Business Models and Strategy finding for the Printing Industries

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Abstract:

The printing industries all over the world have to find new successful strategies and business models. The reason for the necessary changes is based on the ongoing shift from analog to digital production technologies and media products, bringing about new business opportunities on the supply side in combination with changes in the media use on the demand side. The economic situation of major parts of the printing industries is a challenging task. The task for printers is to understand which technologies, processes and markets fit best to implement successful business strategies.
Therefore in this paper strategic options are analyzed based on Porters strategy model, a business model canvas, the core competence approach and the analysis of disruptive changes caused by the digitalization. In order to classify possible strategies and business models a portfolio approach with two dimensions (Technology, Market) is used. Possible business models are identified and assigned to the portfolio. Examples for business models are given.

1. Situation of the Printing Industries

The printing industries all over the world have to find new successful strategies and business models [10]. This is caused by the digital shift, new business possibilities enabled by IT and changes in media use. The economic situation of major parts of the printing industries is a challenging. The task for printers is to understand which technologies, processes and markets fit best to implement successful business strategies.

The changes in media businesses are disruptive due to the digitalization of all media processes since the 1990s. The development of the Internet led from traditional mass media to individual and interactive media, the mobile Internet to location-independent media and social networks. The latest step in the development of the Internet is the 'Internet of things and services (IoT)'. The basic idea of IoT is that most of the materials and components and all parts of productions systems will be connected to the Internet. These 'intelligent' or 'smart' things allow self-organizing supply chains and production and logistics processes.

There are major changes in the use of media. Due to mobile media and the simultaneous use of different media the overall consumption of media is expanding. Especially the generations born after the invention of the Internet, the so called 'digital natives' change from paper based media to digital media use [1]. There are different research studies coming to different conclusions whether the digital natives will change their behavior when they will turn to other phases of life.

A short overview of the situation of the printing industries is given with a focus on Germany. The reasons for the challenging situation like overcapacity and changes in media are nearly the same for all developed countries, especially Europe and USA/Canada and more and more for the emerging markets like China [19, 20]. In addition there are specific problems in some countries. For example in India problems with physical transportation of goods, and financial problems with investments in South America, e.g. Argentina.

From a technological point of view there is still a mix of printing technologies. The market share of printing press technologies depends whether the figures are based on the number of presses or the paper output in m2 or sales value. There is still a high printing volume for Sheetfed-Offset, Web-Offset, Gravure-Printing and Flexographic Printing in commercial printing (e.g. advertising, catalogs), packaging printing (e.g. folding boxes, labels) and publishing printing sector (e.g. newspapers, books, magazines, corporate publishing magazines) [2 & 3].

Gravure printing (excluding packaging) in Europe is concentrated in a few large enterprises offering high volume printing capacities. Digital printing technologies are typically used for personalized or on-demand products or large scale products with short print runs in production. Due to customer demands (decrease in circulations) and an increasing quality of digital prints the market share of digital printing is rising significantly.

Automatization and increasing printing capacity per press causes an overcapacity problem in the printing industries. In addition data for print jobs can easily be sent to low-cost parts of the world. Therefore, printers need a strong product and customer focus, strong business models and if possible integration into the processes of customers. The showroom of many German printers is still the shop floor. They present production technology instead of products. "Printers need to become more involved in their customers' businesses. Once printers can gain a deeper understanding of their customers' business strategies, they can better develop creative solutions through their services. This requires a different selling strategy for printers and encourages them to move beyond the title "printer" to a broader title that encompasses the flexibility to alter services to match their customers' needs" [11].

In Germany there are 141,000 employees left in the printing industries. The number of employees in the German print industry decreased by more than approximately 35% (i.e. more than 80,000 jobs) between 2000 and 2014. In addition the number of employees in the offset-equipment industry has decreased significantly. The number of print shops in Germany decreased from 13,900 (in 2000) to 8,700 (in 2014). Small sized companies are still typical. These figures of the German Printing Association do not include major parts of functional and packaging printing capacity. Nevertheless, a large production volume of the printing industries in Germany remains. Revenues of the German printing industry are in 2014 Euro 20.8 bn in total, and 58% of the advertising revenues in Germany 2015 are still print-based [4].

