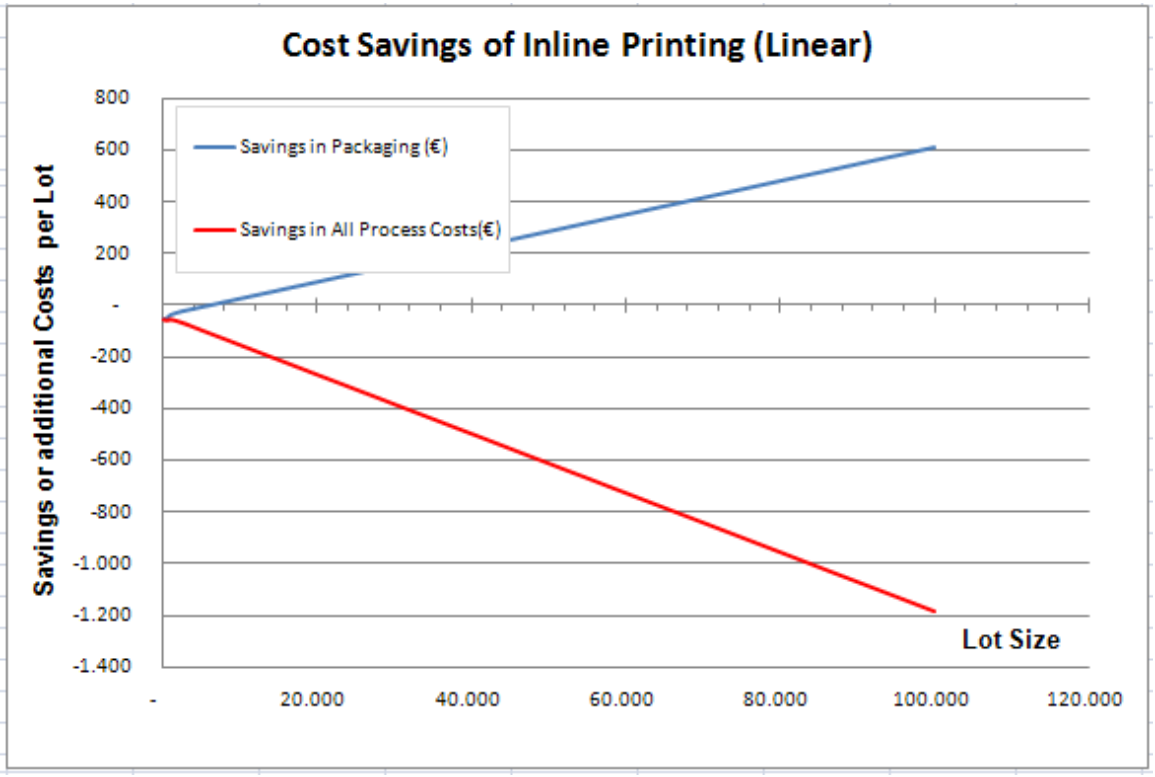


Figure 5.17 - Cost Savings of Inline Printing (Linear)

Figures 5.16 and 5.17 show detail views the graphs of cost savings generated by this excel tool. The two graphs show the same data, but the X-axis (lot sizes) is scaled in a logarithmic fashion to give a clearer representation of the trend of the savings.

The blue curves show the costs saved through reducing the cost of packaging. This reflects both the reduced cost of packaging itself, as well as the cost savings due to inline printing vs. retrieving pre-printed labels from storage. The data from which the curves are generated is the Total Savings chart shown in Figure 5.18, which is simply the sum of the savings in each process step.

Total Savings		
Lot Sizes	Savings in Packaging (€)	Savings in All Process Costs(€)
100	- 54	- 56
250	- 53	- 58
500	- 51	- 60
1.000	- 38	- 56
2.500	- 24	- 69
5.000	- 8	- 97
10.000	25	- 155
25.000	123	- 326
50.000	285	- 613
100.000	610	- 1.185
250.000	1.585	- 2.903
500.000	3.210	- 5.765
1.000.000	6.460	- 11.490

Figure 5.18 - Total Savings

The second part of the results is the actual pay back calculation. This is the actual time it takes for the digital printing machine to pay for itself. An example of what this result might look like is shown in Figure 5.19, with the pay back given in months and years.

Pay Back Calculation		
	Units	Values
Invested Capital	€	7.900.000
Use Period	Years	10,0
Interest Rate	%	6,5%
Calc Interest Rate	€ / Year	5.135
Depreciation	€ / Year	790.000
Earings (Profit)	€ / Year	- 745.440
Cash Flow	€ / Year	1.540.575
Pay Back Period	Years	5,1
	Month	61,5

Figure 5.19 – Pay Back Calculation

5.3.16 Example Calculation

An example calculation with detailed screenshots and instructions can be found in Appendix A4.

5.3.17 Summary

This program is a scheme to calculate the pay back time of installing a digital printing machine into a production line, and to give an estimate of the cost savings that can be achieved through the replacement of conventional printing with digital printing.

This scheme also can probably be adapted into a TCO calculator as well, because it includes the calculation of hourly rates scheme. If more details about costs were added here, this tool could become two good tools in one.

5.4 Profit & Loss calculator

This is an Excel based tool which has collected all of the prices of the products, quantities of sold products and calculates company's potential profit and loss after one, two and three years.

5.4.1 Theory and Purpose

This is a program which uses information about the costs of machines, their installation, consumables, maintenance contracts, Linoprint systems and services, and is multiplying them with the quantities they have sold in every year and all years together. Then everything is summed up to get revenue before and after giving a discount. Afterwards, manufacturing, project service, installation, warranty, R&D, sales and administration costs are summed up together to get company's total earning or maybe loss. It basically gives a rough overview of whether or not a sales project is creating profit.

This program is useful for a sales person, because he or she can work with the tool without interfacing with Excel itself. In contrast to the other tools, the language of this tool is german because it is meant for internal use by Linoprint sales personnel, instead of Linoprint's distributors.

5.4.2 Layout of the Spreadsheet

As shown in Figure 5.20, the Profit & Loss calculator consists of 6 sheets: FixedLine, DriveLineB, DriveLineC, DriveLineD, Preisliste and HK+Übrige Kosten (HK = Herstellkosten (english: manufacturing cost)).

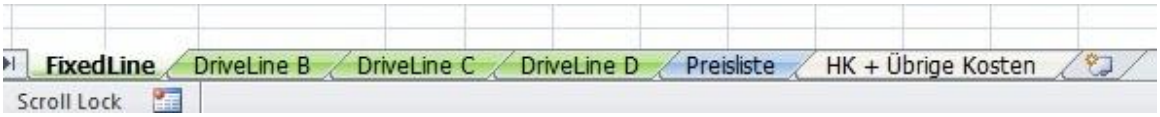


Figure 5.20 - Profit & Loss calculator Sheets

5.4.3 FixedLine, DriveLineB, DriveLineC and DriveLineD

These sheets, which can be seen in Figure 5.21, are all basically the same. The difference is that the information given in every sheet is for different market segments. The sheets consist of a main table, information about which market segment the table is used for (this example is FixedLine), the name of the salesperson who is editing the information, and three buttons ("Properties", "Print" and "Setup").

FixedLine Sales Rep: Walther

Geschäftsjahr	Preis	Menge	Ist 1. Jahr	Menge	Ist 2. Jahr	Menge	Ist 3. Jahr	Menge	Summe Ist 3 Jahre
Umsatz Erlöse :									
- Maschine	133,000 l	1 l	133,000 l	0 l	0 l		0 l		133,000 l
- Installation	6,000 l	1 l	6,000 l		0 l		0 l		6,000 l
- Verbrauchsmaterialien	50 l	1 l	50 l		50 l		50 l		150 l
- Wartungsverträge	133,000 l	1 l	133,000 l		133,000 l		133,000 l		537,000 l
- Sonstiges		1 l							
Z-Summe Erlöse Linosystems -Linc			404,050 l		133,050 l		133,050 l		802,150 l
Erlöse Sondereinrichtungen			100,000 l		0 l		0 l		100,000 l
- Linoprint Fit Tagessatz		1 l							
- Linoprint Lab		1 l							
- Linoprint Flow		1 l							
- Optione sy		1 l							
- Optione sy		1 l							
- Sonstiges		1 l							
Z-Summe Erlöse Sondereinrichtung			100,000 l		0 l		0 l		100,000 l
ERLÖSE BRUTTO			504,050 l		133,050 l		133,050 l		902,150 l
Preisnachlässe			25,203 l		0 l		0 l		25,203 l
in %			5%						
ERLÖSE NETTO			478,848 l		133,050 l		133,050 l		876,948 l
Halbfertig-Material Aufträge variable	103,000 l	1 l	103,000 l		0 l		0 l		103,000 l
Herstellkosten Verbrauchsmaterial	0 l	0 l	0 l		0 l		0 l		0 l
HERSTELLKOSTEN VARIABEL			103,000 l		0 l		0 l		103,000 l
AUFTRAGSKOSTEN SERVICE (Material)	133,000 l	1.0%	1,330 l		1,330 l		1,330 l		5,370 l
DECKUNGSBEITRAG 1			367,858 l		197,060 l		197,060 l		761,378 l
Maschinenaufstellung	2,380 l	1 l	2,380 l		0 l		0 l		2,380 l
Gewährleistung	180,000 l	0 l	0 l		0 l		0 l		0 l
HERSTELLKOSTEN FIX			2,380 l		0 l		0 l		2,380 l
DECKUNGSBEITRAG 2			365,478 l		197,060 l		197,060 l		759,598 l
Entwicklungskosten	11,250 l		11,250 l		11,250 l		11,250 l		0 l
Vertriebskosten	4,500 l		4,500 l		4,500 l		4,500 l		13,500 l
Verwaltungskosten	2,500 l		2,500 l		2,500 l		2,500 l		7,500 l
ENTWICKLUNG / VERWALTUNG /			18,250 l		18,250 l		18,250 l		21,000 l
BETRIEBSERGEBNIS			347,228 l		178,810 l		178,810 l		**738,598 l**

PROPERTIES PRINT SETUP

Figure 5.21 – The main sheet of different market segments

As you can see, the top row of the table consists of price, quantity of products sold in every year and in all three years together. The bottom row is similar with the total price and total earnings.

In order to enter parameters on the sheet, the input dialog boxes can be shown by pressing the "Properties" button. This brings up a series of dialog boxes which allow the user to enter the parameters. The editor of the sheet is asked for his or her name (Figure

5.22), which is important for documentation or if the sheet is printed and given to a customer.

Figure 5.22 – Name of the Editor

5.4.4 Preisliste

This sheet contains the prices of Linoprint products. There are three tables of prices. Each of them consists of a different group of prices for Linoprint Systems, Software, Solutions, Consumables, and Spare Parts. The prices of this sheet are linked straight to the sheets “FixedLine”, “DriveLineB”, “DriveLineC” and “DriveLineD” columns called prices.

The first table, called 5.1, is Linoprint Systems. This table contains the prices of the different DriveLines. Every DriveLine also contains different prices according to its parameters such as printing width, additional colors, or additional inspection systems.

Table 5.1 – First Pricelist

Lino::Systems		price in 1.000 €					
		printing width	1C	2C	4C	add. Color	add. inspection system
DriveLine B 360 dpi	offline	72 mm	189	199	219		29
		144 mm	199	219	249		44
		216 mm	259	279	319		59
		288 mm	279	309	349		74
DriveLine B 600 dpi	offline	108 mm	249	269	299		44
		216 mm	299	329	379		59
		324 mm	349	379	439		price on request
DriveLine C	offline	70 mm	179				29
		140 mm	219				44
		210 mm	259				59
		format extensions	49				
DriveLine D *	offline	70 mm	appr. 119			49 per Color	
		140 mm	appr. 179			49 per Color	
		210 mm	appr. 209			49 per Color	
	inline	70 mm	appr. 119				
		140 mm	appr. 179				
		210 mm	appr. 209				
FixedLine		70 mm	49				
		140 mm	67				
		210 mm	83				

The second table (5.2) as it is shown is Linoprint Software. The Software is called Linoprint Flow. The prices are variable depending on the kind of the Software.

Table 5.2 – Second Pricelist

Software		price in 1.000 €				
		1C	2C	4C	add. Color	add. inspection system
LinoFlow Spot		4,9				
LinoFlow Color				9,9		
LinoFlow Connect		6,5	6,5	6,5		
LinoFlow Remote		5,5				
LinoFlow Datadrop		3,5				
LinoFlow Vision	Part of inspection system					
LinoFlow Rend		5,9				
LinoFlow Trap		6,9				

The third table (5.3) is Solutions, Consumables and Spare parts. It contains the costs of ink, cleaning fluid, curing systems and other additions to the printing lines.

Table 5.3– Third Pricelist

Solutions, Consumables and Spare parts			price in 1.000 € per part/litre
UV curable Ink	Mercury Lamp, CMYK a. Light,	A01, A03	0,10
	Optimized for Food**, CMYK	A02	0,14
	Optimized for LED Curing, CMYK	E02	0,11
UV Cleaning Fluid	Saphira Linoprint Cleaning Agent	U01, U02	0,04
Printing Module	KM 1024, 72 mm - inclusive installation		5,2
	KM 1024, 72 mm - w./o. installation		4,2
	Xaar 1001, 70 mm - inclusive installation		5,2
	Xaar 1001, 70 mm - w./o. installation		4,2
	Kyocra KJ 4, 108 mm - inclusive installation		8,5
	Kyocra KJ 4, 108 mm - w./o. installation		7,5
Curing System	mercury lamp 100 mm		
	mercury lamp 150 mm		0,59
	mercury lamp 220 mm		
	mercury lamp 300 mm		
	mercury lamp 340 mm		
Camera System	Camera 2048 Pixel (< 75 mm PW) - inclusive installation		11,6
	Camera 2048 Pixel (< 75 mm PW) - w./o. installation		10,9
UPS	all DriveLine Systems		4,1
Service 36+ Contract	DriveLine B	72 mm	28,3
		144 mm	30,3
		216 mm	32,3
		288 mm	36,3

5.4.5 HK + Übrige Kosten

This sheet contains manufacturing and other costs. At this time it has no information in it. The information will be provided by company's representative during the upcoming work with this tool.

5.4.6 Buttons

1)

This button opens Print Preview (Figure 5.23).

It gives a faster way to print the sheet.

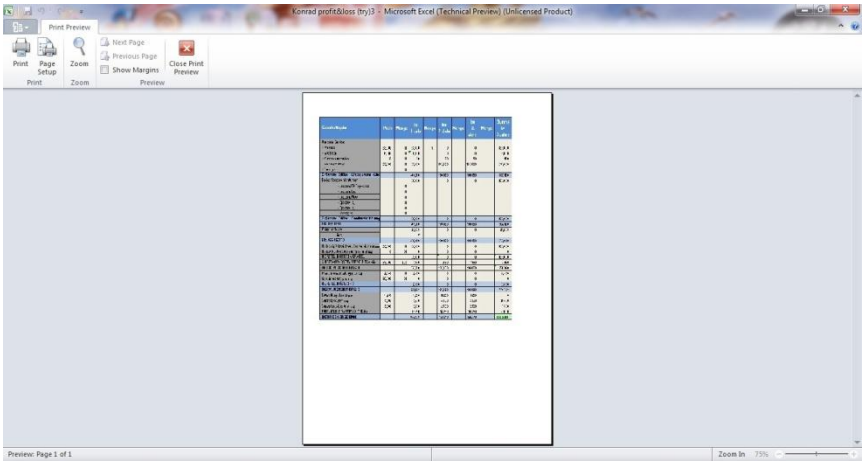


Figure 5.23 – Print Preview

2)

This button opens Setup dialog box (Figure 5.24). It allows the bookkeeper to change all the information kept in this document. There are fields for username and password.

When the Username and Password are correct, the program unlocks "FixedLine", "DriveLineB", "DriveLineC" and "DriveLineD" and HK + "Übrige Kosten" which are

usually locked and can be changed only by the bookkeeper. The dialog box also contains "Log Out" button, with which the sheets can be locked again, "Change Username and Password" button, which opens other dialog box to change these parameters. Like other dialog boxes, this one also contains "cancel" and "OK" buttons.

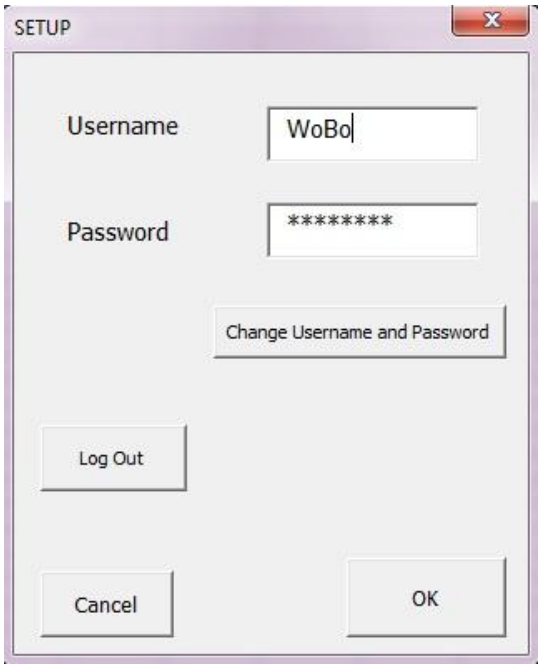


Figure 5.24 – Setup Dialog Box

3)

This button opens properties dialog box (Figure 5.25). The person who entered his name in the field "Definition Auftrag" is able to change properties for all the market segments: FixedLine, DriveLineB, DriveLineC and DriveLineD for three years.

In this dialog box the sales person is only able to change the quantity of the sold products and the discounts. There are also "Cancel" and "OK" buttons, which let the user to cancel the changes and leave the dialog box or confirm the changes with the "OK" button.

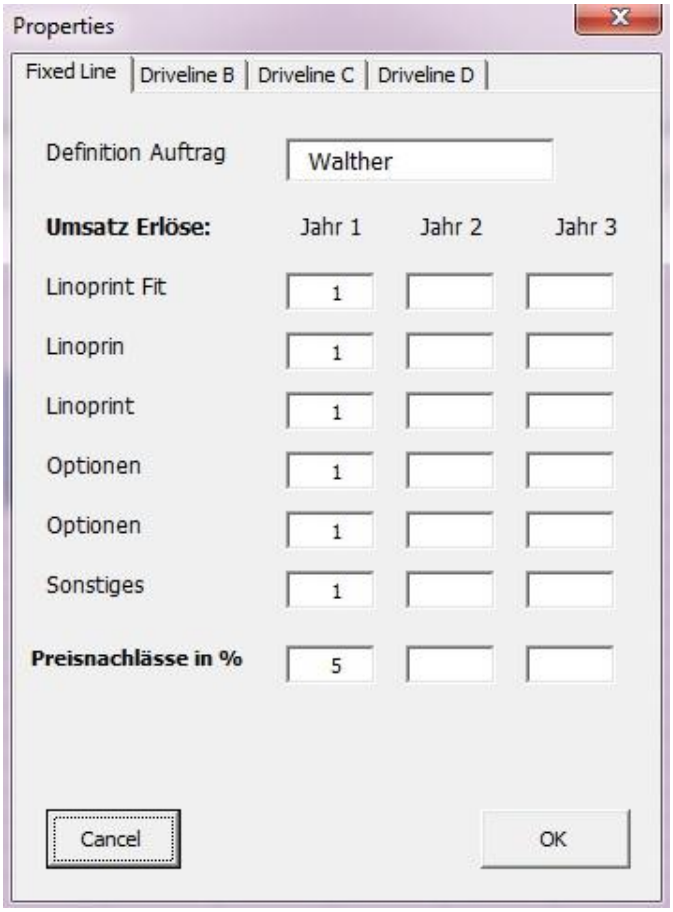


Figure 5.25 – Properties dialog box

5.4.7 Summary

This is an Excel tool basically made to calculate the company's profit and loss.
In this Excel Spreadsheet all the data is put together and counted using excel formulas to have the total results such as earnings. All the data and results are visible to have the clear view about company's bookkeeping.

