

2003

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Parry, G. (2003, November). *Evaluating the use of the web by print firms*. In *e-Business & Information Systems*. Joondalup, Australia: Edith Cowan University.
This Conference Proceeding is posted at Research Online.
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Evaluating the Use of the Web by Print Firms

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School of Accounting, Finance and Economics Working Paper Series
Edith Cowan University
October 2003
Working Paper 0307

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Abstract

The disruptive impact of electronic commerce on the print industry has the potential to radically transform its value proposition. The challenge for the industry is to utilise the disruptive aspects of emerging technology to offer customers greater variety in the delivery of information and communication, and take advantage of potential cost innovations to improve declining rates of return. This paper reviews these developments and reports on an exploratory study of the Australian print industry that suggests that the extent of transformation has, to date, been limited.

Key words: Printing industry; e-commerce; business model; disruptive technology

1. Introduction

The printing and publishing industry is an important part of Australia's economy. Highly dispersed, the industry employs 100 000 workers in some 6000 establishments (ANZ 2002). Most firms are owner-managed. Eighty-five per cent of establishments employ less than 20 employees; 95 per cent less than 50 employees; and only 2.5 per cent of firms employ more than 100 employees (Printing Industries Association of Australia, 2003). Industry turnover in 1999-2000 exceeded \$17 bn, or 2 per cent of GDP, reflecting the business community's on marketing materials and services (print, packaging, direct mail, electronic media, advertising, and promotional items). Australian print and publishing appears to have a similar profile to its counterparts in other countries such as the United Kingdom, Canada and the United States. The United Kingdom, for example, is estimated to have more than 15 000 firms employing an average of eight people. In Canada, the commercial printing industry is the largest manufacturing industry in terms of number of establishments, and its fourth largest manufacturing employer (Eckstein, 2002). As would be expected, larger firms focus on more complex tasks with larger print runs, such as books magazines and reports, whilst smaller companies often have a local area focus and supply brochures, catalogues, business cards and so on.

Although printing and publishing is one of the better performing manufacturing industries over the long term, the sector faces an uncertain future. Whilst domestic sales between 1992-93 and 1997-98 grew at about 3.7% p.a. (ANZ, 2002), this was slower than the rate of growth of the economy as a whole, and slower than the growth rate in service industries such as retailing and property and business services which are large consumers of print material. Industry returns were under pressure during the 1990s, indicated by the fall in profits before interest and tax from 13 cents in the dollar in 1992-93 to 7 cents in 1997-98, and declining returns on assets from 13 cents in the dollar to less than six (ANZ 2002, Department of Industry 2001, p.19), although more recent figures suggest some improvement. In its Industry Brief, the ANZ Bank (2001) concluded that the industry generated insufficient sales in relation to its investment in assets, and that growth in value added over the mid 1990s was less than the growth in sales. The industry is capital intensive, but faces relatively low capacity utilisation, one survey suggesting an average of 40 per cent across a sample of 30 firms. (Printing Industry of Australia, 1999). According to the Department of Industry (2001),

factors precipitating the decline in profitability include competitive pressure, high cost structure, failure to identify and respond to changes in the business environment, and changing market demand. Interestingly, a collaborative (government/industry) action agenda has been developed to investigate the challenges noted above and recommend a course of action for sustained profitability.

2. Technological Change and the Development of a New Business Model

Every industry has been affected to some extent by the development of information and communications technologies such as the Internet. The print industry is no exception, its structure having been fundamentally altered in the last twenty years by innovations driven by the marriage of printing, graphical arts and applied information technology (Eckstein, 2002). Whilst noting the enormous impact of computer-based technology over this period, Smallbone, Supri and Baldock, (2000) believe that the greatest changes are still to come for the majority of print firms. Like many 'bricks and mortar' industries, printing and publishing is starting to embrace e-commerce (defined as any type of transaction executed via online networks), as a means of increasing value and reducing costs. This section reviews the impact of technological change on the cost structure and value proposition of printing and publishing. Adaptation to the effects of technological change is likely to become increasingly critical for survival, especially for small general printers.