2. Research Approach

The approach adopted here uses Porter strategy view, the core competence approach of Prahalad and Hamel and the business model canvas of Osterwalder. In addition effects of the disruptive change on business models in the printing industries are analyzed. A portfolio is derived from these research aspects. Several business models of printing companies are analyzed and classified in the portfolio. In addition future business model possibilities are discussed and classified.
Examples of business models are taken from literature, especially the interviews carried out by Hongzhen Diao [cf. 7,9]. In addition the experience was used from visiting printers, printing associations, intermediates (brokers), printing suppliers and research organizations in the field of printing in Germany, Italy, India, China, Hong Kong, Singapore, Australia, USA, Canada, Argentina and Chile during the last 9 years.

3. Framework

3.1 Definition of Business Models

A business model describes how a company makes profits. It helps to understand, analyze and communicate how that is done. Parts of a business model description are:

- A description of the achieved customer value.
- Value creation architecture: How could adequate technologies and business processes

be used. In addition the understanding of the market and entrance barriers are necessary.
- Profit model: How can profits be made in the value chain?

Strategies for business improvement can be developed on basis of this understanding [cf. 8]. Mintzberg defined a strategy as a pattern in strategic decisions.

Osterwalder et al [17] describes a Business Model Canvas i.e. a business model design template. Using the template a company can easily describe its business model (Table 1). These criteria allow the comparison of Business Models in chapter 4.

Resources/ Infrastructure	**Market**
Key Activities: The most important activities in executing a company's value proposition.	Products and Services
Skills / know how	Customers segments
Finances • Classes of Business Structures: Cost-Driven or Value-Driven • Revenue Stream	Value Propositions: The collection of products and services a business offers to meet the needs of its customers. The value proposition provides value through various elements such as customization, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/ usability.
Key Resources: The resources necessary to create value for the customer (intellectual, equipment, personal)	Delivery channels
	Customer relationships

Table 1: The Business Model Canvase {based on 17]

3.2 The Porter Strategy View for the Printing Industries

Using the Porter strategy view (figure 1) is helpful in understanding the situation and requirements of the printing industries:
- There are the competitors in the industry production line. Using standard technologies like Sheet Offset equipment competitors can easily imitate successful printers. Service development or own software developments (as provided by some online printers) can lead to reduced entrance barriers to markets.
- There is the threat of substitution products, e.g. digital media like E-books.
- There are new competitors. For German printers this is true e.g. for new competitors in Eastern Europe or in China for non-time-critical print products. Barriers of market access for competitors are lowered by IT (easy data transfer around the world, cheap transportation enables offshore printing). Germany imported publishing products valued 2.3 bn Euro in 2015 [21].
- There is the contracting-power of suppliers (e.g. ink, paper, equipment).
- There is the contracting power of the consumers (e.g. for highly comparable products of online-printers) and intermediates like publishers and advertising agencies.

Porter identified three basic strategies: cost leader, niche business and differentiation. These strategies and the understanding of the forces in the Porter strategy view are fundamental for the understanding of business models in chapter 4.

