New Skills for DAM and Variable Data Printing Services

Is the Printing Industry Prepared?

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Franziska S. Frey, Ph.D.

Professor, School of Print Media

Rochester Institute of Technology

Henrik Holm Christensen

Graduate Student, School of Print Media

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A Research Monograph of the

Printing Industry Center at RIT

No. PICRM-2005-08

R·I·T Printing Industry Center

An Alfred P. Sloan Foundation Center

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Executive Summary

This study is designed to identify the skill sets needed by printing companies, and training possibilities offered to existing employees , in the areas of Digital Asset Management (DAM) and Variable Data Printing (VDP). This was accomplished through a survey of the network of printing companies currently engaged in RIT's Printing Industry Center research activities. In order to understand the characteristics of the digital printing market segment in the U.S. in 2005, a demographic study of the respondent group was also conducted.

The respondent companies firmly believe in an increasing future demand for DAM and VDP. When hiring specifically for DAM and VDP, companies are looking for employees with skill sets that the companies previously did not have. On average, companies that did hire DAM, VDP, and IT administration employees were larger than companies that did not hire in these areas. The same companies also experienced a higher revenue growth.

Most companies that have deployed DAM and VDP show a preference for educating their own employees for these areas. Most often companies use in-house training. However, the level of education they require and the training topics they offer do not lend themselves to a full deployment of these technologies. Operation of DAM and VDP are possible with the types of skill sets that are currently trained in-house, but most likely the set-up and system integration skills needed to initiate these technologies are not covered in such training programs.

Another finding supporting this general trend is the reported lack of professional networks outside the printing industry. To learn about VDP and DAM, the employees of responding firms predominantly read materials such as trade magazines, targeted directly to the printing industry. There is a strong belief, fostered by these types of magazines, that adding new technology will create opportunities for increased revenues. However, printers will have a hard time developing strategic competitive advantages if their own employees do not have the skill sets to move beyond the choices offered by the manufacturers.

A deeper quantitative analysis will be conducted to see whether certain aspects of company culture can be defined for companies that have successfully hired employees with new skill sets for the areas of DAM and VDP.

Introduction

Whereas traditional employee skill sets for lithographic print production have been well documented in the industry for many years, the implementation and the operation of Digital Asset Management (DAM) and Variable Data Printing (VDP) technologies now call for new employee skill sets. These skill sets are required in order to gain the maximum benefit from these technologies, and are the foundation of generating a profitable return on the investments they require. Therefore, the challenge for the industry is not only to deploy new technology, but also to attract, manage and keep new types of employees, and re-educate existing employees. Another important aspect of this challenge is the competition among companies to hire the most qualified employees. In the future, printing companies can expect major competition for human capital. As Bartlett and Ghoshal (2002) describe:

> Today managers must compete not just for product markets or technical expertise, but for the hearts and minds of talented and capable people. And after persuading them to join the enterprise, management also must ensure that those valuable individuals become engaged in the organization's ongoing learning processes and stay committed to the company's aspirations. (p. 41)

The stage is set for future competition in the printing industry, in which DAM and VDP technology will play important roles. Companies must face the challenges of attracting, managing, and keeping the most important resource in this business area—the employees.

Background and Significance

In the *2005 PIA/GATF Technology Forecast*, Davis (2005) predicts that the sales of printed direct marketing will increase by 3% to 3.5% from 2005 to 2006. Direct marketing is the largest growing print sector in the 2005 forecast. Furthermore, Davis states that ancillary services (which include DAM) comprise 10% to 15% of current sales revenues. This percentage could increase to 20–25% within the next ten years. Davis adds, "Within ten to fifteen years, it is conceivable that digital printing and ancillary services could comprise half of printers' dollar sales" (p. 6).

Waldman (2004) supports this view and further explains the potential destruction of a company if management ignores these technological advances.

In its *2004–2005 State of the Industry Report*, the National Association for Printing Leadership (NAPL, 2004) indicates that the printing industry has realized this danger. When asked about investment priorities for the next five years, the replies were 57.6% for digital printing presses/systems, 49.2% for fulfillment capabilities, 44.7% for mailing capabilities, 42.7% for database management capabilities, and 32.6% for DAM. When asked about investment priorities over the previous five years, the replies indicated 21.6% for digital printing presses/systems, 16.6% for database management capabilities, and 12.9% for DAM.