This tool should help the salesman, who has no experience with Excel, to change the parameters and enter the data only using dialog boxes. The information is also protected with username and password from the persons who don't have the right to change the data.

Chapter 6: Marketing Concepts

6.1 Introduction

In the previous chapters we have been learning many things about our company, Linoprint. What it is doing, for whom, and who its distributors and competitors are. We have been working too with marketing tools, which have helped us to better understand how the company is selling its products. So, now that we know a little about the business, we would like to give our opinion about how Linoprint is selling its products.
The objective is to make some recommendations about Linoprint´s web page, brochures, catalogs, and marketing communication in general.

6.2 Suggestions for Linoprint to Sell its Products

Give testimonials.
Digital printing for industrial packaging is a new field and like always, few want to be the first comers. In consequence, in our point of view, showing successful costumer experiences is of the most importance thing for Linoprint. When you enter the webpage of HP Indigo, before even they show you their products they explain their success stories of the change to digital. The first thing you see when you enter their webpage section in printing machines for packaging is a Sprite can. HP Indigo, as the market leaders in all digital printing markets, can use the names of the finest companies in their examples: Coca-cola, Lexus etc. Couldn´t Linoprint do the same, with its customers, in a different scale?

Linoprint is considering digital as a substitute and not as a complement to conventional printing. Does this cause the loss of good selling opportunities?
In the whole web or brochures we don´t find any references to the complementarities of Digital and Flexo and we think that there are powerful reasons to consider this:

- These are transition times, from one technology to another and at this moment, for some works, the new technology is not as good as the old one. Digital is working very well in blister and other parts of packaging industry thanks to customization, Track & Trace needs, and others, but for long runs and certain jobs it is still not competitive. Our customers know that and we show them more understanding of their business by being aware of the previous facts. This would help build trust in the Linoprint brand.
- What is wrong if we sell digital machines, not just because they´re better, but because they can let the conventional printers printing the jobs where they are still the best? In that way, you´re taking more profit from both machines. Digital helps you to make money with your conventional machines.

Clear messages.

- "Flexo is cheaper for long runs and for some works can do better quality. Use it for that".
- "Digital con let you do customizations, is a lot quicker and with less cost for small batches. Use it for that, too".
- "Work in the point where the cost per copy of flexo is very competitive and don´t lose set up time with short runs that digital can do faster and cheaper".

Aren´t we stretching our borders too much?

Linoprint states in its web page that its printing systems "are well suited for any production or packaging line", or that Linoprint can "Embellish blisters, folding cartons and labels in the range of pharmacy, food, non-food, cosmetics and beverages". In another example, we can read that DriveLine B: "prints on aluminum, plastic, foils, self-adhesive labels, paper and other flexible materials" It seems that Linoprint currently is addressing a very wide spectrum of the industry. People might have the impression that Linoprint is overselling a bit.

If packaging has around 20 segments, each of them with specific key factors, shouldn´t we center in just a few of them to be successful?

Marketing books always seem to underpin the great necessity to know deeply the customer´s needs and language of every segment in order to be successful. Is Linoprint trying to learn a lot of languages at the same time? Are they so similar that you can know them all?

Given the current crisis situation, wouldn´t it be better to get centered in the best competitive or promising model of the company and focus all the scarce resources into it? Is it not better to complete one deal than to have 5 deals fall through?

Hit the road!

Linoprint has models with competitive technical features. Even exclusively features, like some technological advances of DriveLine B. Why not offer potential customers attractive **"just try"** deals, or short term leasing: **"we rent you the machine by only…".** We think Linoprint should give to adequate customers the machine for testing: **"You decide afterwards".** When we say it is going to do the work it's because we believe it.

6.3 Website Analisys and Alternatives

Currently, having a good web page is a must for any company that wants to do business in a professional way. The website is the place where a lot of customers are going to get to know you for first time, get interested in your products or check the information you personally gave them. The website reflects the professionality of the company, its values, its objectives, and its personality too. Having a good website in style and in content gives revenue and business oportunities.

6.3.1 Overall assessment

Our overall assessment is that the Linoprint webpage should be more focused on the customer's interests and transmit a higher degree of initiative in selling its products. We overwhelmingly liked the design and style but unfortunately the content was disliked by the same degree of unanimity. In the following lines we are going to explain the reasons for this statements.

6.3.2 Analysis of the different parts.

We are going to go through the different sections of the website signaling what we believe are defficiencies and suggesting changes and alternatives.

6.3.3 Start page.

Considered inaccuracies

Linoprint´s webpage starts like this: "During the development of the Linoprint-Printing-Systems, we involved the customers at an early stage and intensively discussed their requirements. Their input…"

In our point of view, the first lines should be a presentation of the company. An explanation of who they are and what they are doing should be given. The current text does not suit this purpose.

Best practices:

As we can see with companies like HAPA or Domino, the first thing they do in their homepage is give a brief description and explanation of the company.

Figure 6.1 - Heading of Hapa´s Website

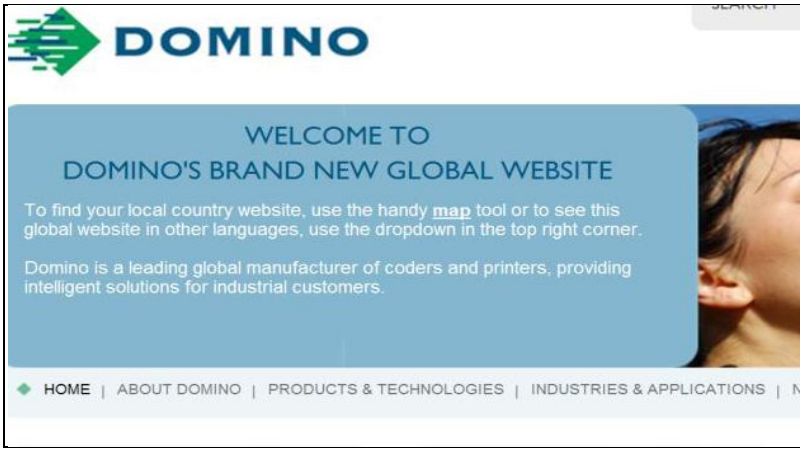


Figure 6.2 - Heading of Domino´s Website

Suggested changes

In our point of view the web should look like this:

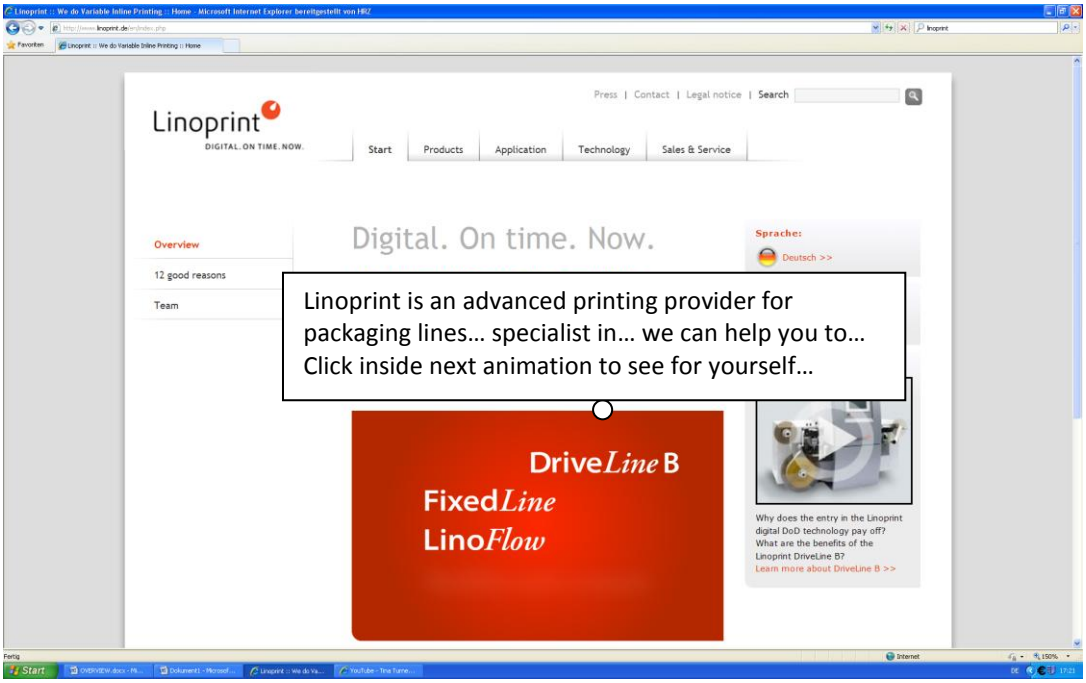


Figure 6.3 Suggested Changes to Linoprint´s Startpage

6.3.4 Products

Considered inaccuracies

For us it is clear that in the products page, the first thing we should find is just that, products, and not the description and advantages of how Linoprint integrates its printers into the packaging lines.

Best practices

When you click in products, Kodak shows you an introduction sentence and then a picture and brief description of the main models.

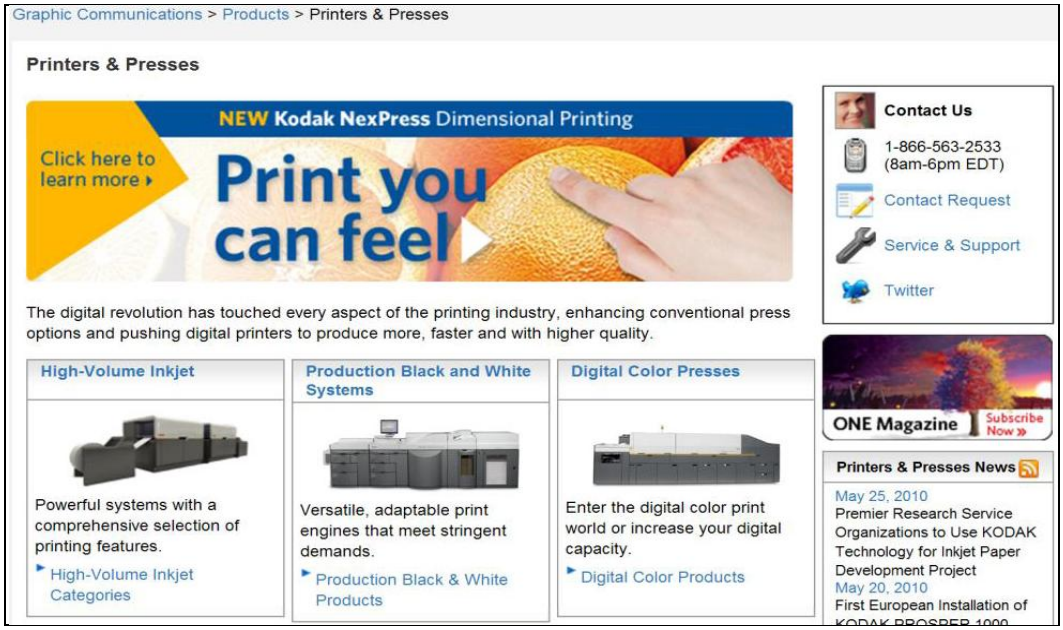


Figure 6.4 - Kodak Product Page

Another interesting option we can find it in Kora-Packmat´s web page. There, in the products section, they start showing a band containing their models:

Figure 6.5 - Products Label in Kora-Packmat´s Website

Suggested changes

We think that there are two options:

1. Start the webpage with a band containing the products, like Kora-Packmat does, and follow down with boxes for each product.

2. Start the products page with the label “Integration in a labeling machine” and follow with boxes explaining the different products. In the band there would be a catching element with a message like “see how we do it!” The pattern is shown below:

Figure 6.6 - Suggested Changes to Linoprint´s Products Page

6.3.5 Technology

Considered inaccuracies

In this part what we think should be done is to start by explaining the DoD technology that Linoprint is currently using, piezo. Instead, Linoprint's website starts explaining two DoD technologies that it is not using: continuous inkjet and thermal. We don´t understand the purpose of that.

Best practices

We think Impika´s solution is a good example of what we want. They only explain the technology they use, saying how well they master this field and the benefits for the customer of this technology This last point, the benefits for the customer, is what is most important.

Figure 6.7 - Impika´s Website Technology Page [68]

Suggested Changes

Take the two first points and start with piezo. Use less packed text and focus on the advantages for the customer.

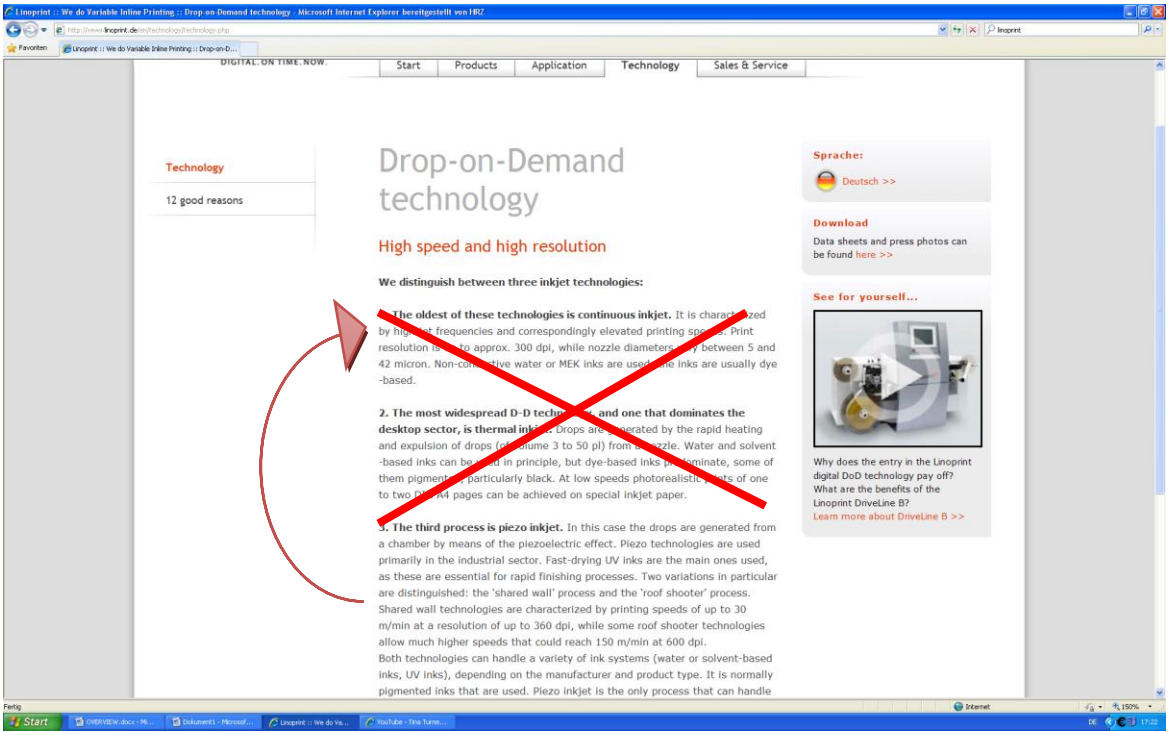


Figure 6.8 - Suggested Changes to Linoprint´s Technology Page

We would start with something like: “Linoprint digital solutions are based on piezo Drop on Demand technology” and follow in some way or another with the content of Impika´s explanations, which we think are very appropriate:

Figure 6.9 - Impika´s DoD Explanation

6.3.6 “12 Good Reasons”

Considered inaccuracies

This part is pretty well written and reasonable, but it is not effective. Again, the focus on the customer is lost. We think that Linoprint is not going to sell any machine for 12 reasons. It´s going to sell them because of 1, 2, or at most 3 reasons. The web mixes what is really important, 2 or 3 reasons, with the rest, thereby converting in something very general and non-interesting.

Suggested changes

We would focus on 2-3 reasons, making an effort to select just the really important points, and develop them.

At the same time, the structure of the message is clearer if there´s a difference between the customer needs and the ways Linoprint is going to solve it. We suggest the following structure:

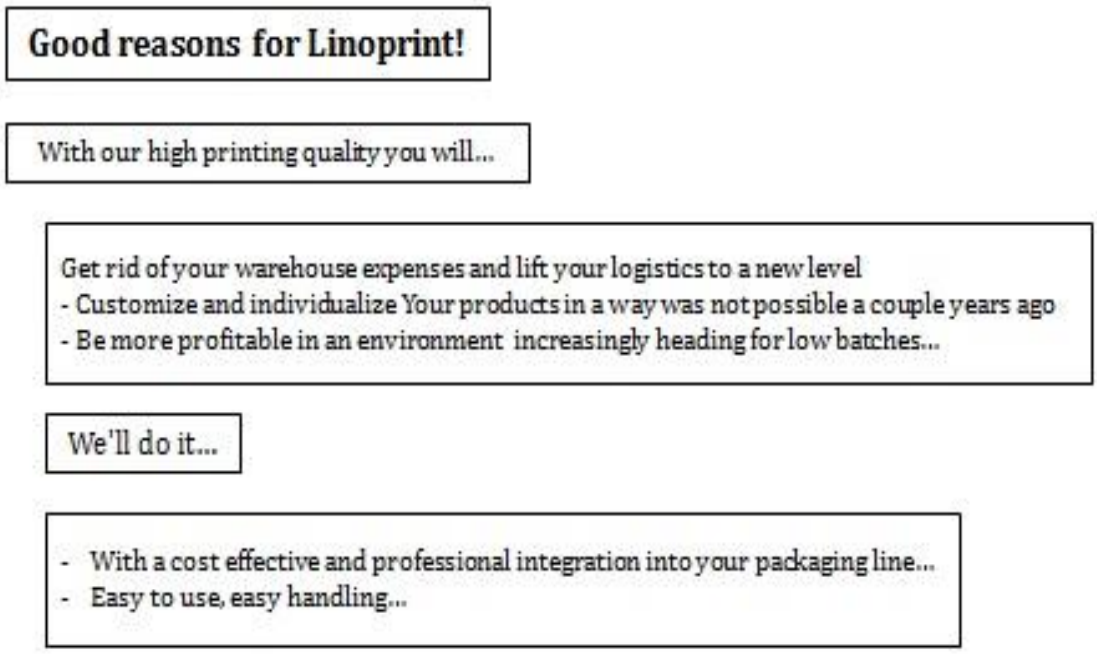


Figure 6.10 – Good Reasons for Linoprint

6.3.7 Lack of Examples

We think having examples would be extremely important to attract new customers and to help explain Linoprint's products. We explained this already in the first section of marketing tools where we gave the example of HP Indigo, continuously showing real examples of the works done by its presses. We can see it in the following picture.