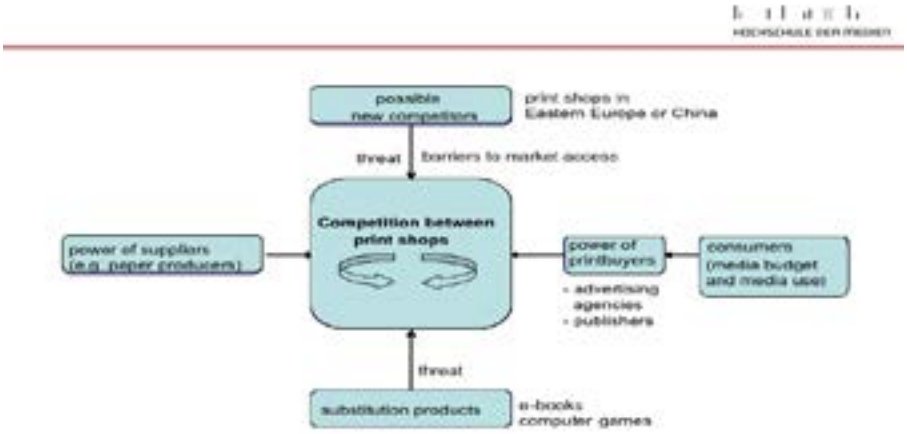

Figure 1: Porters Strategy View [cf. 5] applied on the printing industry

3.3 Core Competence Concept

A core competency is a concept in management theory. Prahalad and Hamel defined core competency as a harmonized combination of multiple resources and skills that distinguish a company in the marketplace [16]. Core competencies fulfill three criteria:

- They provide potential access to a wide variety of markets. Applying this concept in the printing industries means to use printing technology know how in non-media industries.
- They should make a significant contribution to the perceived customer benefits of the end product or service.
- They should be difficult to imitate by competitors. This should be considered, when business models for the printing industries are described in chapter 4.

The portfolio in chapter 4 focuses on companies which have their core competence in 'print' and their strategic focus on applying 'print' in different businesses and in specializing on 'print'. In addition printing technology is used by many companies which apply print as an incidental technology. In these companies printing technology is integral to in other production processes, using screen printing in the production process of a model railroad company. Another example is the printing of cells in biotechnology [15]: "We printed tens of thousands of picoliter aqueous droplets that become joined by single lipid bilayers to form a cohesive material with cooperating compartments. Three-dimensional structures can be built with heterologous droplets in software-defined arrangements. … Printed droplet networks might be interfaced with tissues, used as tissue engineering substrates, or developed as mimics of living tissue." A company using this printing technology would have no focus on 'print'. Therefore such companies are not considered in the following.

3.4 Disruptive Change caused by Digitalization

Digitalization causes disruptive change: Information about competitive offerings and new technologies is available worldwide, workflows become IT-based and allow global supply chains. Transportation costs

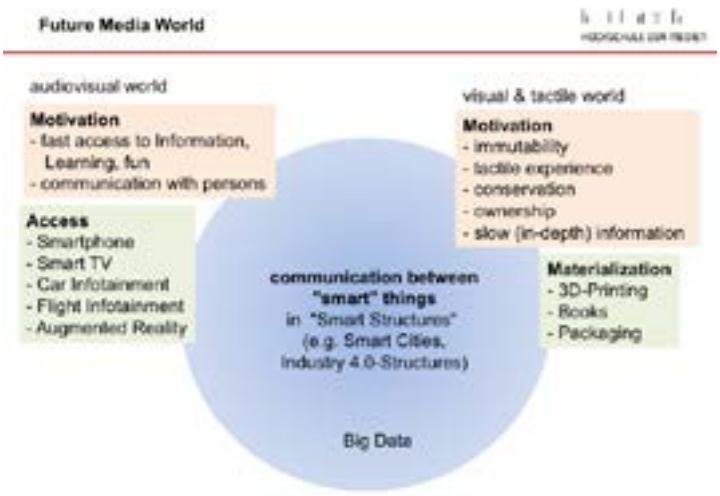

Figure 2: An idea of a futre media world

are low and allow worldwide distribution at reasonable costs. In general predictability is decreasing and uncertainty is increasing. New media cause a 'digital shift' towards the direction of digital and mobile media instead of 'print'. The motivation of media use is changing, often fast access is more important than ownership (figure 2). For the first time new media are not primarily added to existing media. There is a massive substitution effect of printed media.
In addition the Internet of things and services (IoT) is the next disruptive change for all industries including printing and packaging. The concepts of IoT are discussed as the Industry 4.0 concept in Germany, and similarly in the IIC in the US, and as 'Made in China 2025' in China.