A number of disruptive technologies have impacted throughout the printing value chain in recent years. Arguably, the major change in the pre-press processes (content origination, typesetting etc) was the development of desktop publishing. Printed materials that could once only be produced by professional establishments can now be generated in small offices and even homes. Hardware developments such as removable drives and CD-ROM mean print buyers no longer provide camera-ready output to their printer. The document creation workflow is now likely to be entirely digital. According to Davis (2001) follow-on innovations will see content origination move away from a page-based model to a model that creates and uses databases during each stage of the process. Similar technological changes have occurred in the pressroom, where 'traditional' offset and lithographic processes are more likely to be digitally controlled, even eliminating plates in the case of direct digital production. Print speeds are higher, and short turnaround 'quick print' is usually available to customers who have created their work electronically. Davis suggests that the economic goal

of large print users such as publishers and direct marketers is “to multipurpose content, reduce the cost of media, speed time to market and maximise return on brand” (2001, p.8).

This suggests that a strategic imperative for print firms’ is the development of competencies to leverage extra value from the components of digital workflow. Potential leverage exists in communication and aggregation efficiencies such as web-based access for customers and the use of databases for content creation and integration, including the unbundling and versioning of information and digital content management. Potential leverage also exists in new products such as print on demand, data archiving; project management; CD ROM production and e-books which have entered, or are forecast to enter the catalogues of printers and publishers. Personalised and variable printing is a promising market niche made possible by the digital revolution, with an emerging model known as ‘push-pull’ publishing (information retrieved from databases which can be supplied on a ‘just-in-time’ basis). In Australia, the C-2-C project (a joint RMIT, Department of Industry and Common Ground Publishing initiative) set out to envision the future of the book, and examine some of the impacts that this would have on the supply chain. Emerging technologies include print and electronic text convergence, the multilingual rendering of scripts; digital book production and supply chain management and the development of text from many sources. Academics are familiar with these developments, having witnessed how textbooks have expanded in scope, often incorporating multimedia, access to websites and interactive digital imprints on CD-ROM.

The printing industry’s transition from traditional commerce to e-commerce is often described, as in other sectors, as a transition from ‘market place’ to ‘market space’ (Department of Industry, 2001, page 30). Lee’s (2001) model of an organisation’s input-output transformation process helps to draw a distinction between the two concepts and to develop the strategic implications of technological change. The model is represented as

$$X \Rightarrow \square \Rightarrow Y$$

where X represents inputs of labour, capital equipment (such as presses and finishing machines), and intermediate goods (such as paper and ink), and Y represents the finished products.

Traditional printing technologies (e.g. offset printing) are processes of reproduction characterised by ‘old economy’ operations and management techniques. Processes occurring ‘within the box’ drive business value by combining and altering the inputs and intermediate goods to achieve a (standardised) product. In many ‘traditional’ (bricks and mortar) print establishments, transformation of input is scheduled around the firm’s press/es. Lee (2001) describes the value-adding activities in the traditional transformation process as: alter, transport, inspect and store. Management’s focus in the ‘print shop’ is on achieving efficiency and quality ‘inside the box’ - that is, improving the transformation process. According to Hayes’ (2002), management culture focuses on the operating unit as the unit of analysis; with the operations focus on the flow of materials and information through a series of process steps; the administrative focus on the variable costs of production (typically the highest costs of the firm), and the strategic focus on prevailing over competitors by differentiation or price advantage.