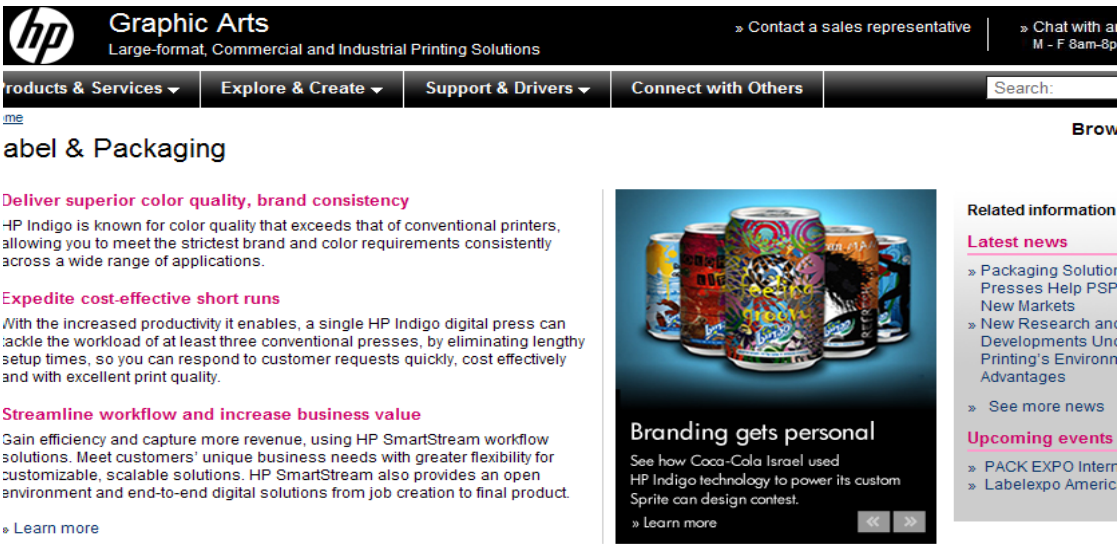


Figure 6.11 - HP Indigo´s Website Showing Print Job Examples

6.3.8 Terminology

We think that the language is sometimes difficult to understand for non specialists. Just as an example, for any person visiting the website, the first words he or she will find are variable printing, inline printing, and offline printing. Most people will not understand any of them. The first time we entered the webpage, we remembered how difficult it was to understand what Linoprint was and the products it offered. The page should be addressed to marketing, purchasing, and management people, not only for engineers or specialists.

6.3.9 Webpage Dynamism

We think that the site looks a bit flat, and a bit dead. Any changes should not spoil the nicely minimal and simple style it currently has. In the following picture we show how changes from page to page the top right part would translate to a less monotonous impression.

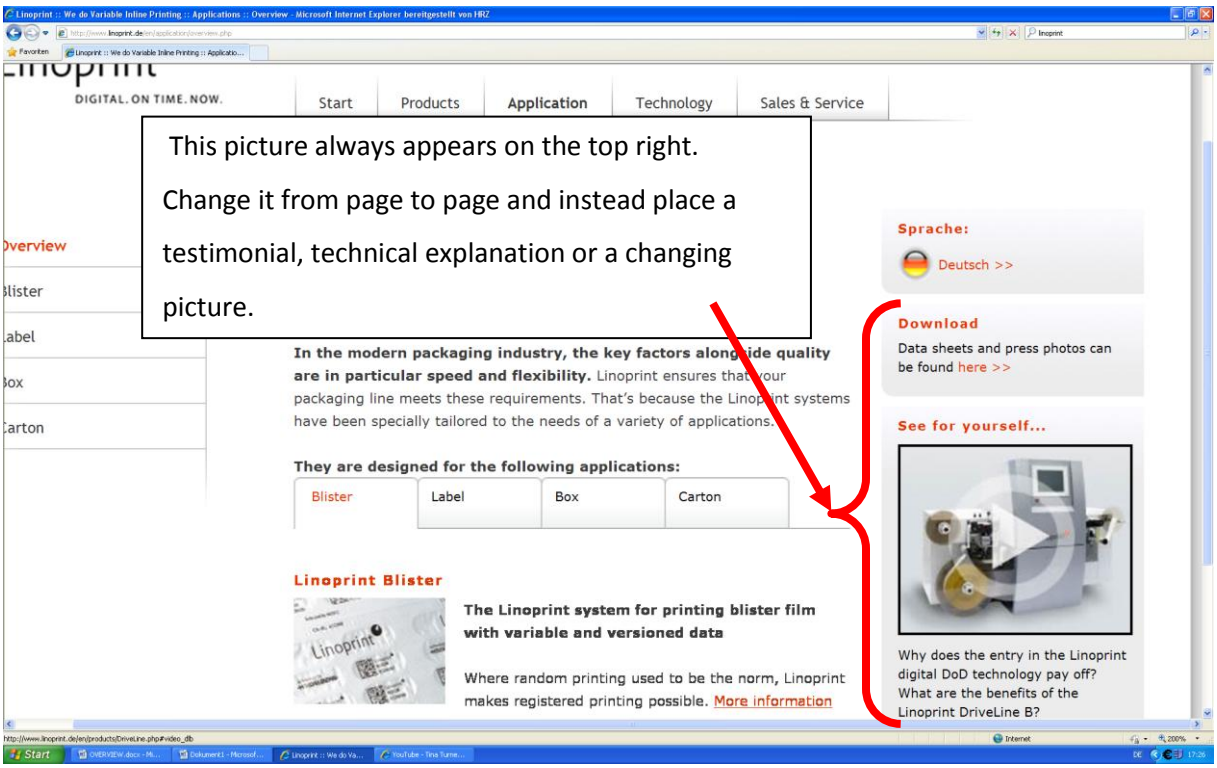


Figure 6.12 - Suggested Changes to Linoprint´s Top Right Pages

6.3.10 Media Content

Video "See for Yourself".

The video "See for Yourself" has different parts:

- Starts with images about HDM and continues with sales comments about DriveLineB: "In 2009 we shipped two DriveLineB label printing systems to a big chemical company in Germany..."
- Follows with a section "DriveLineB" that at the same times has two parts: Roll-to Roll Digital press and DriveLineB in operation.
- Continues talking about TCO and reasons to use digital.
- The final section is about inks.

After watching the video, our impression was that it is confusing, with the different parts not well structured, not well introduced, not well explained, and without the desirable quality. Again the short explanations are using a language for engineers and specialists impossible to understand for non experts.

Our suggestion would be only use the part about DriveLine B, and place it in the product page, where DriveLineB is explained. We would recommend adding voice to the video and changing some of the written labels. For example, the one saying: "Searching for print start before printing starts" should say "Searching for last printed label before printing starts".

In the product web page relating to DriveLineB, we would recommend the following changes in line with our proposals:

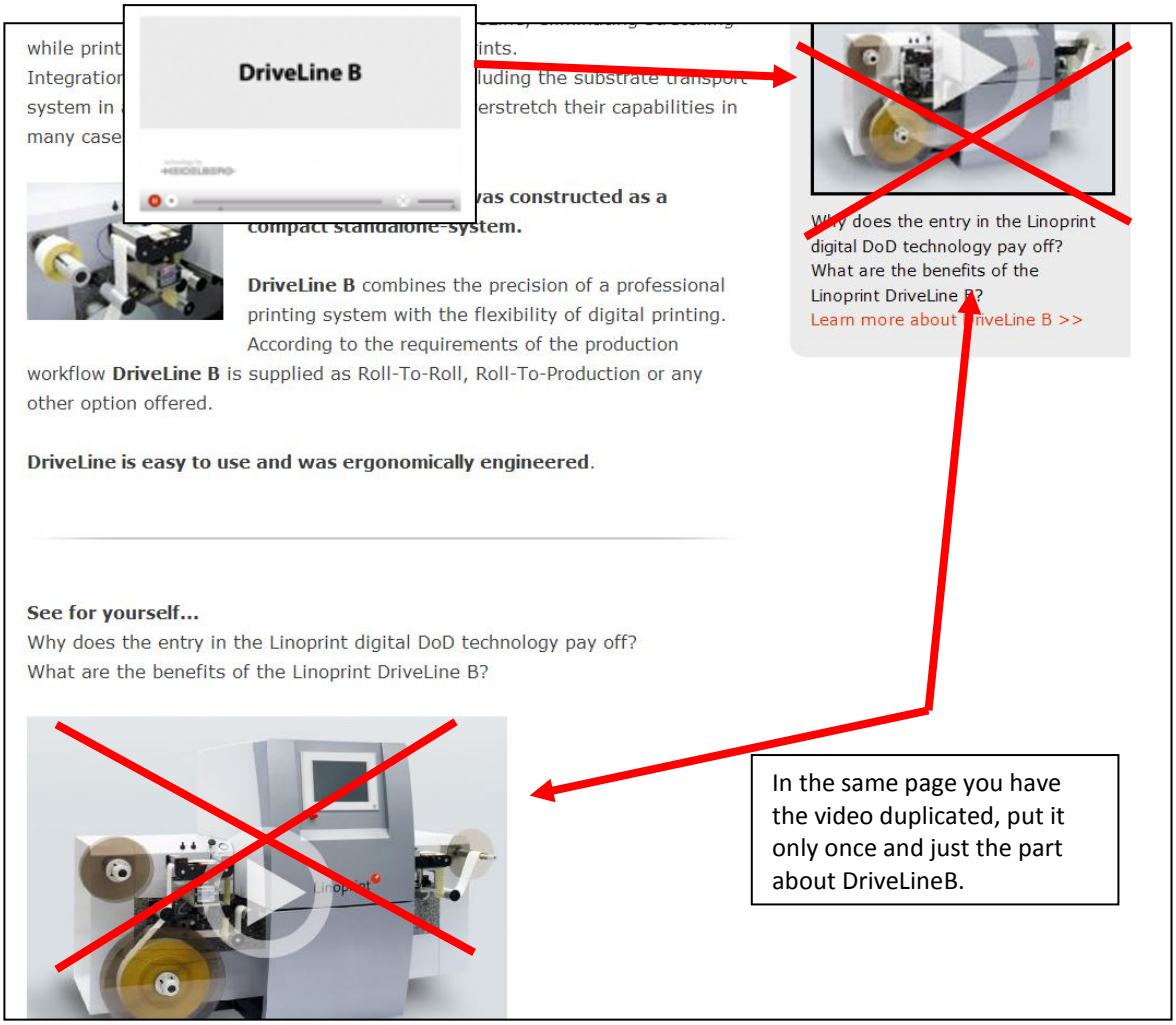


Figure 6.13 - Suggested Changes to Linoprint´s DriveLineB Product Pages

We think it would be of the most interest to show the machine actually working. We miss real video, not just schematics or mock ups. Showing a real machine running would catch the viewer's eye, with comments in a concise and engaging way about the great quality and features achieved it would be really interesting and explanatory.

6.3.11 Technical Errors

At the end of Sales & Service -> Distributors, the following part should be deleted:

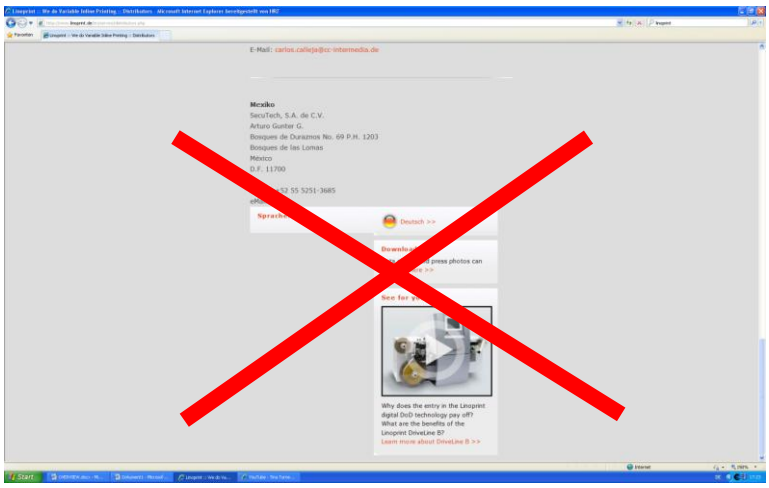


Figure 6.14 - Error in the Linoprint Sales & Service Webpage Section

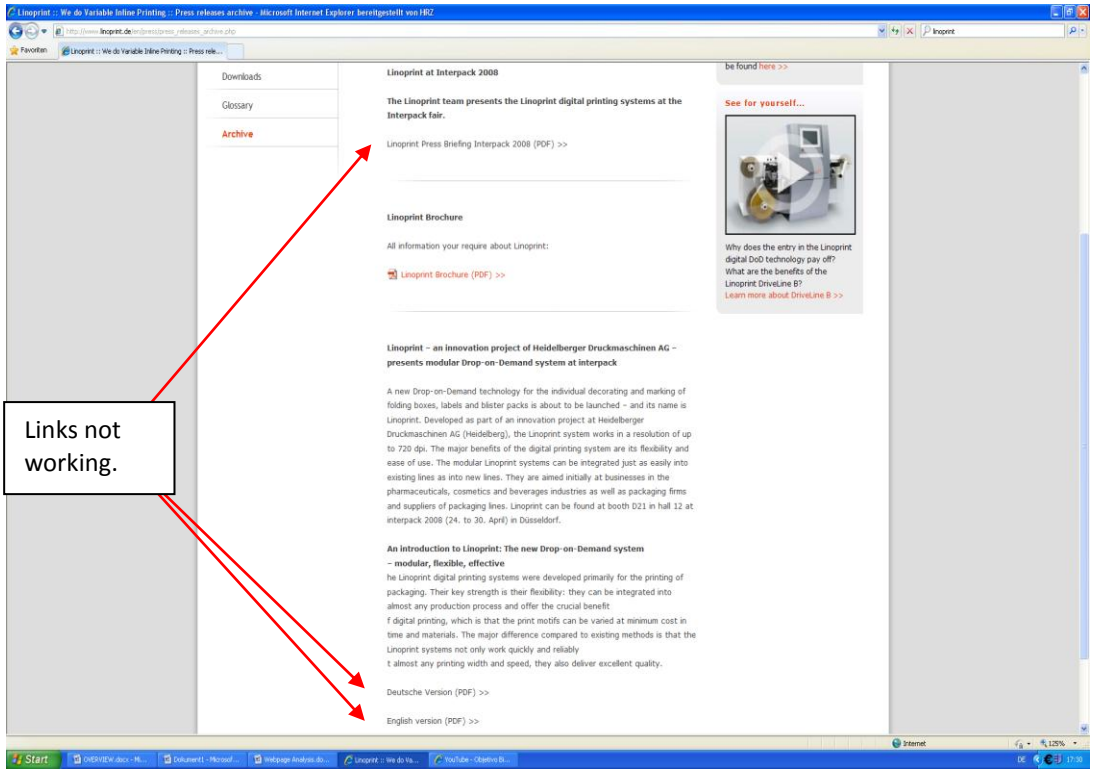


Figure 6.15 - Links Not Working on Linoprint´s Archive Page

Figure 6.16 - Programming Error in the Download Section

6.3.12 Conclusion

In this section we have been making a detailed website analysis. We have developed the criteria just with common sense and the desire to be helpful. We have obtained a good quantity of suggestions and we think the results really could help Linoprint to improve its Internet site.

Because it is more useful, we have been focusing only on what needs to be changed, and not in the nice parts. Here we would like to remind of our good impression of, for example, the lay out: “minimal”, “professional”, ”modern”, and ”matching perfectly with corporate image” were phrases mentioned by members of the team. The Applications & Sales and Service sections were well regarded too.

6.4 Distributor Forum

Linoprint’s forum was created with the intention of helping distributors. It is designed as a standard internet forum which makes it easy to use. Nevertheless, we think that the forum presents some disadvantages.

First disadvantage of the forum is the fact that it is not used at all. There are several evidences for that:

- the forum has 17 registered users but there are no topics and no posts on it

- there is no proof of any activity from any distributor ever
- the last update in News section was done in 03.10.2009

Because of that lack of activity we think that, either is not necessary for the distributors or they are not interested in this kind of contact with Linoprint. Another explanation would be that perhaps Linoprint does not try enough to get them interested.

In the distributor´s forum there is a section, downloads, with the brochures and datasheets about Linoprint products on the forum. This material is available to everybody on the Linoprint website, and the only exclusive information is a LinoFlow demo version.

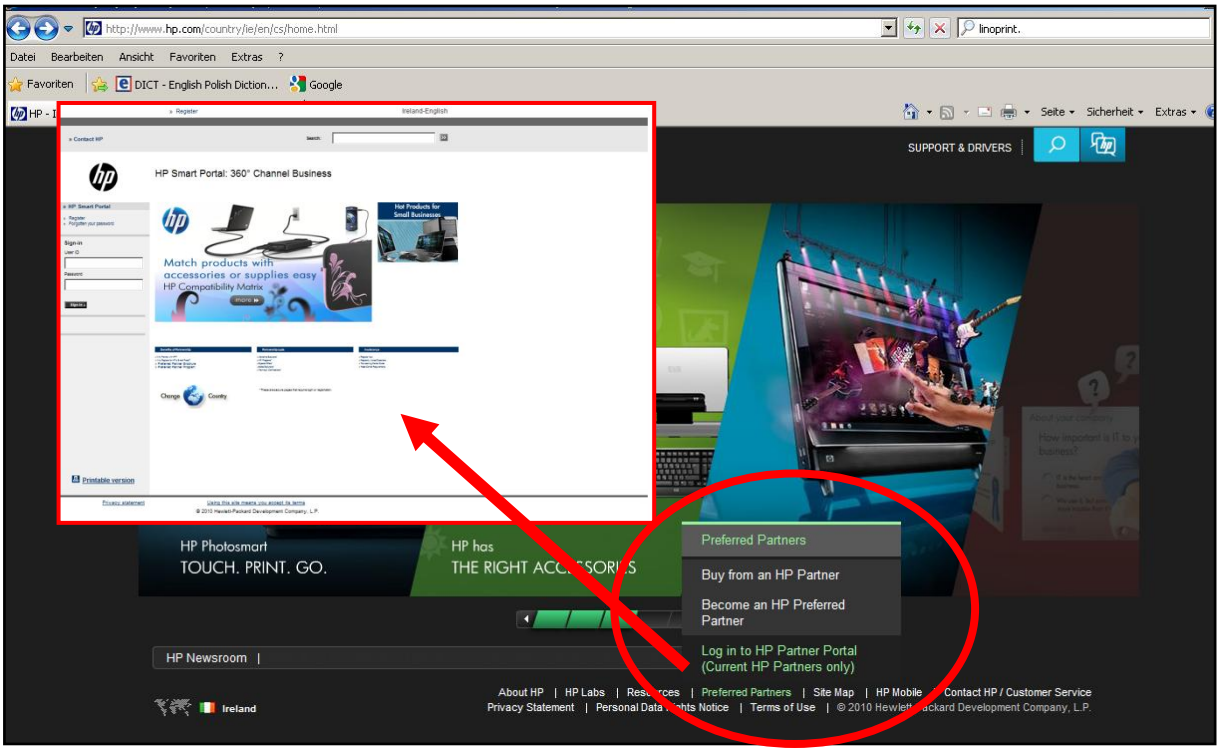


Figure 6.17 - Preferred Partners Section on the HP Website [48]

Our recommendation to transform the forum into something more lively would be to place it in the main website, in a subsection which might be called “For distributors” or “For partners”. A good example of this is the section Preferred Partners, on HP’s website, see Figure 6.17.

In such a section, Linoprint could provide information really necessary for distributors like price lists or some special financial data. We think it would be important that the information in this section should be different from the information in the website available for everyone.

6.5 Suggestions of New Actions for Linoprint. Analysis of Different Business Models: HAPA vs. Impika

In this section, we would like to analyze two direct competitors of Linoprint who take very different business approaches. We will explain in the following lines what their differences are, with the intention that the conclusions could be used to give Linoprint some recommendations in its course of action.