Industry 4.0 is digitalized production including:

- M2M (machine-2-machine) communication.
- decentralized control: A high number intelligent things organize themselves (e.g. using intelligent packaging with printed RFID and antenna structures).
- personalized products: lot size 1 e.g. via 3D-printing of spare parts, prototypes or individualized products.

The German Printing and Packaging industry will be changed massively by these new developments (e.g. changes in logistics, maintenance and production control). New business models can be enabled and e.g. printed electronics can make things smart (e.g. printed antennas, RFID & batteries), and 3D-printing will be part of rapid prototyping and additive manufacturing. Business models based on these possibilities are described in chapter 4.

In general disruptive changes in businesses are caused by Innovations. These innovations allow

- new services and products by enabling new image/branding, personalization/customization of products and usage of new technologies.
- new processes: cheaper (with sometimes lower entrance barriers) or faster (e.g. web-to-print, no intermediates).
- business in new markets and with new customers (e.g. 3D-printing), using media technologies and know how outside media (printing technologies seem to vanish in other businesses from the view of some printing associations).
- new services due to changing legal and cultural frameworks and behavior (e.g. the always-in-touch and prosumer generation).
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Christensen and Overdorf described how disruptive change has to be managed: "Before rushing into the breach, managers must understand precisely what types of change the existing organization is capable and incapable of handling" [18]. This is true for many printing companies especially in Europe. Most of them are small and medium sized. They are not capable of handling new workflows and technologies, they have no R&D departments, their financial situation is weak due to over-capacity. Many of these companies go out of business every year, the business is changing from commercial to industrial structures. One example of lack of innovation is found in the management of internationally organized value chains. German publishers often pass work to Hong Kong brokers because many German printers are not able to organize such processes for their customers.

A explicit strategy and business model will have to be found by the printers. This will be described in chapter 4. In some cases pre-competitive research can be done by establishing research organizations by medium-sized companies to share ideas and costs. The DFTA center for flexographic printing in Stuttgart is a good example for such a structure. In some cases incubators at Universities can lead to more innovative new companies.

4. A Classification for the Printing Industries Business Models

In order to classify possible strategies and business models a portfolio approach with two dimensions is used. The first dimension focuses on whether the strategy is based on existing or new technologies. The second dimension focuses on whether the market for the companies is a media or a non-media market. The four sections of this portfolio will now be explained (figure 3).

