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Adoption of Technologies for Contract Color Proofing in Commercial Printers

by Bruce Leigh Myers, Ph.D. • Rochester Institute of Technology

Introduction

The commercial printing industry has undergone extensive changes due to technological innovations and shifting economic conditions. These developments have likely influenced the technologies utilized to produce proofs for commercial lithographic printing work. In 2005, the Print Industries Market Information and Research Organization (PRIMIR) published an extensive report entitled *Dynamics and Trends in Color Proofing 2005–2010* based on research conducted by State Street Consultants. This comprehensive report analyzed all types of proofs across an extensive array of market segments. The present research examines a portion of these: specifically, contract color proofs utilized by commercial printing organizations are analyzed. For the purposes of the present study, important limitations are defined below:

Contract color proofs are defined as a proof that represents what the job will look like when printed on press. For a proof to be considered a contract color proof, the customer agrees to accept output that matches the contract proof, and the printer agrees to produce output that matches this proof. Although there could be contract proofs for black-and-white printing, for the purposes of this study the term contract proofs is used to refer to those contract proofs intended to represent color work.

Commercial lithographic printing organizations are defined as firms that provide lithographic printing, typically performed on a job basis, and frequently advertising-driven. Included in this definition are printed products such as catalogs, directories, brochures, and posters. Printing excluded from this definition are publications such as newspapers and magazines as well as books, business forms, labels, tags, financial, and packaging printing.

Need for the Study

Since the 2005 PRIMIR study, no quantitative analysis of technologies utilized to produce contract proofs for the commercial lithographic printing industry were found in an extensive review of the published literature. In the past seven years, major economic changes coupled with technological advancements have likely impacted production capabilities and customer expectations of all aspects of

commercial printing. There is no reason to believe that the technologies utilized to produce contract proofs would be an exception to the shifts that affected the entire industry. Furthermore, as the 2005 PRIMIR report projected to 2010, it is suggested here that an update in this area is a timely addition to the literature.

Purpose

The present study uses a cross-sectional questionnaire instrument to collect quantitative data designed to examine the technologies utilized to produce contract proofs. Trends in this field can be a concern for several constituencies, including commercial printers and print buyers, industry manufacturers, standards/specifications committees and educators.

Understanding the stage of proofing technology adoption relevant to the product lifecycle is potentially important information for relevant stakeholders. To help to ascertain the stage of contract proofing adoption among commercial printers, comparisons of the currently reported adoption of contract proofing technologies with the 2005 PRIMIR study are made to examine possible trends and adoption in this particular domain.

Literature Review

The 2005 PRIMIR study offers a comprehensive analysis of multiple types of proofing across several industry segments. Although segment differences were reported by PRIMIR, an overall trend was noted: printers are increasingly moving away from hardcopy halftone-based proofing to digital technologies that are not halftone-based: these technologies include inkjet, toner-based, and virtual soft proofing. Further, PRIMIR discussed anticipated proofing trends, which include the continued emergence and increased use of monitor-based soft proofing.

As the present study is concerned with technology adoption, Everett Rogers' *Diffusion of Innovations* represents literature pertinent to the subject. Rogers (2003) defines diffusion as "...the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). First published over 50 years ago, Rogers' *Diffusion of Innovations* (DOI) has provided the basis for studying technology adoption, and is widely regarded as the seminal work in

Adopter categorization on the basis of innovativeness. Adapted from Roger's Diffusion of Innovations, Fifth Edition (p. 281).