6.5.1 General Description and Overview

In the following chart, we want to give a few facts about both companies. Our selection was based not just in our knowledge that they were following different strategies, but also on the fact that they had a comparable size.

Table 6.1 – Key Data about HAPA and Impika Based on their Website Information

	Own business definition	Employees	Location
HAPA	"On demand printing systems for the pharmaceutical and cosmetic packaging industries".	100	Switzerland
IMPIKA	"Design, production and marketing of advanced industrial inkjet printing solutions".	50	France

6.5.2 Business Strategy

We will analyze their business strategy by taking a look at just two aspects. First, in how many segments of the industry is the company? And second, does the company offer customers more than one technological option? These are two basic questions that these companies are answering in different ways.

6.5.3 In How Many Segments of the Industry is the Company Specialized?

The answer is very simple: just let the companies answer by themselves. In order to do that, we entered their websites and just copied the information directly from their web pages into the following chart (Figure 6.4.2) without any change.

Table 6.2 – Impika's and HAPA's Own Definitions of their Market Presence

IMPIKA	HAPA
Large number of print engines and printing solutions for various industrial applications on five target markets : • **Industrial printing**: Decoration of various industrial substrates and manufactured products. • **Commercial printing**: High speed personalization of transaction or promotion documents (invoices, bank statements, bills and insurance forms, advertising inserts...) • **Security printing**: Personalization of security documents (identity cards, passports, car licenses....) • **Label**: Graphic printing on all kinds of labels (drugs, food and cosmetic...). • **Packaging:** Decoration of different types of packaging (cardboard, film, metal, glass...)	• Hapa manufactures "on demand" printing systems for the pharmaceutical and cosmetic packaging industries. • **Hapa is the world leader** of Late Stage Customization and On Demand printing technologies, delivering pharmaceutical industries fast, accurate and value-creating packaging solutions • Packaging forms: ampoules, bottles, cartons, bags, labels, blisters, leaflets, medical packs, pouches, strip packs, suppositories and vials.

The meanings of their own definitions are confusing for at least two reasons:

- **Some categories are part of the others at the same time**. For example, when Impika speaks about "markets", they refer to two things at the same time: on the one hand, market segments or industries they are addressing (security, industrial or commercial printing), and on the other hand, substrates they can print on (label). This is confusing because, for example, in packaging they print on labels, but they have a separate category for label at the same time. For HAPA, label is a sub category of packaging.

- **They do not understand the same thing when they talk about packaging.** When Hapa talks about packaging, it is thinking about Pharmaceutical or Cosmetics. On the other hand, Impika is also including categories like beverages or food.

In order to compare them, we needed to make a more systematic classification scheme. We have tried to separate clearly the substrates (label, paper, carton…) from the market segments (food, pharmaceutical, security) that the companies are addressing. For that purpose we have created the chart shown in Fig. 6.4.3. With these criteria now it is possible to compare both companies. We are going to obtain the information from their webpages and catalogs. The results of the searches are shown in the following charts.

For Impika:

Table 6.3 – Impika's Presence in the Different Markets

SEGMENT / SUBSTRATE	BEVERAGES	FOOD	PHARMA	COSMETICS & BODY CARE	INDUSTRIAL	SECURITY	COMERCIAL		
							Print on Demand	Mail	Others
LABEL	I	I	I	I					
PAPER			I			I	I	I	I
FILM	I	I	I	I					
CARTON		I	I	I		I			
FLEXIBLE PLASTIC	I	I	I	I					
RIGID PLASTIC	I	I	I	I	I	I			
GLASS	I	I	I	I	I				
METAL	I	I	I	I	I				
WOOD					I				

For HAPA:

Table 6.4 – HAPA's Presence in the Different Markets

SEGMENT / SUBSTRATE	BEVERAGES	FOOD	PHARMA	COSMETICS & BODY CARE	INDUSTRIAL	SECURITY	COMERCIAL		
							Print on Demand	Mail	Others
LABEL			H	H					
PAPER			H						
FILM			H						
CARTON			H						
FLEXIBLE PLASTIC			H	H					
RIGID PLASTIC			H	H					
GLASS			H	H					
METAL			H						
WOOD			H						

If we combine the two tables:

Table 6.5 – HAPA's and Impika's Market Presence

SEGMENT / SUBSTRATE	BEVERAGES	FOOD	PHARMA	COSMETICS & BODY CARE	INDUSTRIAL	SECURITY	COMERCIAL		
							Print on Demand	Mail	Others
LABEL	I	I	H I	H I					
PAPER			H I			I	I	I	I
FILM	I	I	H I	I					
CARTON		I	H I	I		I			
FLEXIBLE PLASTIC	I	I	H I	H I					
RIGID PLASTIC	I	I	H I	H I	I	I			
GLASS	I	I	H I	H I	I				
METAL	I	I	H I	I	I				
WOOD			H I		I				

We can see that the number of segments that IMPIKA covers is much wider than HAPA´s. In our chart IMPIKA is in 39 markets, but HAPA only in 13.

The following chart (Fig. 6.4.6) summarizes visually the differences between Hapa's and Impika's marketing strategies. As we can see all HAPA´s pictures are medical related. Instead, Impika´s pictures cover a wide variety of segments, almost everything.

Figure 6.18– HAPA's and Impika's Print Job Samples Obtained From Their Websites

6.5.4 Does the Company Offer the Customers More than One Technological Option?

This time the answer is easy and comes without confusion. In the chart we include the exact information offered by the companies:

Table 6.6 – HAPA's and Impika's Descriptions of How They Use Technology

IMPIKA	HAPA
Impika's printing solutions are fully digital and exclusively based on Drop On Demand piezo electric inkjet technology.	Only Hapa offers you the most sought-after printing technologies available to meet any Just-in-Time print production need, securely and reliably. **Flexo** technology is ideal for all bulk printing – runs in the tens or hundreds of thousands – and for product information and artwork requiring the highest print quality. **UV Digiprint** is Hapa's efficient computer-to-print technology for medium-sized batches were more frequent changeovers are required. **UV DOD** is the fully-digital, non-contact print technology ideally suited for the smallest batches, codes, and serialization, Track and Tracing and anti-counterfeiting measures. **Hybrid**, exclusively Hapa, allows you to combine any of our technologies – or those of any other suppliers' – into one system. Meet your existing and evolving needs. **Digital Laser Engraving:** The Hapa 500 series laser engraver incorporates a 50 or 200 Watt CO2 laser for medium or high speed engraving of the highest quality print mat material at up to 2400 dpi.

As we can see, Impika uses only one technology and HAPA uses three:

Table 6.7 – Comparison of the Company's Technology Portfolios

NUMBER OF TECHNOLOGIES	
Impika	**HAPA**
DoD	Flexo DoD Laser

6.5.5 Conclusions about HAPA's and Impika's Strategies

The results of our analysis show that HAPA and Impika are following different business approaches that can be summarized in the following chart:

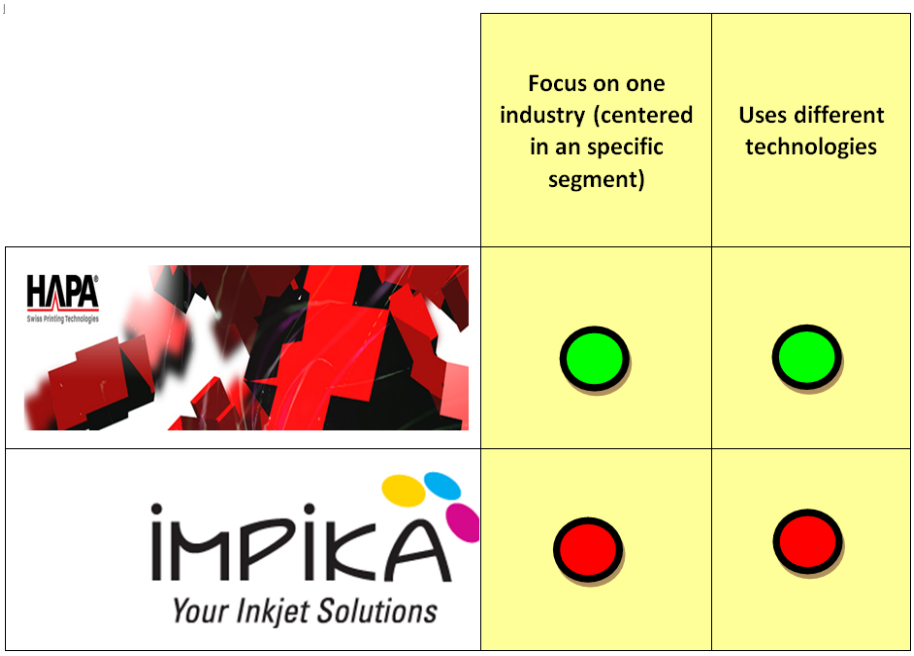


Figure 6.19 – Segment Presence and Technological Use of Impika and HAPA

Although it is well known that the trend in the pharmaceutical industry is going towards small runs, **there is still the need to print long batches**. In Europe's biggest countries like Germany or France, millions of units of the best selling drugs are sold annually in millions of units. These sizes are not printed in one run, but in 20 or 30, and each of these batches amounts to hundreds of thousands units. We show as example, in the following chart, the run size of the bestselling drugs in Spain in 2006.

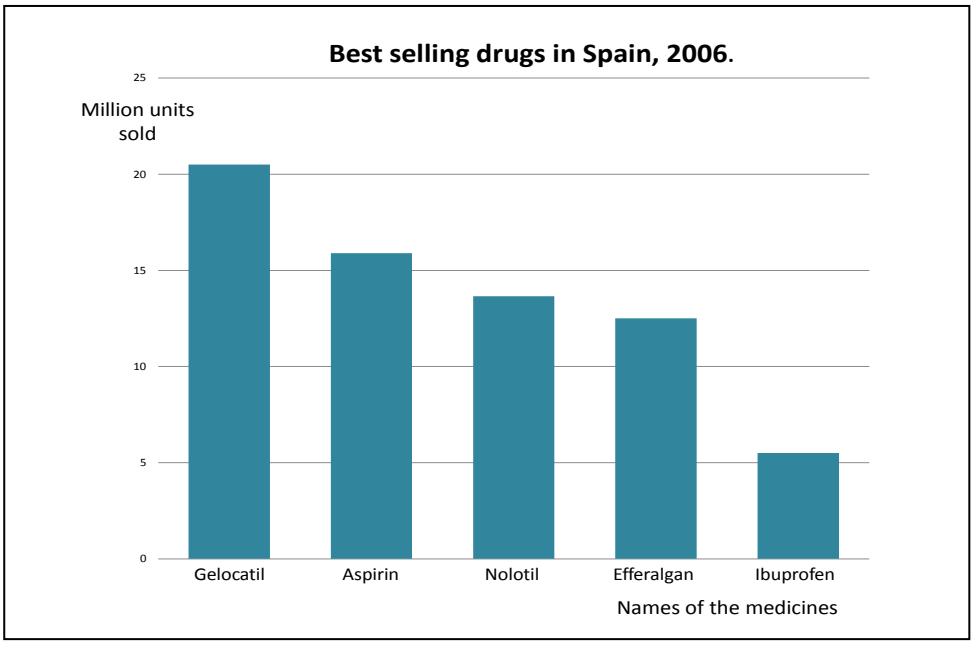


Figure 6.20 - Best Selling Drugs in Spain, 2006. Units mean boxes [103]

As digital label production is proven cost effective for run sizes between 1,000 and 150,000 labels, **currently, not all the jobs can be done cost effectively with digital.** In order to supply printing machines or services to the biggest pharmaceutical companies, **there is still a need to have flexo** in the portfolio. HAPA can solve all the needs of the pharmaceutical segment by printing long runs with flexo and short runs with DoD, but Impika can't.

HAPA is number 1 in blister and is more profitable than Impika, and we believe that the reasons are that HAPA:

- Covers only the pharmaceutical segment where it has a wide variety of products.
- Uses different technologies. That gives the company more flexibility in order to meet the different needs of the pharmaceutical industry.
- Is well established in the market.

As we explained in the previous section of this chapter, Linoprint may be stretching its borders too much. We have done the same search with Linoprint that we did with HAPA and Impika and the results are shown in figure 6.4.11. The conclusion is that Linoprint is closer to the model of Impika than HAPA´s. Linoprint´s presence in 4 segments is in between HAPA, present in 2 segments, and Impika, present in 6. Counter intuitively,

smaller companies like Linoprint and Impika are covering a greater number of market segments than bigger and better established companies. It seems that there is a law in the printing industry stating that the smaller you are, the more segments you are present in. We think that one of the reasons for this behavior is the inability of their management to risk. They prefer to "die slowly" by trying to cover too many markets than to assume the risk of failing by focusing their company in one segment.

Table 6.8 – Linoprint Market Presence

SEGMENT / SUBSTRATE	BEVERAGES	FOOD	PHARMA	COSMETICS & BODY CARE	INDUSTRIAL	SECURITY	COMERCIAL		
							Print on Demand	Mail	Others
LABEL	L	L	L	L					
PAPER			L	L					
FILM	L	L	L	L					
CARTON	L	L	L	L					
FLEXIBLE PLASTIC	L	L	L	L					
RIGID PLASTIC			L	L					
GLASS									
METAL									
WOOD									

6.5.6 Suggestions for Linoprint

We would like to suggest Linoprint to focus on one or two market segments. The reasons are that:

- Every market segment is very competitive, has its own language, its own specific technological needs, its own specifications. In order to succeed, the company must be aware of that and have a deep knowledge of the specific market it is focusing on. Linoprint should try to know well one of these markets instead of speaking a few words about 20 of them.
- With few resources, as Linoprint probably has, the best solution is to concentrate efforts on the most promising model, for example DriveLine B. Linoprint is going to sell more machines with one competitive model than with 4 below average machines.
- The complementarily that HAPA has with flexo and DoD technology is within the reach of Linoprint. Gallus, the Swiss daughter company of HDM, is specialized in flexo and could be a very good partner for Linoprint.
- Summarized in one chart, our advice move for Linoprint would be:

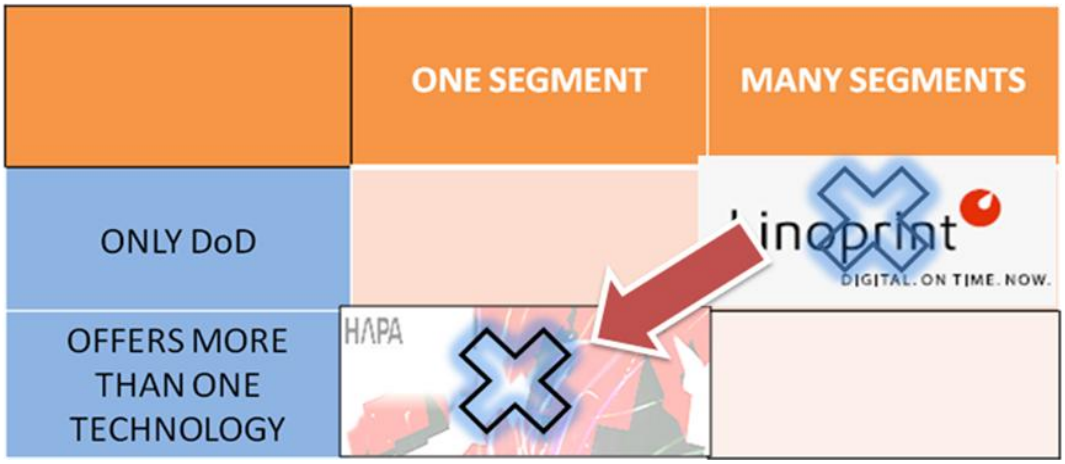


Figure 6.21 - Recommended Movement for Linoprint

6.6 Summary of Findings

In the chapter of marketing concepts we have been able to use the knowledge achieved throughout this project and had a chance to be consultants. We have been asking ourselves big questions: How can Linoprint sell its products? What are the competitor's strategies? Are these strategies better than Linoprint´s? We have thought about these questions and gave reasoned advice. We liked a lot the experience of being placed in the management positions and ask ourselves: What would you do?

The answer to this question has been in the direction of getting centered in just one or two market segments in which to concentrate the scarce resources. We´ve pushing through this chapter with some ideas like the importance of using testimonials.
In the second part of the chapter we have been analyzing Linoprint´s webpage. Our general assessment is that it is suboptimal, and we gathered a good amount of ideas to improve it.

Overall Conclusion

- The core HDM business, sheet offset, is being attacked by two sides, from gravure and especially from digital printing.
- Digital printing has improved a lot in these last years in terms of quality and speed. Now it is offering very attractive possibilities. Among them, being able to be more profitable in small batches, getting rid of warehouse expenses, or customizing production.
- Linoprint constitutes a risky movement for HDM: going to a new market (packaging lines instead of print shops) with a new technology (DoD piezo instead of sheetfed offset)
- Linoprint uses a promising digital DoD technology, piezo, which offers a broad spectrum of applications and selection of inks.
- Pharmaceutical and cosmetics are segments experiencing higher rates of growth than the GDP, and are expected to continue that way. The digital print market follows the same promising pattern. Linoprint's target markets seem like a good choice.
- Digital is growing every year and currently its best performing markets are: photo products, commercial printing and packaging.
- Ink is a complex matter and a continuous challenge for the printing industry.
- Only two distributors are effectively distributing Linoprint products: Griffin-Rutgers and Sigtech. The others are not really selling the product.
- About potential distributors we think two are very attractive: Vivo Health & Food Packaging from Turkey, and QII S CO Ltd from Thailand.
- Linoprint is situated in the low end competitive position of label, blister and carton.
- Linoprint should try to work as much as possible in the reliability of its presses, as that´s one of the weak points of digital. To fight this problem Linoprint should offer trials to its potential customers.
- It could be convenient for Linoprint to regard piezo also as a complement to flexo and not only as a substitute. We think it would be beneficial to offer more than one technological solution to its customers.

- Due to its current scarce resources and the results experienced by competitors we believe Linoprint is focusing on an excessive number of market segments.
- We found lacking key elements in Linoprint's selling approach, like the absence of testimonials or different budget solutions.
- Linoprint currently has a suboptimal webpage that can be improved considerably in multiple ways with little cost.
- After being improved, simplified and guided with input masks using VBA, the new marketing tools are now more suitable for the job. The new tools are easier to use instruments for the sales representatives and more understandable for the consumers.
- Gallus and Griffin-Rutgers, with their flexo knowledge, should be considered as good options for a merger with Linoprint due to their good complementarity with Linoprint´s digital business.