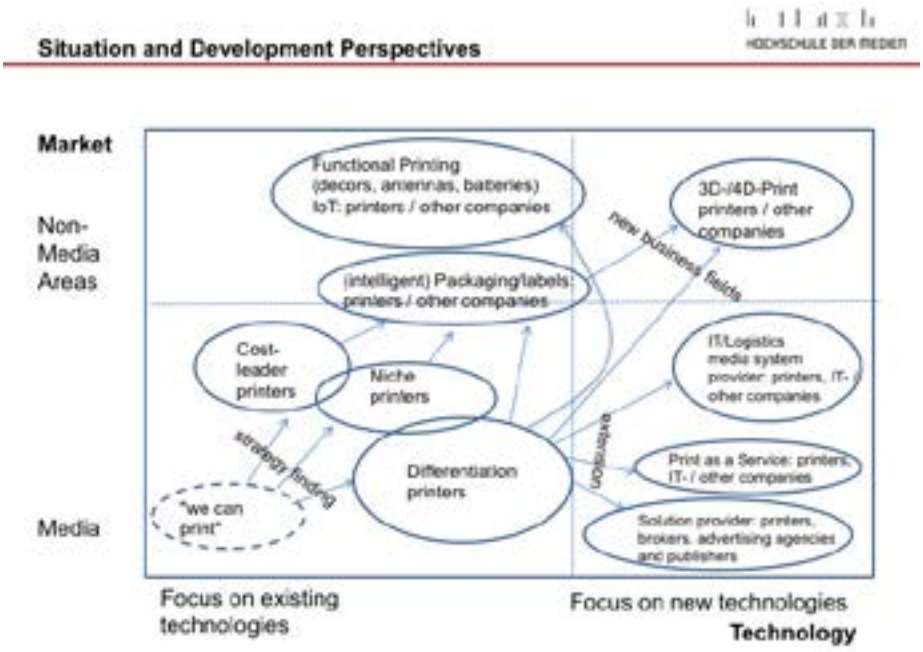

Figure 3: The printing industries situation and development perspectives

4.1 Section 1: Existing Technologies / Media Market

Many small commercial family run print shops at least in Germany still focus on their printing equipment. They have to think more about customer needs and products to be successful, not about technologies ('we can produce on a 6 color press'), i.e. they have to define a strategy and a market position. Their financial resources are weak due to comparable products, and personal resources are limited. Using the porter strategy model there are three basic strategies:

Cost leader strategy: Offer the cheapest products, e.g. via web-to-print, clearly defined products and highly efficient processes in a 'good enough' quality.

Differentiation strategy means not to offer the cheapest product but to offer a clear value to the customer, different from others.

Examples are:

- a large print shop in Singapore offering high quality and high-level world-wide service for book printing including most of the world-wide available quality management certificates.
- a regional newspaper being a cross-media platform and management platform for local events.
- a publisher which is specialized in magazines for children offering ideas and stories for well-known toy brands. Parts of a toy construction kit or doll accessories are attached at the magazines. This is an example of brand symbiosis between publisher and toy production companies.

Niche strategy printers offer a clear value to the customer which is very specific and not part of the mainstream market. Examples are:

- offering 'green' carbon-free printing including certificates.
  - a small printing company in Beijing offering a manufactory atmosphere for artists using old-fashioned collotype printing equipment.
- - a company in mainland China specializing in products for toys and children's books using lenticular printing.
- - a US-printer understanding the winery business and offering specialized printed materials including high end wine labels with customer-specific color management.
- - banknote and smartcard printers.

4.2 Section 2: Existing Technologies / Non-Media Market

A business model can be implemented by applying printing technologies in non-media industries. Examples are:

- individualized decor printing by using gravure printing.
- individualized textile printing.
- printing of antennas by using screen printing for the automotive industry.
- printing of flexible batteries.

The biggest sector for non-media use of printing technologies is the packaging printing sector (besides the aspect that packaging is important for advertising). Packaging is highly differentiated. It is used in different sectors like food, beverage, cosmetics and pharmaceuticals using different materials like paperboard, glass, metal and plastic [cf. 12]. A core competence for successful packaging printers therefore is the detailed understanding of their customer needs and processes.

In developed countries this sector is driven by increasing requirements of customers: quality requirements for pharmaceutical and perfumes product packaging, protection against forgery, culture-dependent packaging design, food-hygiene regulations, increasing number of single households (small package sizes) and age appropriate packaging. In emerging countries urbanization drives packaging printing companies: the necessity of preservation and therefore packaging of food for the citizens of mega cities especially in Asia.

Packaging cannot be replaced by digital media and is a growing sector. Nevertheless the packaging sector is affected by the upcoming of new information technologies. Changes refer to green printing & packaging (renewable raw materials, recycling, de-inking), personalized packaging, finishing possibilities in printing, smart packaging using IT RFID-tags or barcodes for improved logistics and additional information from the internet. The label business is normally done by printers. Printing directly on packaging materials like glass or beverage cans is often done in the production lines of other industries.