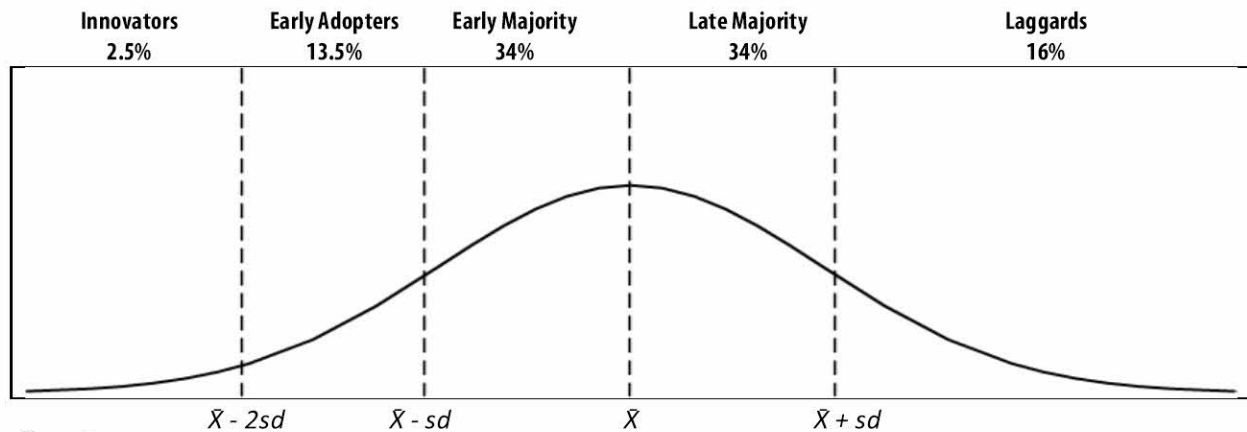


Figure 1

this field. Perhaps the most famous element of Rogers' theories is his contention adopters of any new innovation or idea could be categorized as innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%), based on a bell curve, as illustrated in Figure 1 (Rogers, 2003).

Several researchers have studied innovation diffusion and technology adoption in the graphic communications industry. Relevant studies range from research involving the adoption of computer electronic prepress systems (Nwako, 1990) to an examination of the barriers to successful implementation of a print management information system (D'Amico, 2006) to Burgess, Burkinshaw, and Vijayan's 2004 study which examined the diffusion of digital inkjet printing in the textile industry.

Research Design and Methodology

Using a self-reported mailed questionnaire instrument, pre-media managers working at various graphic communications organizations were selected to receive the survey in the spring of 2013. One hundred different organizations were selected using the 2012 *Printing Impressions Top 400* as a basis sampling frame. In a manner consistent with Dillman's *Mail and Telephone Surveys, The Total Design Method* (1978), managers were contacted first with an introductory letter, followed in several days by the survey instrument packet. The survey instrument packet included the survey instrument booklet, a letter of instruction, and postage-paid return envelope. Two weeks after the initial packet mailing, a reminder postcard was sent to non-respondents, and approximately ten days after the reminder postcard a second survey

packet was mailed to those who had not yet responded by that time. To potentially increase response rates, steps were taken to assure the respondent's anonymity.

As the research is limited to general commercial lithographic printing, the survey instrument began with a qualifying question which defined general commercial color lithographic printing, and asked those that did not do this type of work to disqualify themselves and to return the survey packet with the remainder of the questions unanswered. Of 100 mailed surveys, 4 were returned as self-disqualified. In these cases the respondent indicated that no commercial printing was conducted at that specific location. Forty-nine respondents identified their organizations as performing commercial printing, and also responded to the subsequent questions. Of the 49 usable responses, 24 indicated that their company location employed 100 or more, ten reported 50-99 employees, and 7 reported 20-49 employees.

Data Analysis and Results

The study solicited information regarding the mix of contract proofing technologies that are in use by general commercial lithographic printing companies. As indicated in Figure 2, the reported utilization of virtual proofing increased from 7 to 16% in organizations with 19-49 employees, while it decreased from 14 to 10% in organizations with 50-99 employees, and remained constant at 9% for companies 100 or more employees. Further, more companies are reporting jobs where no contract proof at all is required. These include 7% of all jobs for companies with 50 or more employees and 4% of all jobs for companies with 19-49 employees.