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List of Abbreviations

BSS – Business Software Solutions

CMYK - Cyan, Yellow, Magenta, Key

DoD - Drop on Demand

EP - Electrophotography

Flexo - Flexographic/Flexography

FMCG - Fast Moving Custom Goods

GAGR - Compound Annual Growth Rate

GDP - Gross Domestic Product

HDM - Heidelberger Druckmaschinen AG

HK – Herstellkosten (English: Manufacturing Costs)

HP - Hewlett-Packard

ISO - International Organization for Standardization

Piezo - Piezoelectric

PMS - Pantone Matching System

RFID - Radio-Frequency Identification

SKU - Stock Keeping Unit

SM - Speedmaster

TCO - Total Cost of Ownership

USD - United States Dollars

UV - Ultraviolet

VOC - Volatile Organic Compounds

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Appendix A1

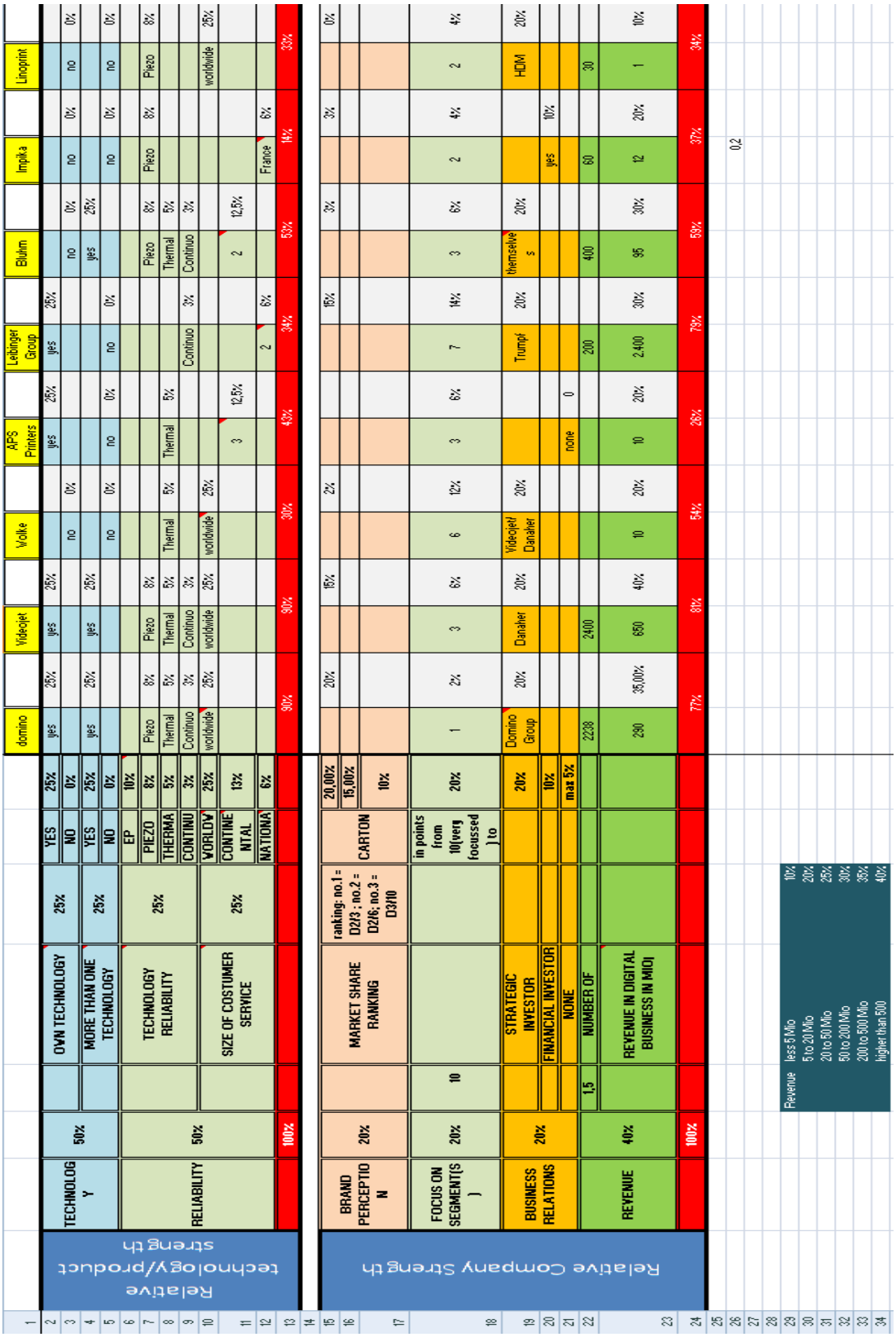


Figure A1.1 – Analysis Matrix for Linoprint's Competitors in Carton

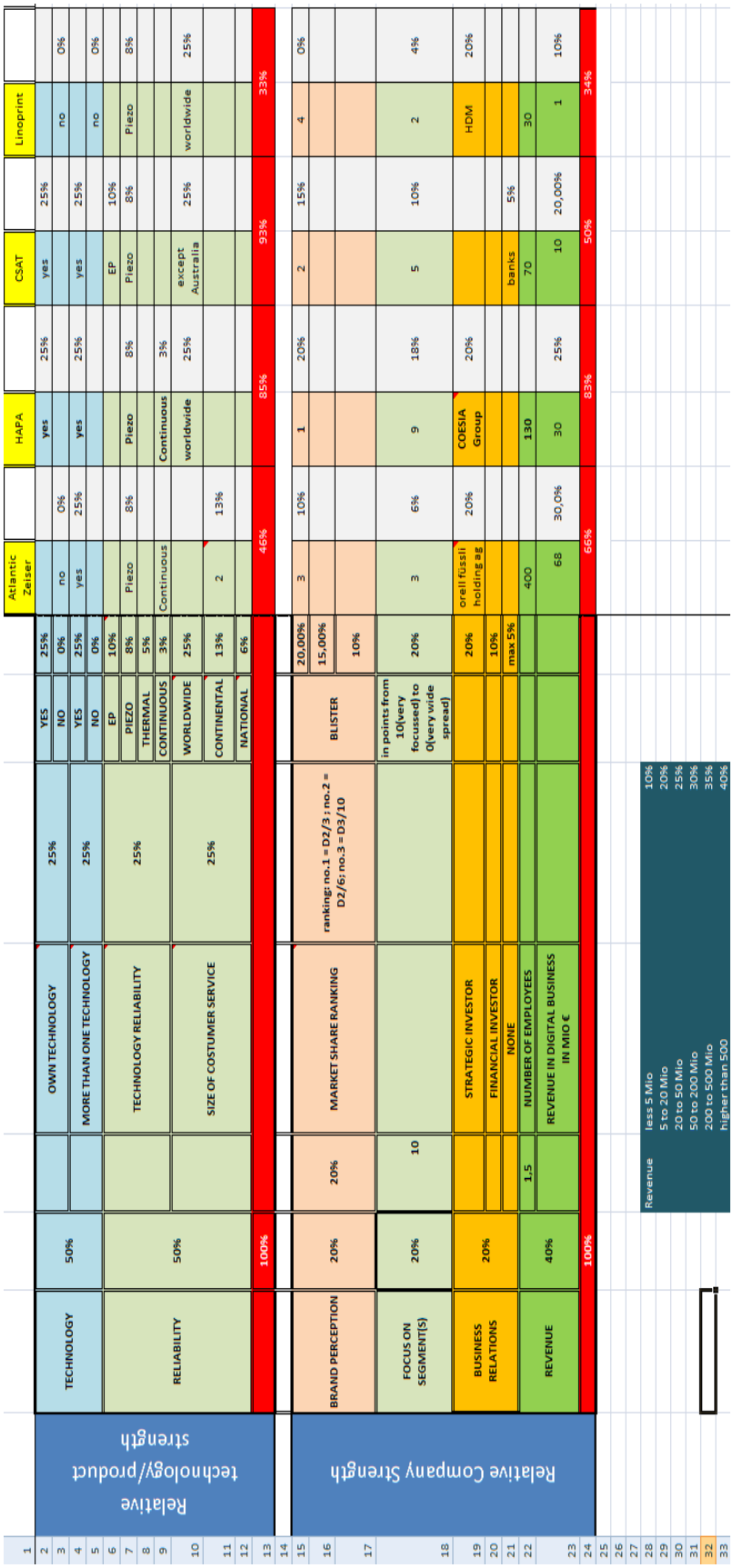


Figure A1.2 - Analysis Matrix for Linoprint's Competitors in Blister

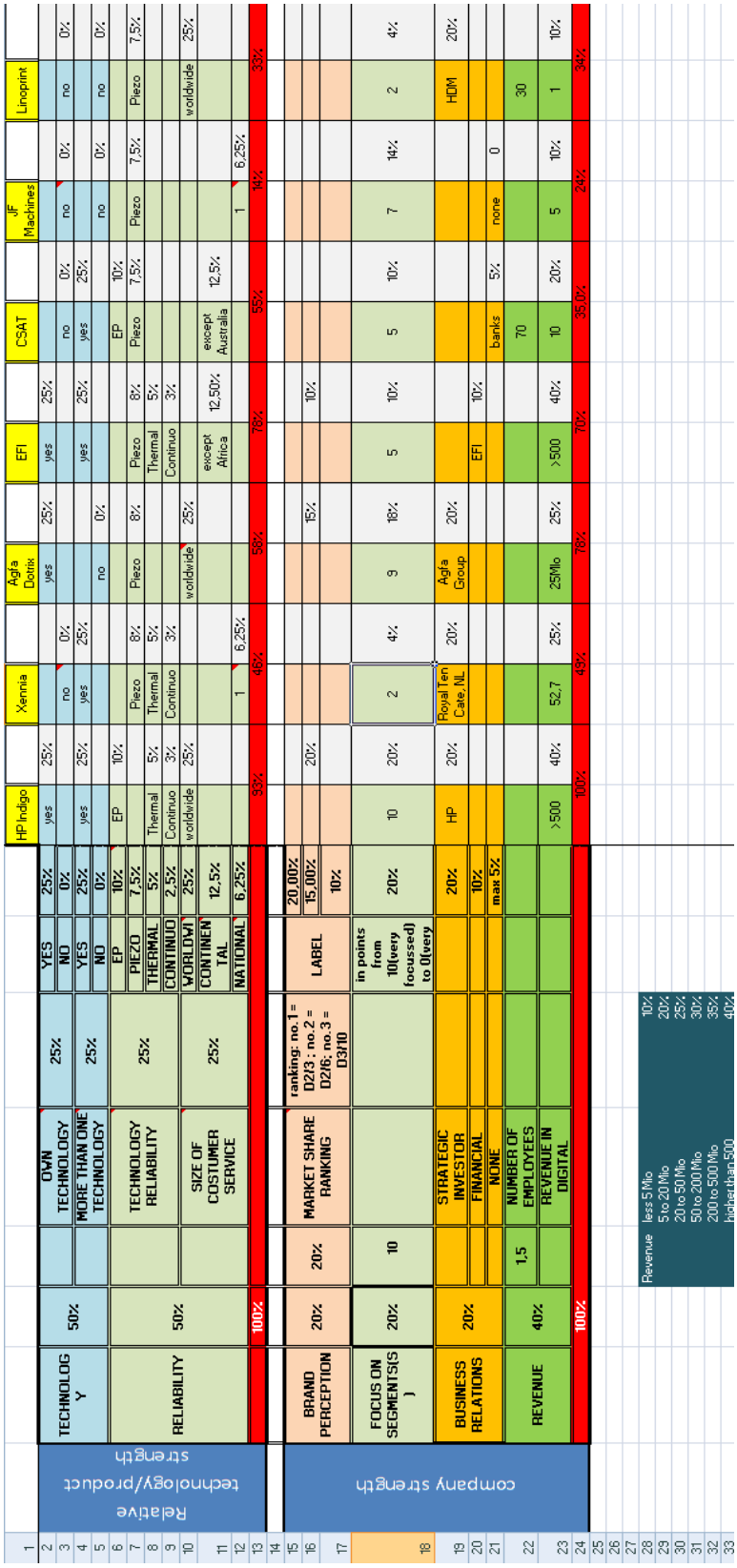
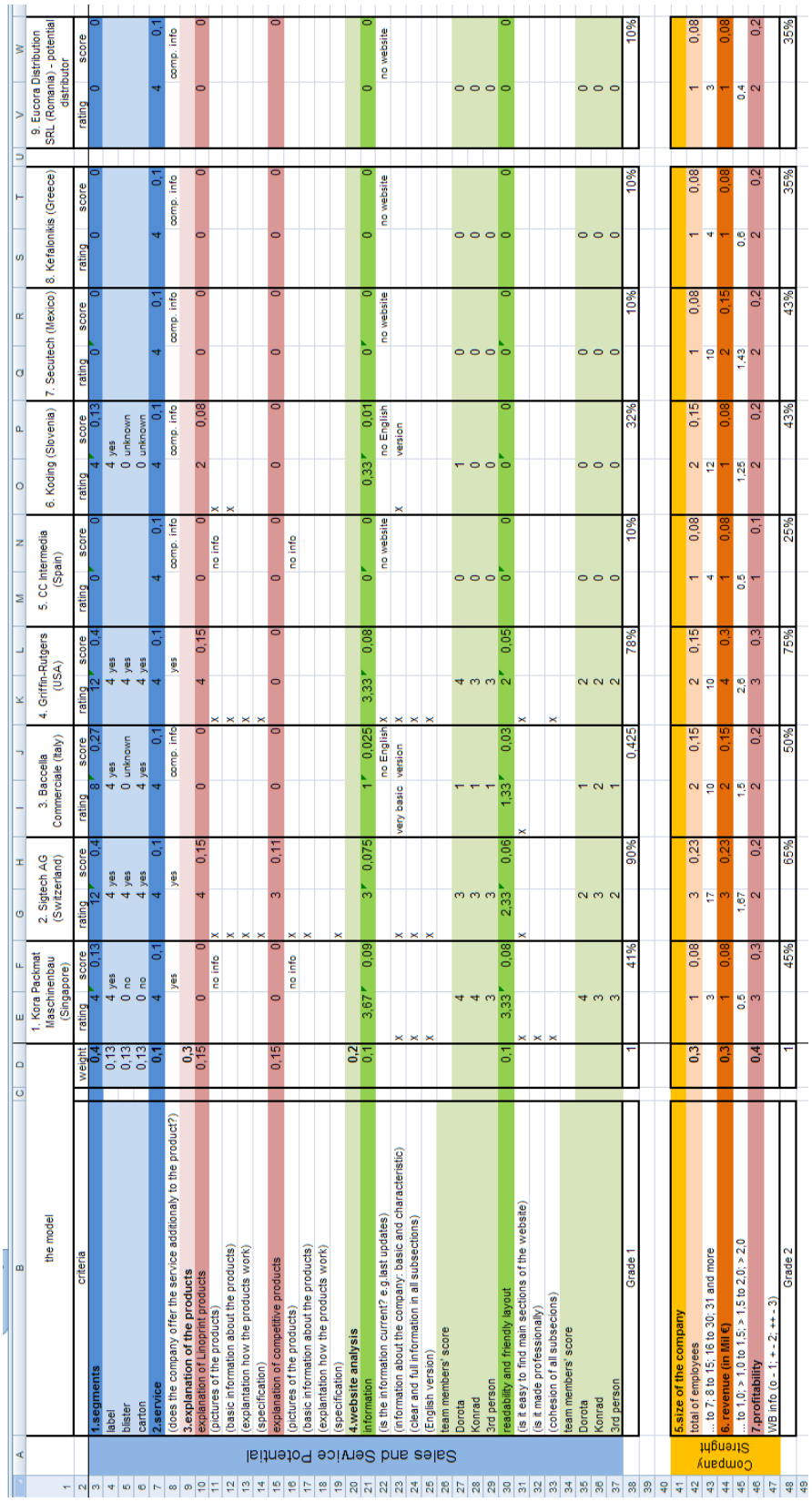


Figure A1.3 - Analysis Matrix for Linoprint's Competitors in Label

Appendix A2



	the model		1. Kora Packmat Maschinenbau (Singapore)		2. Sigtech AG (Switzerland)		3. Baccella Commerciale (Italy)		4. Griffin-Rutgers (USA)		5. CC Intermedia (Spain)		6. Koding (Slovenia)		7. Secutech (Mexico)		8. Kefalonikis (Greece)		9. Eucora Distribution SRL (Romania) - potential distributor	
	criteria	weight	rating	score	rating	score	rating	score	rating	score	rating	score	rating	score	rating	score	rating	score	rating	score
Sales and Service Potential	**1.segments**	0,4	4	0,13	12	0,4	8	0,27	12	0,4	0	0	4	0,13	0	0	0	0	0	0
	label	0,13	4 yes		4 yes		4 yes		4 yes				4 yes							
	blister	0,13	0 no		4 yes		0 unknown		4 yes				0 unknown							
	carton	0,13	0 no		4 yes		4 yes		4 yes				0 unknown							
	2.service	0,1	4	0,1	4	0,1	4	0,1	4	0,1	4	0,1	4	0,1	4	0,1	4	0,1	4	0,1
	(does the company offer the service additionaly to the product?)		yes		yes		comp. info		yes		comp. info		comp. info		comp. info		comp. info		comp. info	
	3.explanation of the products	0,3																		
	explanation of Linoprint products	0,15	0	0	4	0,15	0	0	4	0,15	0	0	2	0,08	0	0	0	0	0	0
	(pictures of the products)		no info								no info									
	(basic information about the products)																			
	(explantation how the products work)																			
	(specification)																			
	explanation of competitive products	0,15	0	0	3	0,11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(pictures of the products)		no info								no info									
	(basic information about the products)																			
	(explantation how the products work)																			
	(specification)																			
	4.website analysis	0,2																		
	information	0,1	3,67	0,09	3	0,075	1	0,025	3,33	0,08	0	0	0,33	0,01	0	0	0	0	0	0
	(is the information current? e.g.last updates)							no English				no website		no English		no website		no website		
	(information about the company: basic and characteristic)						very basic	version						version						
	(clear and full information in all subsections)																			
	(English version)																			
	team members' score																			
	Dorota		4		3		1		4		0		1		0		0		0	
	Konrad		4		3		1		3		0		0		0		0		0	
	3rd person		3		3		1		3		0		0		0		0		0	
	readability and friendly layout	0,1	3,33	0,08	2,33	0,06	1,33	0,03	2	0,05	0	0	0	0	0	0	0	0	0	0
	(is it easy to find main sections of the website)		x		x															
	(is it made professionally)		x																	
	(cohesion of all subsections)		x																	
	team members' score																			
	Dorota		4		2		1		2		0		0		0		0		0	
	Konrad		3		3		2		2		0		0		0		0		0	
	3rd person		3		2		1		2		0		0		0		0		0	
	Grade 1	1		41%		90%		0,425		78%		10%		32%		10%		10%		10%
Company Strength	**5.size of the company**	0,3																		
	total of employees		1	0,08	3	0,23	2	0,15	2	0,15	1	0,08	2	0,15	1	0,08	1	0,08	1	0,08
	...to 7: 8 to 15: 16 to 30: 31 and more		3		17		10		10		4		12		10		4		3	
	6. revenue (in Mill €)	0,3	1	0,08	3	0,23	2	0,15	4	0,3	1	0,08	1	0,08	2	0,15	1	0,08	1	0,08
	... to 1,0; > 1,0 to 1,5; > 1,5 to 2,0; > 2,0		0,5		1,67		1,5		2,6		0,5		1,25		1,43		0,6		0,4	
	7.profitability	0,4	3	0,3	2	0,2	2	0,2	3	0,3	1	0,1	2	0,2	2	0,2	2	0,2	2	0,2
	WB info (o - 1; + - 2; ++ - 3)																			
	Grade 2	1		45%		65%		50%		75%		25%		43%		43%		35%		35%

Figure A2.1 – Analysis Matrix for Current Distributors

						1. SKK S.A. (Poland)			2. Vivo Health&Food Packaging (Turkey)			3. Q II S CO Ltd. (Thailand)			4. AT Design (Russia)			5. Bio Naturelle Ltd. (Uzbekistan)			6. Korea Uni Com (The South Korea)			7. Eucora Distribution SRL (Romania)		
		the model		weight		rating		score	rating		score	rating		score	rating		score	rating		score	rating		score	rating		score
Sales and Service Potential		criteria		0,4		4		0,13	8		0,27	12		0,4	0		0	0		0	0		0	0		0
	1.segments			0,13		4	yes		4	yes		4	yes													
	label			0,13		0	no		4	yes		4	yes													
	blister			0,13		0	no		0	no		4	yes													
	carton			0,1		4		0,1	4		0,1	4		0,1	4		0,1	4		0,1	4		0,1	4		0,1
	2.service						yes			yes			yes			comp. info			comp. info			comp. info			comp. info	
	(does the company offer the service additionaly to the product?)			0,3																						
	3.explanation of the products			0,3		0		0	0		0	4		0,3	0		0	0		0	2		0,15	0		0
	explanation of competitive products												x													
	(pictures of the products)												x													
	(basic information about the products)												x													
	(explantation how the products work)												x													
	(specification)			0,2																						
	4.website analysis			0,1		2		0,05	2		0,05	3,33		0,08	0		0	0		0	0		0	0		0
	information				x		no English					x				no English			no website			no English			no website	
	(is the information current? e.g.last updates)				x		version			very basic		x				version						version				
	(information about the company: basic and characteristic)				x					clear but not full		x														
	(clear and full information in all subsections)									partly			partly													
	(English version)																									
	team members' score					2			2			3			0			0			0			0		
	Dorota					2			2			4			0			0			0			0		
	Konrad					2			2			3			0			0			0			0		
	3rd person			0,1		3		0,08	2,33		0,06	3,33		0,08	0		0	0		0	0		0	0		0
	readability and friendly layout				x				x			x														
	(is it easy to find main sections of the website)				x							x														
	(is it made professionally)				x				x			x														
	(cohesion of all subsecions)																									
	team members' score					3			2			3			0			0			0			0		
	Dorota					3			3			4			0			0			0			0		
	Konrad					3			2			3			0			0			0			0		
	3rd person			1			36%			48%			97%			10%			10%			25%			10%
	Grade 1																									
Company Strenght	5.size of the company			0,45		1		0,11	1		0,11	3		0,34	2		0,23	1		0,11	1		0,11	1		0,11
	total of employees					4			5			20			6			4			5			3		
	... to 5; 6 to 15; 16 to 30; 31 and more			0,55		1		0,14	1		0,14	4		0,55	1		0,14	1		0,14	1		0,14	1		0,14
	6. revenue (in Mil €)					0,5			0,7			2,6			0,8			0,5			0,7			0,4		
	... to 1,0; > 1,0 to 1,5; > 1,5 to 2,0; > 2,0																									
	Grade 2			1			25%			25%			89%			36%			25%			25%			25%

Figure A2.2 – Analysis Matrix for Potential Distributors

Appendix A3

The following screenshots and instructions apply to Photoshop 7.0, but the coverages can be found in other versions of Photoshop by following similar procedures.