Digital technologies exhibit a value creation process that goes beyond the transformation box, involving a different set of steps: gather, organise, select, synthesise and distribute (Lee, 2001). Managers need to find ways to take advantage of the disruptive nature of e-commerce to gather and utilise richer information and content, synthesise products, which meet individual customer needs and increase the speed of delivery. At an introductory e-commerce level, many printers have developed static websites as a one-way communication vehicle to gather business from outside their geographical market, sometimes incorporating interactive functionality such as an online form, which customers can use to obtain estimates. Seeking higher levels of interactivity and functionality, printers now have the opportunity to take advantage of supply chains, which run across organisational boundaries to lower costs and increase perceived value. For example, Noosh (www.noosh.com), a company formed in 1998 as an e-Procurement provider for the print industry, provides standardised templates which replace unique forms and enable time and costs savings to be made in online ordering. Others firms such as Collabria (www.collabria.com), Impresse (www.impresse.com), httpPrint (www.httpprint.com) and printCafe (www.printcafe.com) sell themselves to the industry on cost saving characteristics such as dynamic scheduling and optimised plant workflow; and end-user value drivers such as network publishing, real-time updating and repurposing of digital assets. In other words, these e-procurement firms store customer data (for example a supermarket’s graphics images), repurpose it as required, place and track orders and deliver to the newspaper, magazine or catalogue printer far more quickly than if

each task was manually handled. Because the production and procurement of corporate communications materials is a critical part of any organisation, companies that replace manual, time-consuming processes with Internet-based collaborative systems can gain economic and competitive advantages. Davis (2001) suggests printers need to become a better partner to their customers, linking business content and productive processes and providing multiple output options. Lee (2001) notes that what appear to be disruptive aspects of the technology offer reduced transactions costs, enable information to reach more people and potentially increase richness of content.

Raisinghani and Hanebeck (2002) describe a framework for evolution of e-marketplaces through three stages – ‘shops’ evolve into ‘tailors’ who provide custom-built applications and functionality which meet specific industry or company needs, or to ‘malls’ which host business processes or content, similar to a publicly accessible database. They predict that e-markets will evolve into ‘exchanges’, which provide whole solutions to problems, creating value because

- they expand market reach, especially useful for fragmented industries such as printing, health care and electronic components, where buyers and sellers may face difficulty in finding each other.
- they enable price reduction through competition - buyers can reach more sellers and markets can clear efficiently (e.g. excess inventory stocks can be passed on).
- they cut supplier costs through processes such as order tracing, inventory management and reordering efficiencies. Transaction costs can potentially be reduced as information exchange reduces search costs.
- they provide high value added content such as sharing industry best practice, building economies of scope.

Table 1 summarises key differences between ‘shop’ and ‘exchange’ in printing and publishing. E-procurement exchanges such as those mentioned above fulfil similar functions to marketplaces and hubs in other industries such as SciQuest (life sciences), PlasticsNet (plastics), e-STEEL (steel), PaperExchange (paper) and FloraPlex (flowers). Exchanges capitalise on the price efficiencies that result from standardising complex processes and varied products and services, and also on the industry’s own unique knowledge. According to Raisinghani and Hanebeck (2002), the exchange can spread the risk for participants and enable them to uncover new opportunities. Exchanges create value by creating market

transparency, enabling better and faster communication, supporting trade execution and enabling business process execution.

These technological and economic forces suggest the number of small printers who are able to rely on conventional processes in the future will decline (Smallbone, Supri and Baldock, 2000). The challenge for commercial printers is to present a different set of performance attributes, even if, as Lee (2001) believes, they are not always immediately valued by existing customers. The challenge is to go beyond concentrating on the transformation box to utilise the disruptive nature of e-commerce tools to gather, combine and distribute information that creates more value for customers.

Table 1: Shops versus exchanges in printing and publishing*

Characteristic	Old economy printing – a marketplace (shop)	New economy printing – a marketspace (exchange)
The product	Reproduction of a standardised product for a mass market.	Every print is an original; niche markets can be as viable as mass markets.
Production costs	Variable costs focus; unit costs fall due to supply-side economies of scale	Dominated by up-front costs, with low marginal costs; supply side economies of scale are flat; but there are positive network externalities as the number of printers utilising the marketspace grows.
Revenue sources	Paper output reproduces input	Output gathers digital sources, such as databases and packages them to meet dynamic demand.
Information networks	Small, local, tightly held	Large, global, open, transparent.
Competition	Differentiation	Compatibility
Operations management	Process management - flow analysis, scheduling, expediting	Project management of a system of complementary products - negotiating, building consensus, building incentives

* Adapted from Hayes (2002, p.28)

3. Print Industry Progress Towards E-commerce in Australia

This paper reports an exploratory study, which investigates the extent to which the printing industry in Australia has incorporated e-commerce, as judged by the level of e-commerce functionality observed on their web sites. Higher levels of web site functionality would indicate the extent to which printing firms are capable of, and willing to, make the

strategic moves, which will transform them from old to new economy - from traditional to digital, from shop to exchange.