4.3 Section 3: New Technologies / Media Market

New business models can be implemented by 'Print as a service'. In the business-user¬¬ sector integrated print (workplace and department printers), scan and copy solutions including scan-to-mail are available. There are printing companies offering a full service package including maintenance and integration of the hardware in the customer IT. They add 'click'-based settlement systems and integration in accounting systems. The core competences of these companies are to understand the IT systems of the customers and the capability to integrate their services into these systems.

Other business models are based on a 'solution provider' concept. New services based on web-to-print, Job Definition Format (JDF) based workflows, virtual showrooms, Customer Relationship Management tools, QR-codes and database publishing can be offered by print shops. Those services are often combined with digital printing capabilities for personalization. Data usage for different media can be enabled using media-neutral database management

systems (separation of content and format information) and editorial systems.

The general idea is to offer services which cover major parts of the value chain and to redefine the interface between printers and advertising agencies. Printers can use their technical skills in using print as a push media in cross-media or trans-media (telling a story across multiple platforms) campaigns.

Other 'solution providers' work on international processes. For example there are 'broker companies' in Hong Kong using innovative IT based business processes for quality management, order processing and logistics [6,7,9]. They offer the management of print jobs in mainland China for European publishers in order to provide price sensitive and non-time-critical print production. In the past German printers often did not follow this international business model. Many suppliers for example followed the German car manufacturers to China. They established production plants in China and offered their well-known services but only a few printers for operating instructions and packaging of spare parts did the same.

A new business model is the IT/logistics media system provider. For example there is a print-on-demand printer for scientific books working together with booksellers like Amazon. The printer offers digital printing for small production runs including the whole IT-oriented business process (getting order and production data from the online bookseller, handling accounting, logistics and delivery to the customer). Printers have to look for the profitable parts of the value chain. Profit margins are high, where comparability is low. This principle also applies in reverse. Offering simply 'printing capacity' means high comparability (e.g. by comparing prices in Internet portals) and low margins. If solution and service providing are offered or even better media system management than comparability is low and profit margins are high.

4.4 Section 4: New Technologies / Non-Media Market

Business Models can be defined for new printing technologies in non-media markets.

3D-printing technologies enable products for new markets. 4D-printing means that 3D-products use materials that change their volume and structure after production, which can be e.g. useful for in-ear implants [cf. 13]. In July 2014 Amazon opened a 3D-Online-Printshop in the US. Global revenues are estimated to increase from approximately 3 bn to nearly 11 bn dollars in 2021.

This field with new technologies and business processes enables a wide area for startup companies. Their business model is to support rapid prototyping and spare part production. A challenge is the quality management of end-user CAD data. Professional services for industry (architecture models, spare parts for classic cars) and end-users (e.g. jewelry parts) are offered.

Due to these technologies, the 3D-printing and the functional printing described above, the printing industries can be part of leading edge businesses, the Internet of things and services and the Industry 4.0 initiative in Germany.

According to a study of McKinsey there are only 15 newly developed technologies which will decide the future of major parts of our economy and society. Up to 25% of Germany's economic strength will massively be influenced by these technologies in 2025. The study says the potential Impact on the German GNP in 2025 will be: Rank 1 the Internet of things with 286 bn US-Dollar and rank 13 '3D-Printing' with 24 bn US-Dollar [cf. 14].

5. Conclusions

Analyzing the different business models there are several conclusions for the printing industries:

- Over capacity and changing media use requires new business models and new, innovative business fields.
- There is not a single solution for the printing industries. New successful business models are individual. They are not limited to new technologies.
- There is an increasing field of printing technology applications outside media.
- IT-Innovations are the strategic key for most of the new business models.
- Profit is often related to the control of larger parts of the value chain.
- The work force in the printing industries needs new IT-skills for designing processes, skills for global operations and management skills (management techniques like Lean Printing).
- The often negative image of the printing industries for students ('dead tree media', 'old media', 'stick with ink and sink') can change due to 3D-printing and functional printing developments. It's well known by students that even the Aston Martin in James Bond's "Skyfall" was printed in 3D.

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