First, convert the image from RGB to CMYK color by selecting Image>Mode>CMYK color, as shown in Figure A3.1.

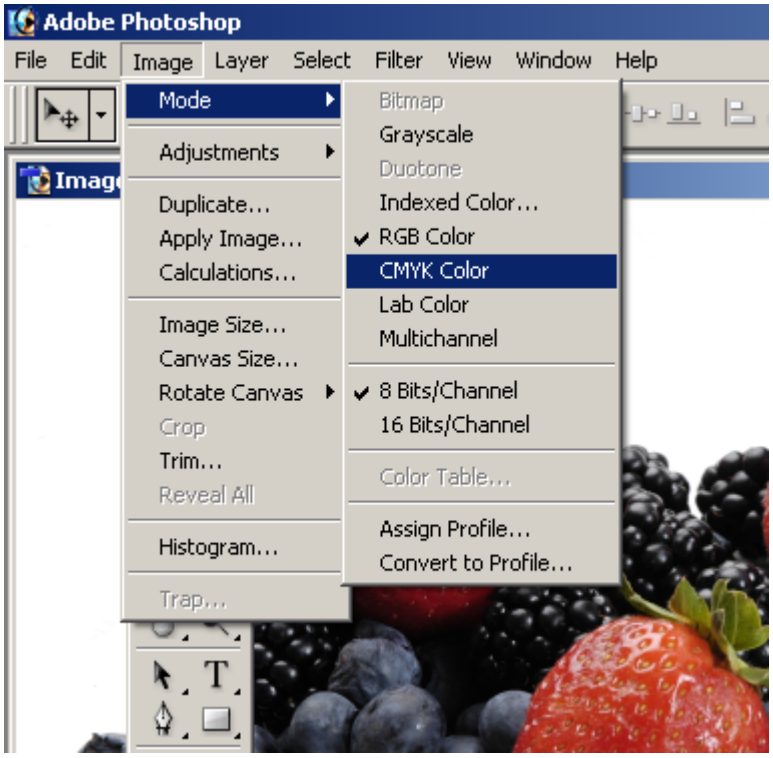


Figure A3.1 - Converting to CMYK

Next, go the Histogram, and find the mean coverage value of each color: Cyan, Magenta, Yellow, and Key, as shown in Figures A3.2 and A3.3.

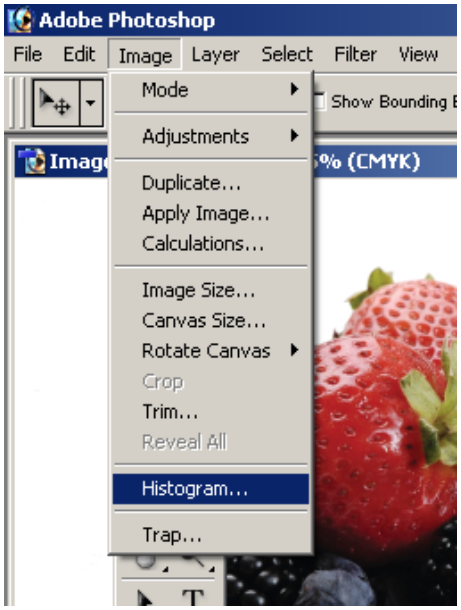


Figure A3.2 – Accessing the Histogram

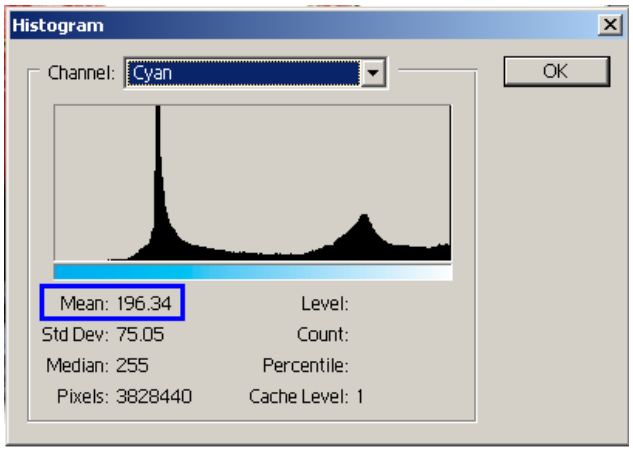


Figure A3.3 - Reading Mean Ink Coverages

It is important not to save the file in CMYK format, because Microsoft Excel can only handle the image files when they are saved as RGB jpeg files.

These mean coverages given by Photoshop are the coverages in absolute terms, with 0 meaning full coverage of that color, and 255 meaning no coverage of that color. The normal input dialog box of the program requires the coverages to be entered as percents, which can be calculated using the following formula:

[(255-Coverage)/255] * 100

However, the program automatically converts the coverages for new images into a percentage, so it is only necessary to take note of the absolute coverage.

The actual database of example labels is saved in a folder called “Sample Labels”, which must be in the same directory as the ink consumption tool itself. To add a new label, copy the image file in .jpg format into the Sample Labels folder, giving it a descriptive file name. Next, create a text (.txt) file with the *exact same* name as the label. The best program to use for this is Microsoft Notepad, as shown in Figure A3.4.

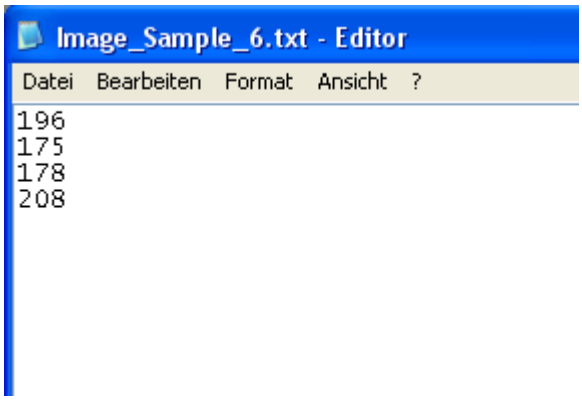


Figure A3.4 – Ink Coverages Text File

Then, the coverages found in Photoshop can be typed in this text file, using the format shown in Figure A3.4. The first line corresponds to the coverage of Cyan, the second to the coverage of Magenta, the third to the coverage of Yellow, and the fourth to the coverage of Key.

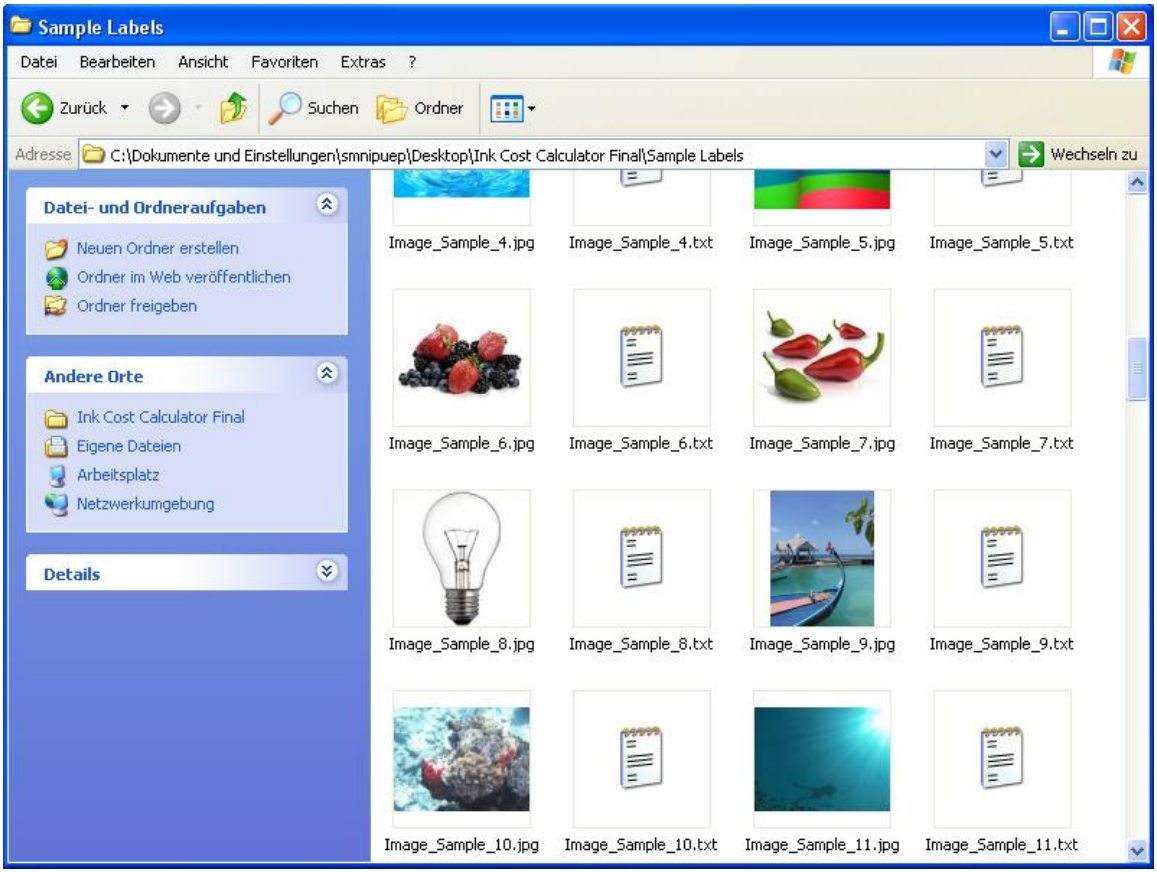


Figure A3.5 - Sample Labels Folder

Finally, save the text file. With both the image file and text file in this folder, as shown in Figure 5.13, the new example label should now show up in the list of the example label userform, shown in Figure 5.5.

Appendix A4

This appendix explains how to use the pay back calculator, and goes through an example calculation with screenshots and an explanation of each step. The numbers for the example come from information from Linoprint about typical industrial process costs and typical costs of printing machines.

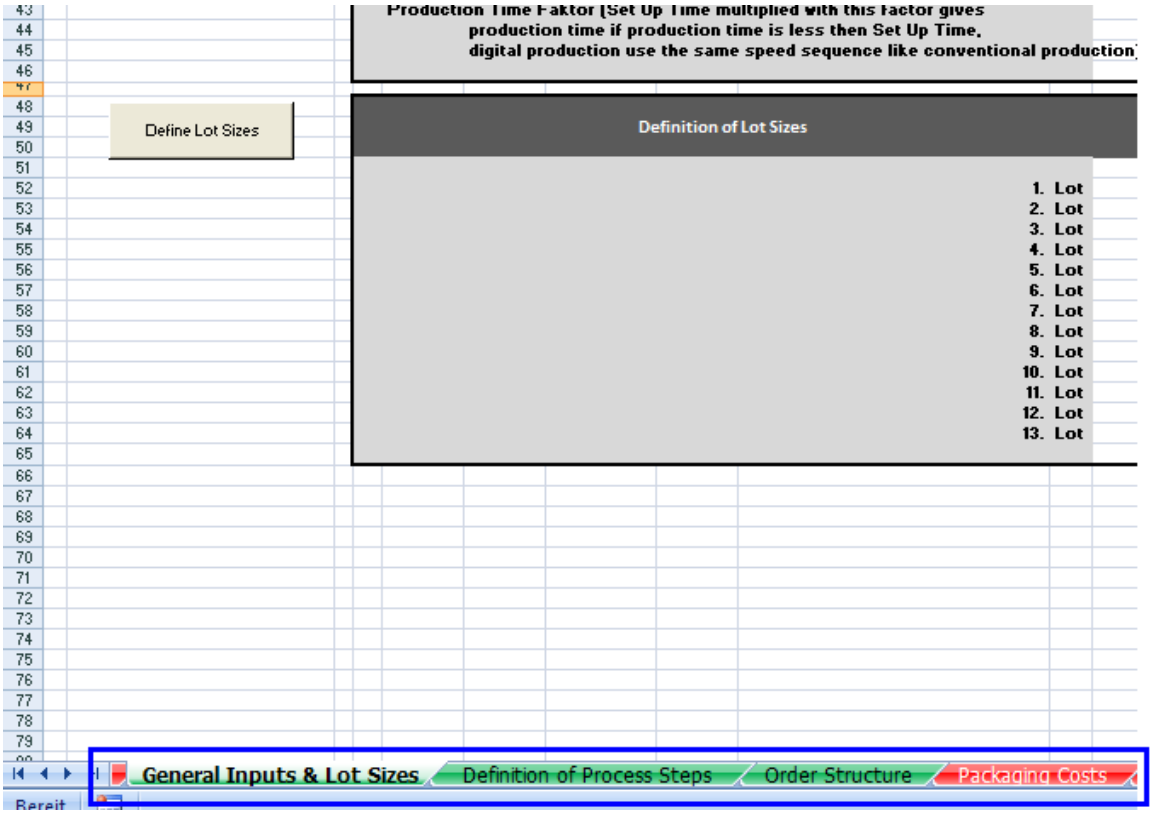


Figure A4.1 – Selecting Sheets within the Payback Tool

The spreadsheet consists of 10 sheets, which can be switched by selecting the appropriate tab near the bottom of the screen, as shown in Figure A4.1. The user should start with the "General Inputs & Lot Sizes", as shown above. Any tabs colored red are tabs with no input requirements, and will be skipped in this example. Refer to chapter 5 for information about how these sheets work.

The first step is to define the general inputs and set up the sheet. This is done by selecting the "Define General Inputs & Set Ups" button, as shown in Figure A4.2.

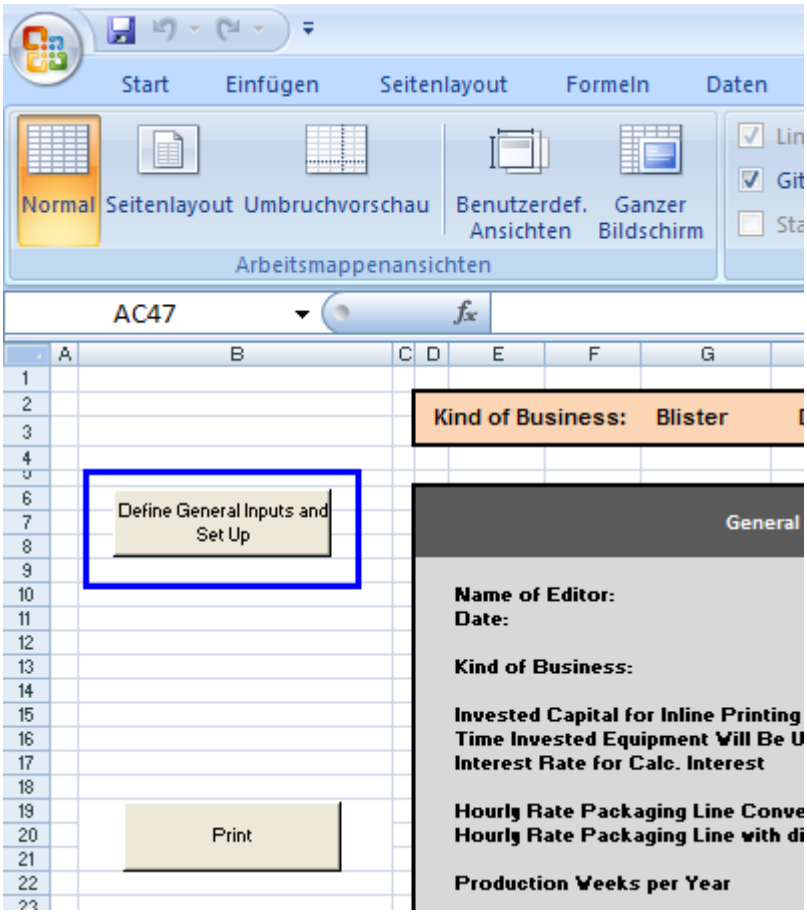


Figure A4.2 – Opening General Inputs Dialog Box

Next, simply enter all of the correct general input parameters into the dialog box. The dialog box loads with some default parameters which should be changed to fit the actual print situation of the customer. The general inputs dialog box is shown in Figure A4.3.