The paper adapts the model of internet commerce adoption (MICA) metric developed by Burgess and Cooper (1998) in a study of the metal fabrication sector, and later applied to tourism (Doolin, Burgess and Cooper, 2001) to examine the level of functionality of commercial printer web sites. As shown in Table 2, the metric proposes three layers of web site functionality – promotion, provision and processing.

Table 2: Model of Internet Commerce Adoption*

Levels of functionality	Print industry indicators of adoptions
Stage 1 – PROMOTION	
Layer 1 – basic company information	Company name, address and contact details (phone/fax/mail)
Layer 2 – rich information	Mission statement, newsletters, details of print industry awards, details of equipment (printing capability), multimedia enhancements to web site.
Stage 2 – PROVISION	
Layer 1 – low level interaction	email contact points, systematic links to details of products and services
Layer 2 – medium level of interactivity	Educational information on printing processes to assist content preparation, customer support (e.g. FAQ, online feedback, information on how to prepare and supply artwork and files.
Layer 3 – high level interactivity	Use of online forms to obtain estimates,
Stage 3 - PROCESSING	
Layer 1	Interaction with corporate servers (e.g. customer login), downloadable drivers (e.g. barcode writers, flightcheck routines), online transactions, monitoring, supply chain management. provisions for uploading files.

* Adapted from Doolin, Burgess, and Cooper (2001)

The three layers suggest the extent to which a firm has made a transition from product orientation (traditional transformation processes) to a commercial electronic relationship. Doolin, Burgess and Cooper suggest that the addition of layers is synonymous with businesses moving from a static internet presence through increasing levels of interactivity towards a dynamic site which incorporates “value chain integration and innovative

applications to add value through information management and rich functionality” (2001, page 149).

In order to investigate the extent of e-commerce adoption by the printing industry, a review of websites of 52 member companies of the Printing Industries Association of Australia was conducted. A subset of member companies was first selected to investigate attributes or descriptors which might characterise each level of functionality, although there was an element of subjectiveness involved in this process due to the variety in the structure of web sites. Each of the 52 web sites was then examined in detail and the functions performed by the site were entered in a spreadsheet file. Table 3 reports the results of the review.

Table 3: Functionality attributes of print firms’ web sites

MICA layer	Functionality attribute	% found
PROMOTION		
1. Basic information	post and phone contact details	100.0%
	list of products and services offered	96.5%
2. Rich information	mission statement/history	32.1%
	information about printing equipment	35.7%
	newsletters	25.0%
	details of printing awards etc	21.4%
PROVISION		
1. Low level interactivity	email addresses	96.4%
	systematic links to products/services	89.3%
	hyperlinks to external sites	25.0%
2. Medium interactivity	downloadable forms and brochures	10.7%
	frequently asked questions (FAQ)	28.6%
	(educational) information on printing processes to assist content preparation	32.1%
	information on supplying artwork	39.3%
	online feedback form	21.4%
3. High interactivity	online estimates/quotes (form)	53.6%
PROCESSING		
1. Processing	web-based file upload	10.7%
	downloadable drivers eg barcode, flightcheck	7.1%
	login for users	17.8%
	secure online transactions	3.6%
	order status tracking	0%

The results reported in column three are the proportions of printer web sites which display various levels of functionality. Unlike the work of the model’s originators (applied in

manufacturing and tourism contexts), no attempt has been made in this study to categorise print firms into stages and layers of functionality. The low proportion of higher order attributes suggest that the transition from marketplace to marketspace has to date been limited. Judging by the level of interactivity on their web sites, most commercial printers use the Internet as a tool for information distribution, with very few applying it as a tool for digital value creation using the techniques discussed in the previous section. This conforms in general with an ABS survey (ABS, 2003) which reported low use of the Internet to conduct business activity – as at June 30, 2001, just 28 per cent of manufacturing businesses had a website or homepage, and just 3 per cent of these businesses had integrated web technology with back-end systems.