Percentage of contract color proofing technologies utilized by commercial printing companies by company size: 2005 compared to 2013

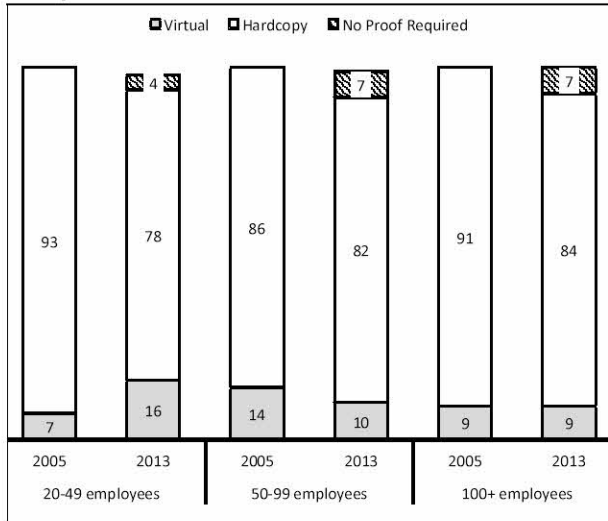


Figure 2

A summary of the types and percentages of respective contract proofs utilized by the respondents is illustrated in Table 1.

A closer look at the virtual proofing technology utilized across all commercial printers reveals that of the 49 commercial printing respondents, 31 reported that virtual, monitor-based soft-proofing technology is sometimes utilized for contract proofs. Of these 31 monitor-based proofing adopters, 11 (35%) reported using soft proofs which were not color managed at least one-half of the time that virtual proofs were used, whereas 13 of the 31 (42%) utilized color managed monitor proofs for at least one half of their virtual proofs.

Turning to the hardcopy proofing technologies utilized, continuous-tone hardcopy proofs are clearly dominant, accounting for over 88% of the contract proofs. These technologies include inkjet, toner-based, and photographic technologies. Halftone-based technologies, which include ink-on-paper press proofs and digital halftone technologies account for nearly 11% of the contract proofs reportedly produced in this market.

As continuous-tone proofs represent the dominant form of hardcopy proofs, a further analysis of the types of technologies utilized was here performed. The present study analyzed toner-based technologies two ways: one defined as digital presses which utilize liquid-or dry toner-based technologies (e.g.: H.P. Indigo, Xerox iGen,

Kodak NEXPRESS) and the other defined toner-based devices as “networked color copiers”. Together, these toner-based technologies reportedly represented close to 23% of the hardcopy contract proofs utilized in this market, with the networked color copiers representing close to 7% and digital presses representing almost 16%.

Recognizing that in addition to halftone- and toner-based technologies, other marginally utilized types of proofs, including photographic or dye thermal sublimation which are not halftone-based, were reportedly used for less than one percent of the hardcopy proofs made by commercial printers. It is therefore clear that inkjet technologies continue to dominate the hardcopy proofing market, representing nearly two-thirds of the contract color hardcopy proofs produced.

Consistent with the 2005 PRIMIR research, the adoption halftone-based proofing technologies represent a minority in the commercial printing market, accounting for nearly 11% of the reported hardcopy contract proofs utilized. Digital halftone proofs (e.g.: Fujifilm Finalproof and Kodak Approval) did represent nearly 8% of the hardcopy proofs being made by larger commercial lithographic printers surveyed, while just over 3% were represented by ink-on-paper press proofs.

Table 1: Contract color proofing adoption among commercial lithographic printers 2013

Virtual contract color proofing adoption among commercial lithographic printers	
Some virtual contract proofs	63%
Percentage of virtual proofs color managed \geq 50%	42%
Percentage of virtual proofs non-color managed \geq 50%	35%
Hardcopy contract color proofing adoption among commercial lithographic printers	
Continuous-tone hard copy proofing	88%
Inkjet-based continuous-tone hard copy proofs	64%
Toner-based continuous-tone hard copy proofs	23%
Toner-based continuous-tone proofs: networked color copier	7%
Toner-based proofs: digital press	16%
Other continuous-tone hard copy proofs	< 1%
Halftone-based hard copy proofs	11%
Ink-on-paper halftone-based hard copy proofs	3%
Digital halftone-based hard copy proofs	8%