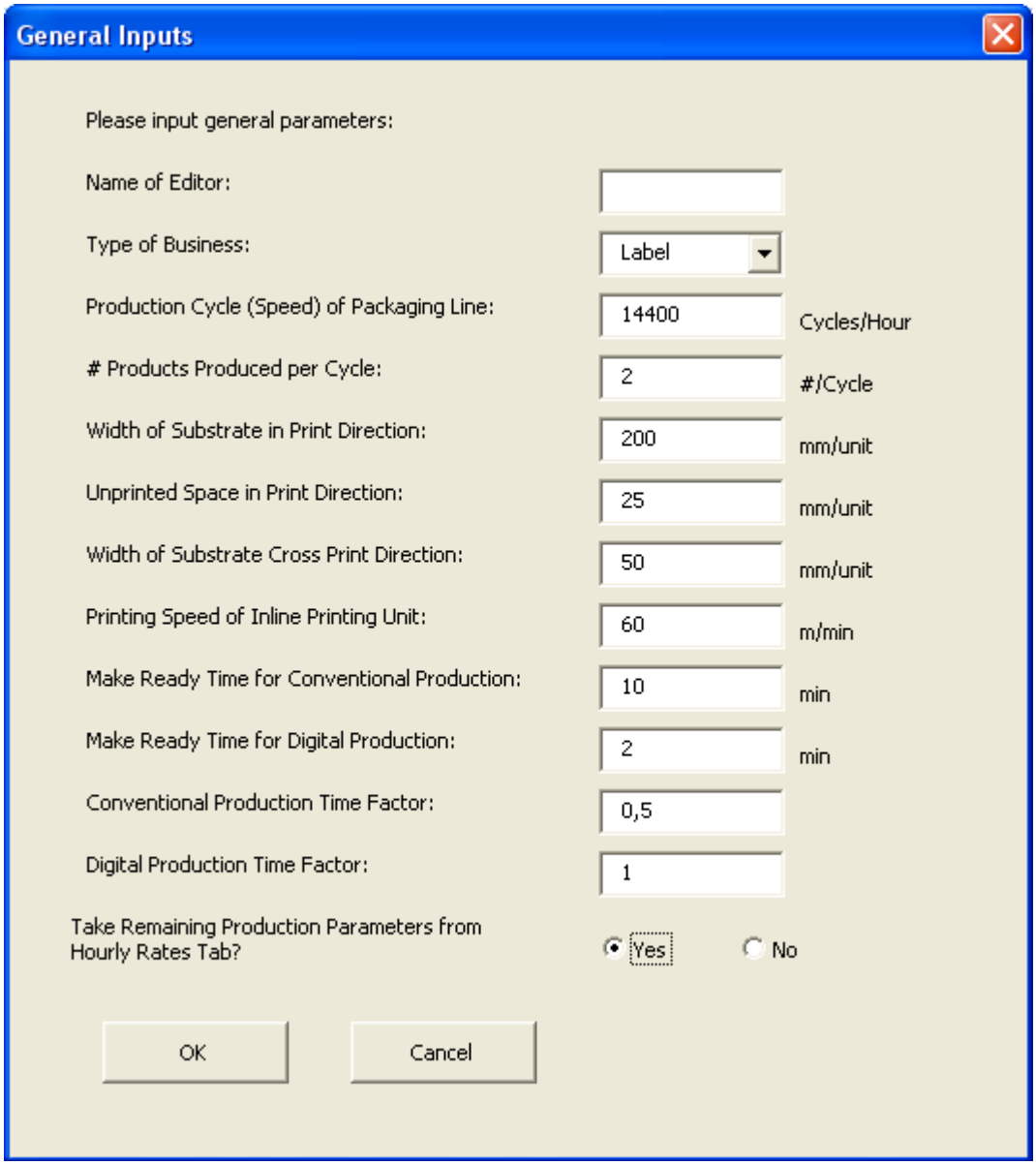


Figure A4.3 - General Inputs Dialog Box

Some of the general parameters can be calculated by the spreadsheet on the hourly rates sheet, which can be controlled by selecting “yes” where the dialog box asks whether or not to take the remaining parameters from the hourly rates tab. If no is selected, then another dialog box is displayed asking for this information to be entered now, as shown in Figure A4.4.

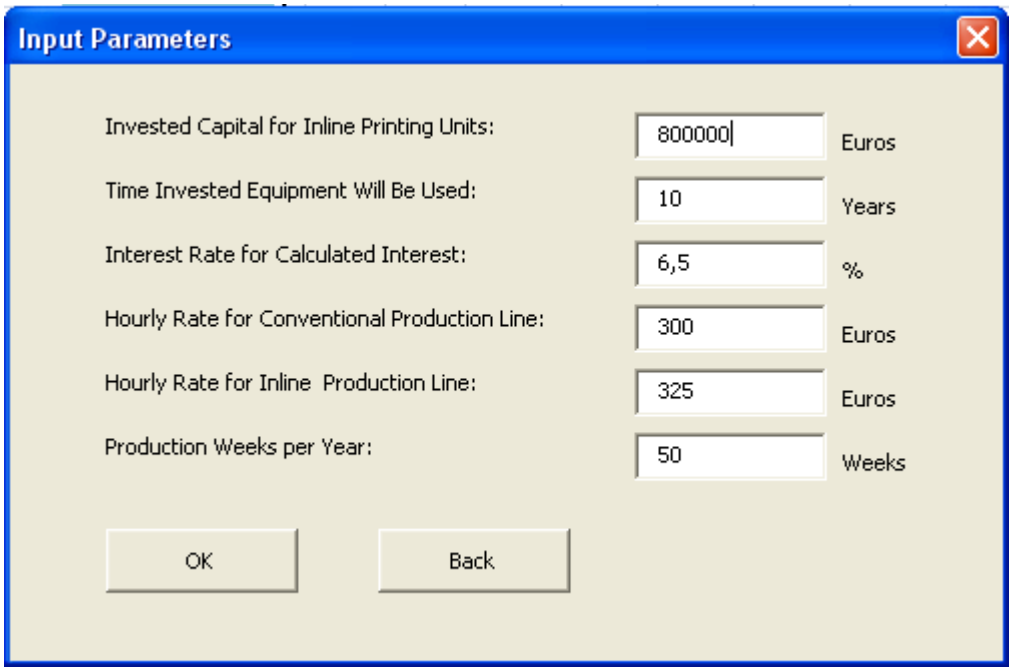


Figure A4.4 - Hourly Rates Input Userform

If yes is selected, then the spreadsheet calculates the hourly rates information based on more detailed parameters, which is discussed later on and shown in Figures A4.11 through A4.14.

The other information that should be entered on the first tab is information about the lot sizes. Default values have been provided which should be reasonable for most production processes, but if the typical run lengths seen by a company are very large or very small then they can be adjusted as shown in Figures A4.5 and A4.6.

Figure A4.5 - Opening Lot Sizes Dialog Box

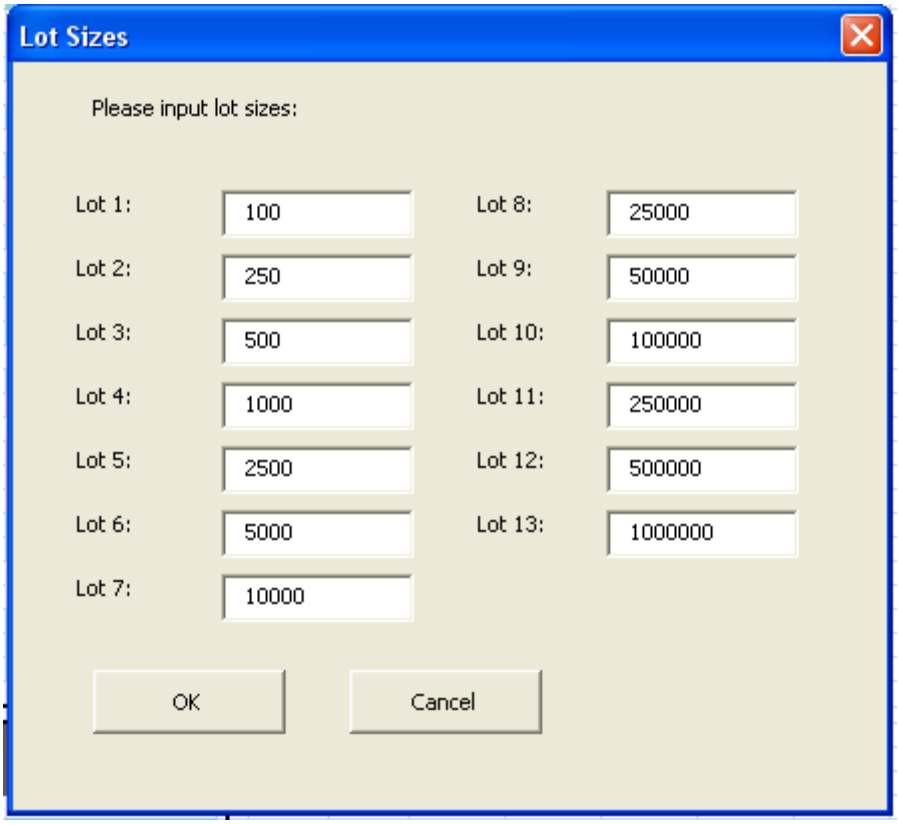


Figure A4.6 - Lot Sizes Input Box

Next, go to the next input sheet, which is called "Definition of Process Steps". The basic layout of this sheet is shown in Figure A4.7.

Conventional Packaging Process		Process Step 1	Process Step 2	Process Step 3	Process Step 4	Process Step 5	Process Step 6	Process Step 7	Process Step 8	Process Step 9	Process Step 10	Process Step 11
Define Conventional Process Steps and Costs						Packaging	Apply Pre-Printed Material					
Process Costs	€/1000	0,1	0,6	0,1	2,00	0,00	4,00	0,25	12,5	2,8	0,75	0,35
Handling Charge	€/Lot	0,05	0,00	0,00	0,00	0,00	0,00	0,1	0,00	0,00	0,00	0,00

Digital Printing in Packaging Process		Process Step 1	Process Step 2	Process Step 3	Process Step 4	Process Step 5	Process Step 6	Process Step 7	Process Step 8	Process Step 9	Process Step 10	Process Step 11
Define Digital Process Steps and Costs						Packaging	Inline Printing					
Process Costs	€/1000	0,05	0,1	0,05	0,65	0,00	10,5	0,1	0,00	0,00	0,2	0,35
Handling Charge	€/Lot	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00

Figure A4.7 - Definition of Process Steps

The process steps can be entered by pressing the buttons to define conventional or digital process steps and costs. Step 5 will always be packaging, and Step 6 will always be the other step which is counted when total packaging costs are calculated, so the names of these steps are fixed, but everything else is left open.

Even complicated processes can be represented here, because if there are more than 4 process steps before packaging, the costs of two or three process steps can simply be added together and evaluated as one step. Similarly, if there are more than 5 steps after packaging, the excess steps can be added together to fit the sheet's input.

If the process is very simple, simply enter the costs of the unused steps as zero, so that they don't affect the results.

As an example, the input dialog box for digital process steps is shown below in Figure A4.8, but the input box for conventional process steps looks exactly the same.

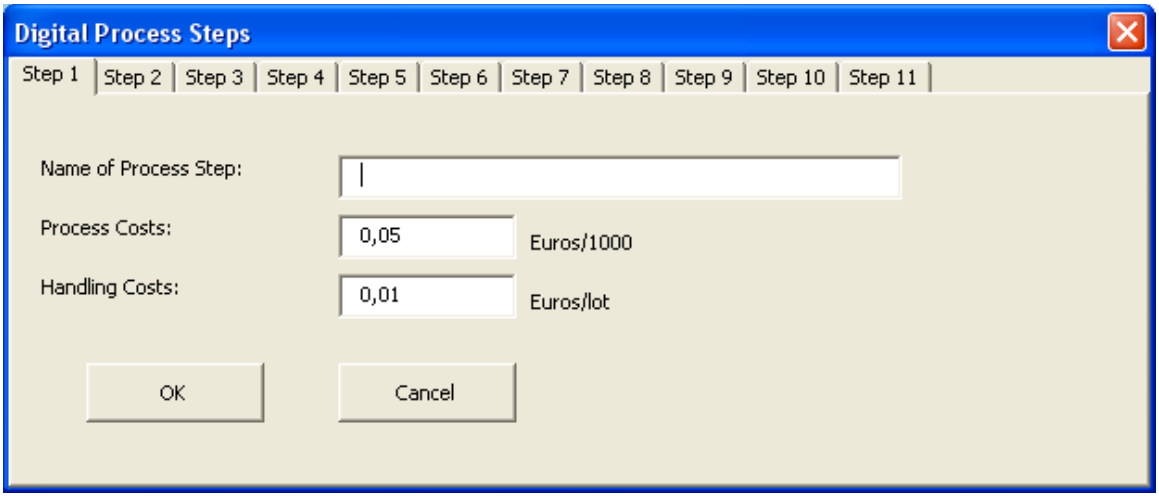


Figure A4.8 - Digital Process Steps Input

The next input sheet is the order structure input sheet, which is shown in Figure A4.9.

Daily Requests		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Product or Brand 1	Package 1	250	500	500	100	750	500
	Package 2	10.000	10.000	5.000	10000	6500	25000
	Package 3	3.000	2.750	2.500	3.000	2250	5000
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 2	Package 1	500	250	500	750	750	1.000
	Package 2	5.000	100	5.000	6.500	6.500	10.000
	Package 3	2.500	1.500	2.500	2.250	2.250	4.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 3	Package 1	4.500	500	250	500	250	4.500
	Package 2	10.000	10.000	8.000	5.000	8.000	10.000
	Package 3	7.500	2.750	1.000	2.500	1.000	7.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 4	Package 1	250	250	250	250	250	250
	Package 2	8.000	8.000	8.000	8.000	8.000	8.000
	Package 3	1.000	1.000	1.000	1.000	1.000	1.000
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 5	Package 1	750	750	250	750	500	1.500
	Package 2	6.500	6.500	6.500	6.500	6.500	13.000
	Package 3	2.250	2.250	2.250	2.250	2.250	4.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 6	Package 1	1.000	1.000	500	1.000	1.000	2.000
	Package 2	12.500	12.500	5.000	12.500	12.500	17.500
	Package 3	4.500	4.500	2.500	4.500	4.500	7.500
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 7	Package 1	250	250	250	250	250	500
	Package 2	7.500	7.500	7.500	7.500	7.500	12.500
	Package 3	1.500	1.500	1.500	1.500	1.500	300
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0
Product or Brand 8	Package 1	500	250	750	250	500	1.250
	Package 2	7.500	10.000	7.500	7.500	5.000	10.000
	Package 3	1.500	1.500	2.500	1.500	2.500	2.750
	Package 4	0	0	0	0	0	0
	Package 5	0	0	0	0	0	0

Figure A4.9 - Order Structure

The order structure, or number of daily requests, can be adjusted by opening the input dialog box shown in Figure A4.10. Simply go through all of the work days of the week and type in the correct order structure for each package of each brand.

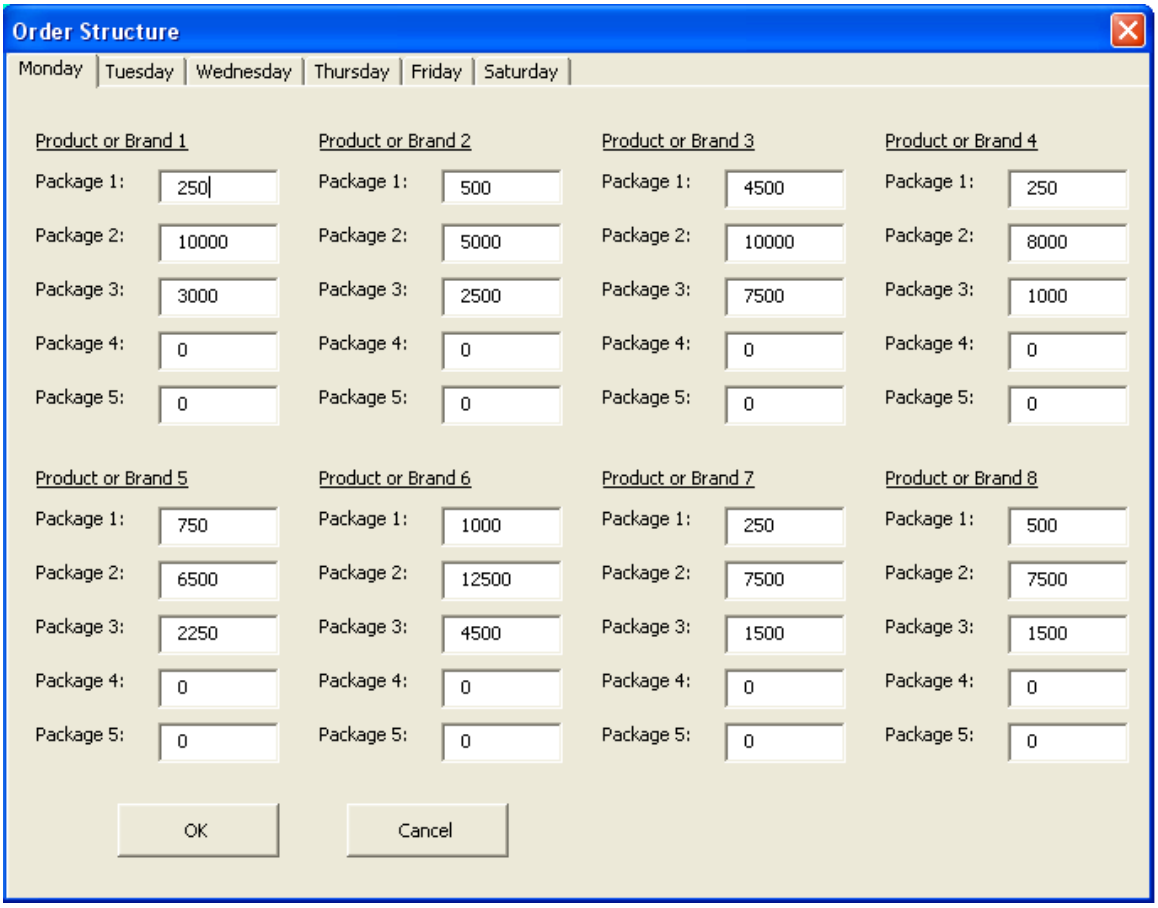


Figure A4.10 - Order Structure Input

The default values of the order structure are zero, because if there was a production process with very few different brands or packages it would take a lot of time to delete any initial values if they are not needed.

The last input sheet is the hourly rates sheet. If “no” was selected for taking values from the hourly rates tab, this sheet can be ignored. If yes was selected, though, meaningful inputs must be entered into this sheet so that it calculates reasonable hourly rates.