Most web sites contained systematic ‘click-through’ links to marketing information such as product specialisations, technical capabilities, industry awards and so on. These ‘promotion’ sites are limited to the customer being able to determine information about the capabilities of the printer. Although targeted at buyers, they offer most benefits for the sellers. About a third of sites added levels of information complexity important to content originators, such as advice about file formats tips and tricks to ensure creator output meet the standards required to integrate fairly seamlessly with the printer’s pre-press (for example, the integration of graphics files, colour management, pre-flight and file packaging). Typically, however, these were scanned instructions similar to instructions in software packages. The highest level of internet commerce adoption, processing, was evident on very few websites, yet seems to offer the greatest potential cost savings and possibilities for dynamic execution of business such as just in time use of databases. Just five firms enabled clients to upload files from within their browser, and three provided plug-ins for clients to ‘flightcheck’ files, prepare standard format barcodes, access information resources such as photographic files, and so on. Such functionality helps to reduce transactions costs and effectively create a bundle of outputs. The content originator can link to the printer’s electronic resources to prepare content and format output so that it can be uploaded direct to print. These complementary products and services have important strategic advantages for the printer in several ways. They expand market reach, particularly in fragmented industries such as printing where buyers and sellers may have trouble contacting one another, and establishing the potential value of the economic exchange. They add to value for buyers by reducing transactions costs as they add richness and make knowledge resources available to more partners. They add value for sellers because they establish switching costs which strengthen

the ties of the buyers to the printer. Further, they provide economies of scope which leverage the value of digital assets held by printers or groups of printers.

4. Limitations and Further Research

The author acknowledges several limitations of this research. The company websites surveyed are probably a biased sample of the print and publishing industry in Australia. Firstly, the sample may overestimate the proportion of firms displaying high-level functionality, given that Printing Industry Association members may be expected to be more in tune with emerging technologies and business models than non-members. Secondly, as the Association is national, member firms are likely to be larger than average and have a wider geographical spread of customers. Other things being equal, larger firms should have larger asset values and thus be more likely to use more up-to-date technology. Higher levels of interactivity and processing may be underreported for two reasons. Firstly, the researcher was unable to enter password-protected sections of the nine sites, which demonstrated the 'user login' level of functionality. Secondly, the web sites illustrate business-to-consumer (print buyer) functions, which focus on the marketing and sale of print products. It is likely that a number of firms in the sample have more comprehensive B-2-B links with downstream companies in their supply chain.

Comparison of these results with other industry sectors is somewhat dangerous. The printing and publishing industry produces a commodity product in a market with high numbers of buyers and sellers. Most forms of printing can be classified as experience products because it is likely that customers are repeat buyers who have a clear set of expectations of their requirements, and some previous experience of output, value and prices. Studies using the MICA framework have been done on the tourism industry in New Zealand [Doolin, Burgess and Cooper(2001)]; metal fabrication (Burgess and Cooper, 1998) and superannuation and managed funds. Comparison with tourism and superannuation sites needs to recognise that these products are credence goods, which cannot be sampled before the decision is made.

This paper reports an exploratory investigation, and notes that the industry association and government are conducting benchmarking studies related to increasing rates of return. The author plans a follow-up web site review, which will establish the degree of change in the

provision of high order functionality. Following that, it is intended to investigate the contribution of ICT technologies to competitive advantage by correlating the implementation of ICT and profitability. Finally, in reflection on the nature of the printing industry, it appears worthwhile to establish the barriers to entry, which exist in the application of ICT technologies to the printing business model. Aside from finance, these are likely to include obstacles, which can be overcome with time, such as industry and domain experience and backend integration.

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