n=49

Findings

The results of this study indicate that the proofing market is moving towards less sophisticated technologies. Of course, the least sophisticated contract proof is for a job that requires no proof at all. Monitor-based virtual “soft” proofs also have impacted the marketplace: a sizeable percentage of these are reported as not being color managed at all. This likely means that all sorts of devices, from computers to mobile devices could be future platforms for contract proofs for a segment of the commercial printing market. Solutions utilizing virtual proofing on newer-type devices could likely be considered in the early stages of Rogers’ DOI, while monitor-based proofing in general appears to have ‘stalled’ in the commercial printing industry when the present results are compared to the 2005 *PRIMIR* research. Further research will be required to more confidently assign a stage of adoption for these virtual proofing technologies.

The present study segments toner-based technologies into “networked color copiers” and “digital presses.”

Networked color copiers represent another example of what could be considered a less sophisticated technology. Alternatively, digital presses represent another source of contract color proofs for lithographic jobs. While it is unlikely that an organization would incur the cost of a digital press solely for the purpose of making contract proofs, many offset printers have adopted digital presses to enhance their product offerings, especially in the area of short-run, fast-turnaround work. This means that these organizations could have color digital presses on their floor already. It comes as little surprise that tightly controlled digital presses can produce proofs as accurately as their inkjet cousins if production constraints and job format size permits their use. As the consumable imaging costs of digital presses is likely less than that of inkjet, these marking engines can be poised to capture more of the contract proofing market moving ahead. When viewed in the framework of Rogers’ DOI, it is difficult to confidently assign an adoption stage for these particular technologies as proofing devices: using these toner-based marking engines as proofers is likely not the sole or even primary purpose in most organizations.

Consistent with the 2005 *PRIMIR* report, now mature inkjet technologies continue to dominate the contract proofing market. This study indicates that other continuous-tone technologies such as photographic and dye-thermal sublimation represents marginal technologies as proofs for commercial printing jobs. Established tech-

nologies like these could be considered in the “late majority” or “laggard” stages of Rogers DOI.

Halftone-based hard copy proofs are the most complex and expensive of the examined proofing technologies continue to represent a small percentage of proofs produced. Their continued use is sufficient for some printing organizations to maintain production for what is likely the most demanding and price indiscriminant buyers. New adopters of these technologies would likely be considered “technological laggards” when viewed through Rogers’ DOI theory.

Conclusions

The trend toward jobs requiring no proofs and virtual proofs that are not color managed represents an interesting condition for the commercial printing industry. Perhaps this indicates a lessened emphasis on precise color reproduction, together with an increased level of confidence in the printer’s ability to produce accurate, consistent color reproduction without the need for a physical or virtual contract proof that is color managed. Other job factors, including cost, turnaround time, and shortened run lengths may be of more value to this segment of the market. This finding points to the realization that a segment of the commercial printing market may be ready to embrace technologies such as workflow tools that support customer-relevant factors in real time utilizing the Internet and cross-platform display technologies. Innovators and early adopters here may have an edge in providing enhanced customer value.

Future research

As the present study is quantitative and cross-sectional in nature, future researchers could adopt a more qualitative approach to print providers and buyers to obtain a richer understanding of the salient factors driving the technologies utilized for contract proofing. Further, as this research is limited to commercial lithographic printing, future researchers may add additional market segments, including packaging, publication, advertising agencies and in-plant printing operations. Finally, the present research is limited to technologies serving as contract proofs only: technologies utilized to produce concept, content, and imposition proofs could be examined by researchers to develop a more comprehensive view of the proofing market as a whole.

Further, to draw more confident conclusions on any technological innovation through Rogers’ DOI it is sug-

gested that at least three data points are necessary. If adoption rates increase, the technology can be assigned to the “innovator,” “early adopter,” “early majority” side of the adoption curve. However, if it appears that the technology has peaked, then it is more reasonable to view the technology on the “late majority” and “laggard” side of Rogers’ DOI curve. Therefore, future researchers may revisit these technologies in the coming years and update comparisons with the PRIMIR study and the present research.

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