The basic sheet is shown below, in Figure A4.11:

Annahmen Investitionsrechnung (all values in i)					Conventional	Inline Printing
1. **Equipment Costs**	# of units	Invest per Unit				
Investment	1	7.100.000	Euros		7.100.000	7.100.000
Number of additional equipment needed Conventional	1	250.000	Euros		250.000	
Number of additional equipment needed Inline Printing	1	350.000	Euros			350.000
Inline Printing Unit	1	450.000	Euros			450.000
Total Investment	**Total**		Euro		**7.350.000**	**7.900.000**
Depreciation Period			Years		10	10
Depreciation per Year			Euros/Year		735.000	790.000
Calc. Interest Rate / Calc. Interest	6,5%		Euros/Year		238.875	256.750
2. **Cost of Labor**						
Manpower					2	2
Cost per FTE			Euros		40.000	40.000
Total Costs Manpower					200.000	200.000
Number of Shifts					2	2
Number of working hours per shift			Hours		7,5	7,5
Number of working Days per Week			Days/Week		6	6
Total average Working Days of FTE per Year			Days/Year		240	240
Total working hours of FTE per year					1.800	1.800
Up Time of the Equipment			%		95%	95%
Number of working weeks per year	50		Weeks/Year		50	50
Total of production days			Days		300	300
Total production hours per Year			Hours/Year		4.500	4.500
3. **Misc. Production Costs (Running Costs)**						
Cost of service / maintanance of	**Blister-Line**		in % of Invest	2,0%	142.000	142.000
Cost of service / maintanance of	**additional Equipmen**		in % of Invest	3,0%	7.500	10.500
Cost of service / maintanance of	**Inline Print Unit**		in % of Invest	7,50%		33.750
Σ **Total of Service and Maintance**					**149.500**	**186.250**
Average Power Consumption of Equipment in use			kW		27	33
Average Energi Consumption			kWh		121500	148.500
Cost of electrical Energi		0,12	i/kWh	Euros/Year	14.580	17.820
Cost space		15,0	i/sqm/month			75
Space needed for equipment in use			sqm		75	
Total Cost of space per year			i/year		13.500	13.500
Water Consumption			m3 pro Jahr		4.500	4.500
Cost of Water per Year		2,0	i/m3	i/r Year	9.000	9.000

Ergebnisse der Investitionsrechnung		Units	Conventional	Inline Printing
Total of Investment		i	7.350.000	7.900.000
1. **Cost of Equipment per Year**				
Depreciation per Year		i/Year	735.000	790.000
Calc.Interests per Year		i/Year	238.875	256.750
2. **Running Cost of Equipment per Year**				
Cost of Labor		i/Year	200.000	200.000
Cost of Energi		i/Year	14.580	17.820
Cost of Space		i/Year	13.500	13.500
Cost of Water		i/Year	9.000	9.000
Cost of Service and Maintenance	Σ	i/Year	149.500	186.250
Total Production Hours per year		Hours	4.500	4.500
Total of Production Costs per Year		i/Year	1.360.455	1.473.320
3. **Hourly Rate of Production Line incl. Printing System**		i/Hours	**302**	**327**

Figure A4.11 - Hourly Rates

There are three different input forms that have to be opened to input all of the necessary parameters. The first input form is a form to enter equipment costs, and is shown in Figure A4.12:

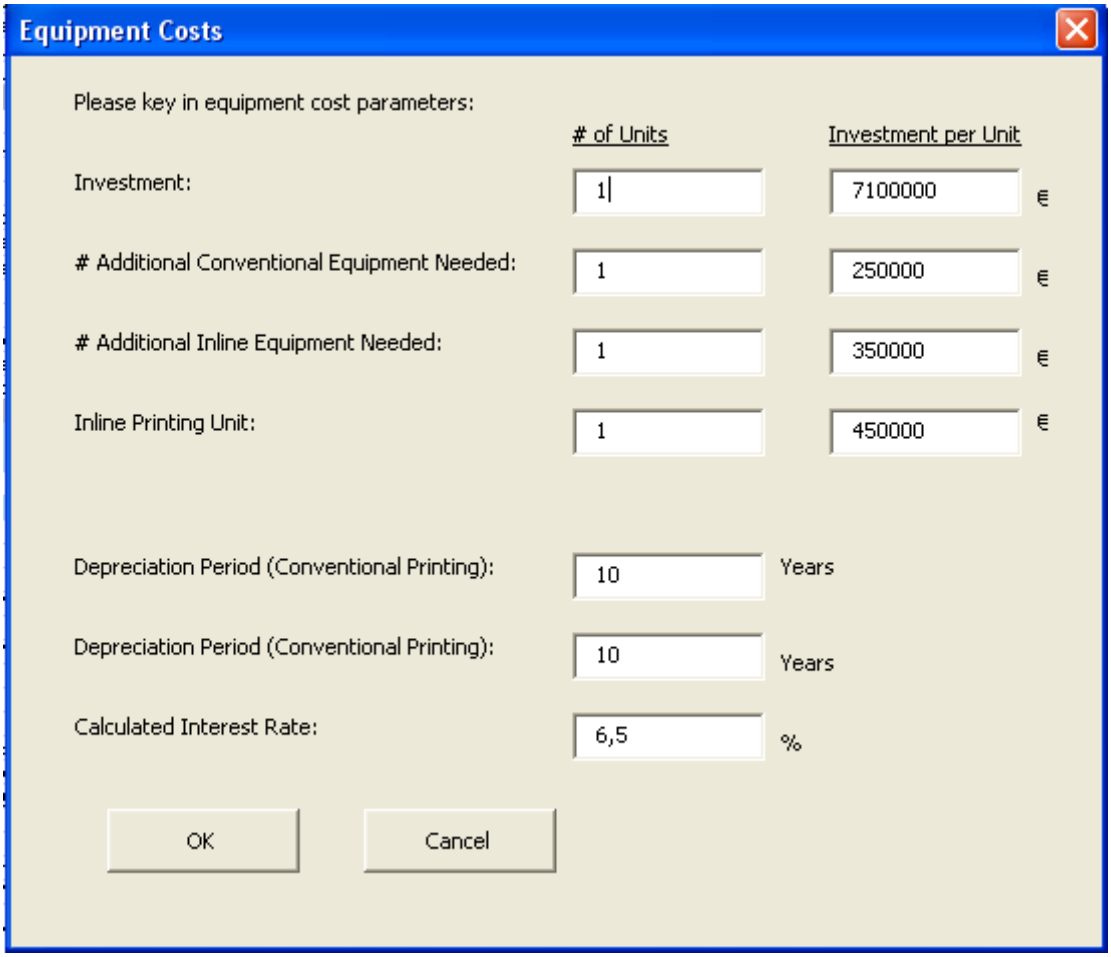


Figure A4.12 - Equipment Costs Input

The next form is used to enter labor costs, and is shown in Figure A4.13:

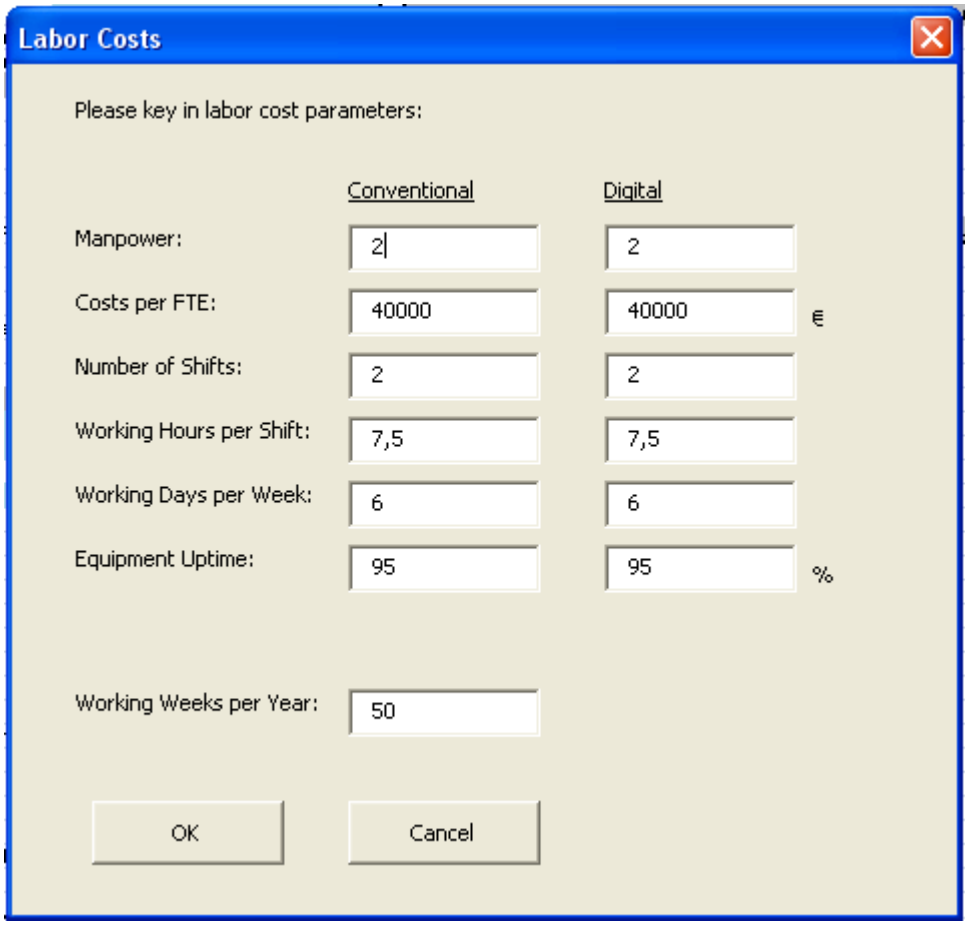


Figure A4.13 – Labor Costs Input

The final input form is used to input running costs, as shown in Figure A4.14:

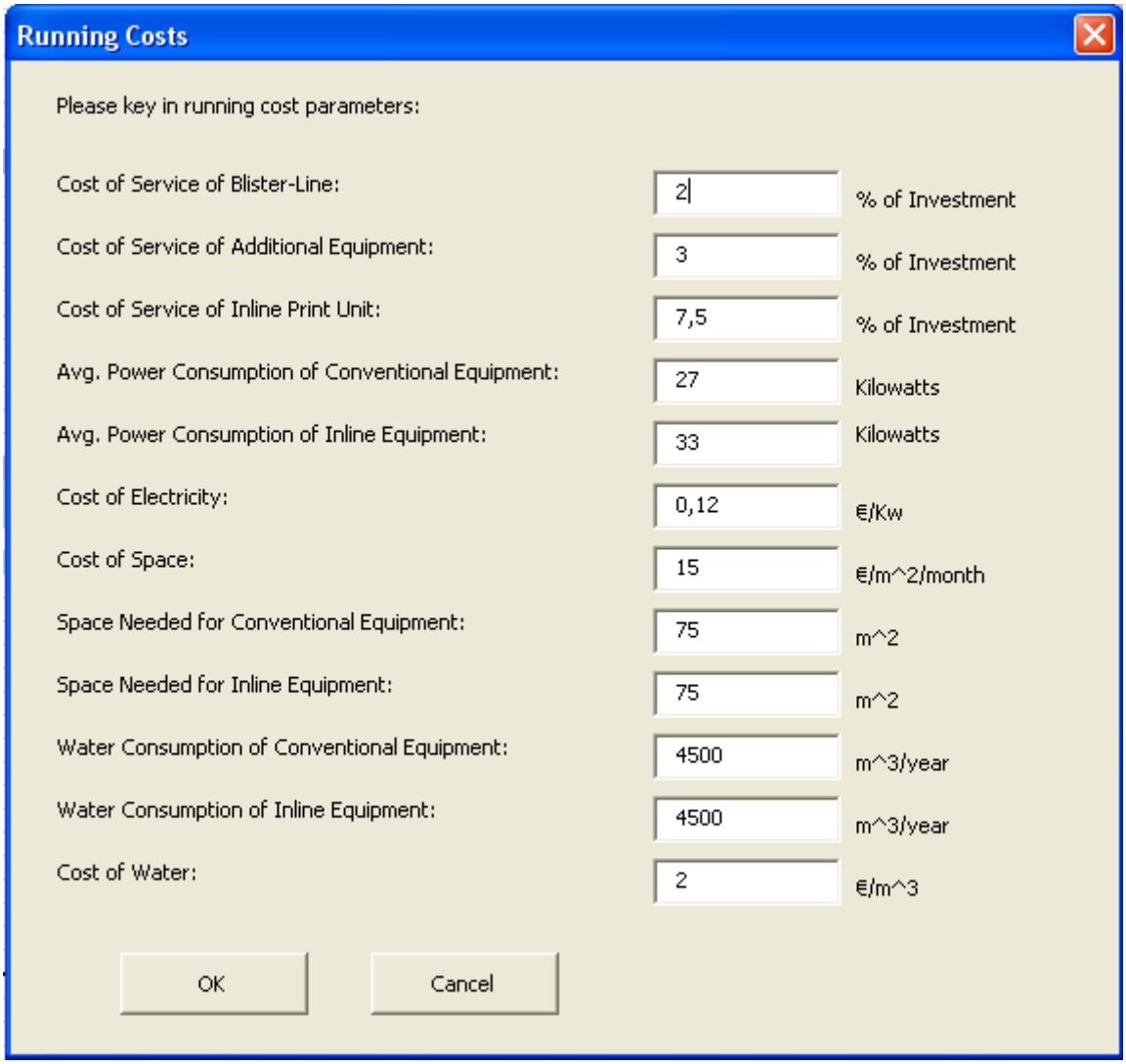


Figure A4.14 – Running Costs

Finally, after all of the input sheets have been accessed and all of the parameters have been entered, the results are ready to view. To view the results, go to the sheet called "Results & Diagrams", which is shown in Figure A4.15.

Total Savings

Lot Sizes	Savings in Packaging (€)	Savings in All Process Costs(€)
100	- 54	- 56
250	- 53	- 58
500	- 51	- 60
1.000	- 38	- 56
2.500	- 24	- 69
5.000	- 8	- 97
10.000	25	- 155
25.000	123	- 326
50.000	285	- 613
100.000	610	- 1.185
250.000	1.585	- 2.903
500.000	3.210	- 5.765
1.000.000	6.460	- 11.490

Pay Back Calculation

	Units	Values
Invested Capital	€	7.900.000
Use Period	Years	10,0
Interest Rate	%	6,5%
Calc Interest Rate	€ / Year	5.135
Depreciation	€ / Year	790.000
Earings (Profit)	€ / Year	- 745.440
Cash Flow	€ / Year	1.540.575
Pay Back Period	Years	5,1
	Month	61,5

Figure A4.15 - Results

There are two parts to the results, one part for pay back time, and one part for cost savings. The cost savings portion of the results consists of two graphs and a table, as shown in Figures A4.16 – A4.18.

Total Savings		
Lot Sizes	Savings in Packaging (€)	Savings in All Process Costs(€)
100	- 54	- 56
250	- 53	- 58
500	- 51	- 60
1.000	- 38	- 56
2.500	- 24	- 69
5.000	- 8	- 97
10.000	25	- 155
25.000	123	- 326
50.000	285	- 613
100.000	610	- 1.185
250.000	1.585	- 2.903
500.000	3.210	- 5.765
1.000.000	6.460	- 11.490

Figure A4.16 - Total Savings

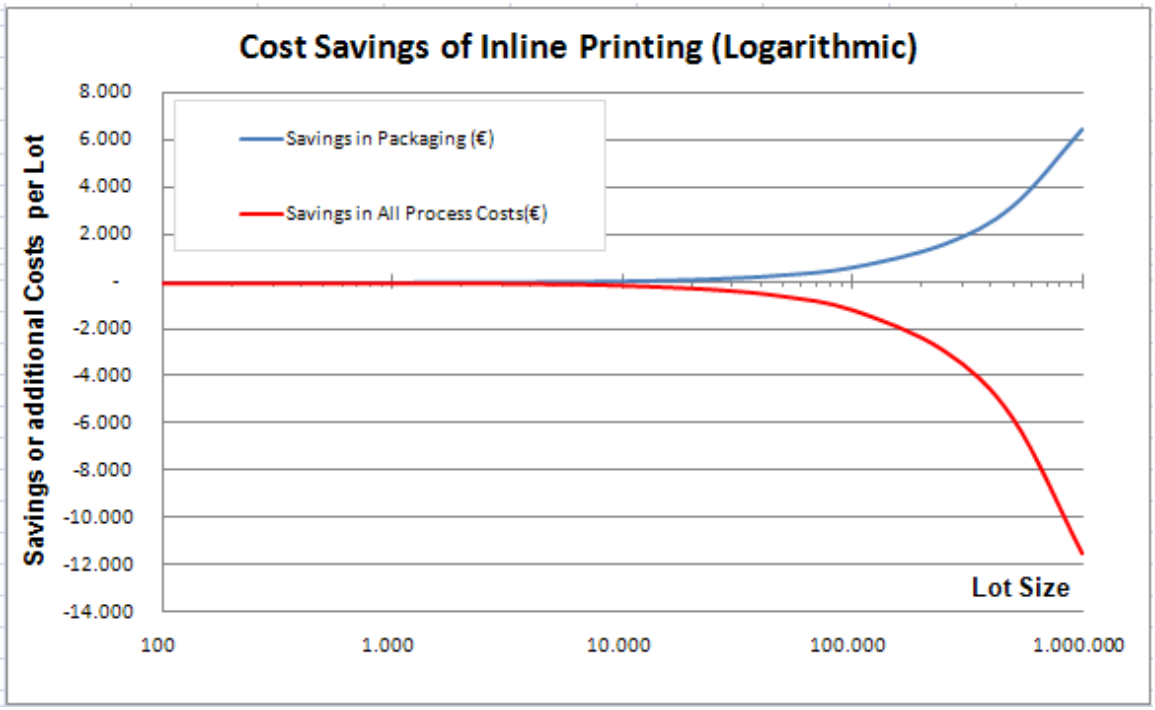


Figure A4.17 – Cost Savings of Inline Printing (Logarithmic)

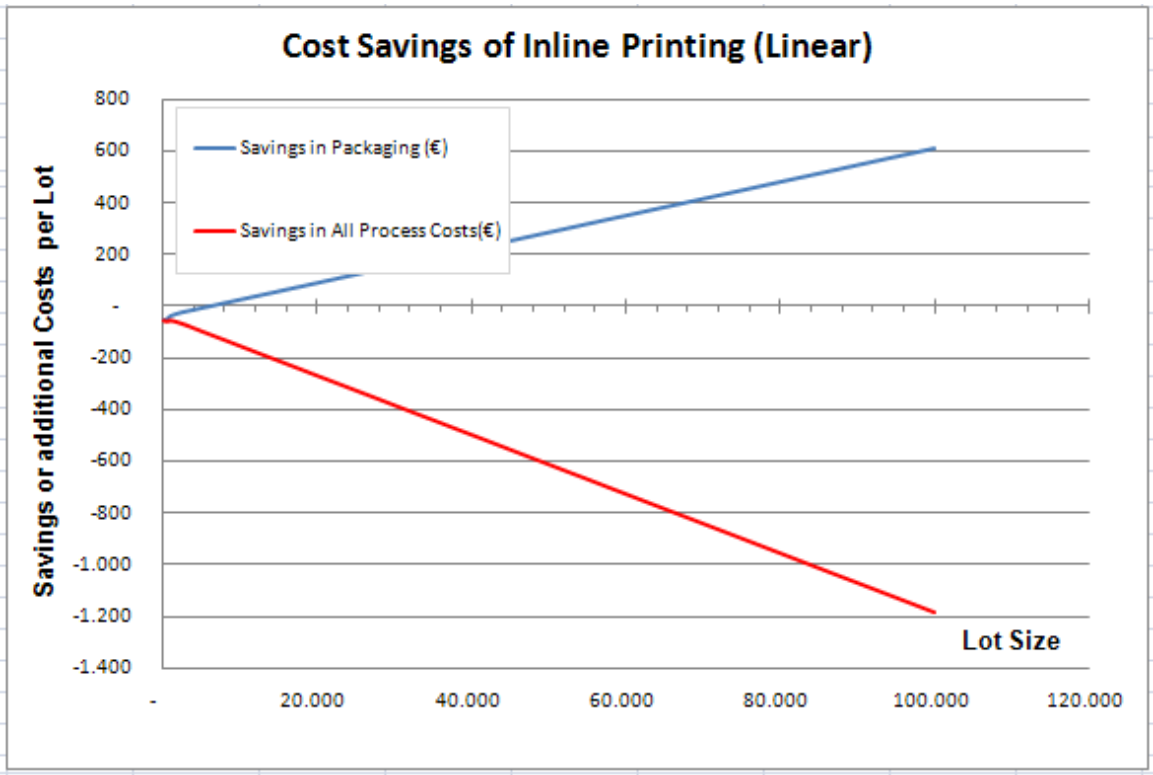


Figure A4.18 - Cost Savings of Inline Printing (Linear)

As explained in Chapter 5.3.15, these graphs represent the cost savings as a function of lot size. Again, negative numbers represent savings while positive numbers represent losses, so in this example the savings of all process steps increase as the run length increases, but, while packaging sees an initial savings, the company is actually spending more on packaging as the run length increases beyond 5,000.