In this context, deployment of technology and skill set requirements are closely related. NAPL (2004) states in its *2004–2005 State of the Industry Report*:

> Our industry is in transition and continues to be redefined. It stands to reason that labor force requirements are changing or will change as well. Differences can range from the number of traditional positions to requirements of whole new skill sets. Almost half (47.6%) of the participants in the latest S*tate of the Industry Survey* indicated they have added new kinds of employees or skills over the last three years. (p. 18)

This study will focus on the skill sets needed to implement and operate a printing business based on DAM and VDP systems. Skill sets refer to the employees' ability to solve concrete tasks regarding implementation and operation of these technologies. This is of significant interest since these skill sets have not previously been related to the traditional printing industry. These skills are closely related to information technology and engineering, and people possessing them are usually managed and employed using a different approach than that found in the traditional printing industry.

To attract, manage, and retain this type of employee, the graphic communications industry will have to modify its approach. Companies will have to effectively compete with other print services providers, as well as with other industries, for people who have these skill sets. NAPL (2004) states the following about new skills for the printing industry in the *2004–2005 State of the Industry Report*:

> These positions are in demand economy-wide. So printers must compete for this talent pool, not only with other printers, but also with non-printers. And as the economic expansion continues, labor markets are going to get tighter. (p. 18)

Therefore, the ability to attract skilled employees will be a considerable factor in the overall success of the graphic communications companies of the future.

Specific research objectives and questions include:

- What skill sets need to be available in the workforce for the successful integration and use of DAM and VDP?
- How can a printer attract the right people with the right skills when competing with other industries?
- What management strategies are needed to keep people with such skills?
- How are professional networks changing to adapt to new requirements in the workforce?
- How do employees working on the new technologies fit into the existing workforce?

Literature Review

Introduction

The printing industry has undergone profound changes within recent years. Several causes can be named as the impetus for these changes, but the national economic downturn is usually cited as the biggest influence. NAPL (2004) groups recent changes in the industry into two major categories: cyclical and structural.

Cyclical changes were caused by the general economic downturn in the U.S. economy, during which the printing industry was hit by changes in paper prices, ad spending, and interest rates. However, this downturn affected the printing industry much more than overall U.S. manufacturing. The reason for this is found when examining the development in growth of sales. The rate of growth for commercial printing was traditionally higher than the U.S. Gross Domestic Product (GDP). But in 1998, the growth of commercial printing dipped below the GDP, which in turn compounded the effects of the recession that began in 2000.

The reason commercial printing growth took this downturn in 1998 can be found in the structural changes of the industry. Structural changes are profound changes that alter the fundamental basis of print in communication throughout society (NAPL 2004, p. 3).

Friedman (2005) describes changes throughout the world that have had a "flattening" effect on it. The main historical and technological drivers of these changes are:

- The fall of the Berlin Wall, and the rise of the IBM PC platform equipped with the Windows operating system at the end of the 1980s and the beginning of the 1990s.
- Public access to the Internet made possible by the introduction of the Netscape browser in 1995.
- The emergence of workflow software and software compatibility in the late 1990s.
- Open sourcing of intellectual property and software.
- Outsourcing of business tasks, made possible with high-speed Internet and advanced telecommunications.
- Offshore manufacturing and services brought about by cheap labor and new manufacturing, Internet, and telecommunication technologies.
- An enhanced focus on supply chain structures in manufacturing and services.
- In-sourcing of supply chain management and supportive services to external providers. This makes it possible for small companies to reach the same geographic distances as large companies, and enables large companies to foster a local perspective and provide a local feel.
- The extensive information available to and searchable by anyone, through Web services such as Google, Yahoo!, and MSN Web Search.

- The "steroids" that make all of the world flatteners even more rigorous, i.e., new digital, mobile, personal, and virtual technologies.

These ten flatteners have made communication in various forms possible throughout the world, and have encouraged world citizens to adopt and rely on new technologies. They are clearly affecting the structural changes in the printing industry.

NAPL (2004) defines the changes in communication that have caused structural changes in the printing industry as:

- The Internet and other electronic alternatives to print. Sometimes they complement print. Sometimes they compete with print. Sometimes they're neutral. It depends on what is being communicated—a directory or a general-interest magazine, a best seller or a scholarly journal—and how the audience prefers to receive that communication.
- Technologies that allow clients to shorten press runs by targeting their markets more precisely, to reduce inventory by buying print just-in-time and on-demand, and to bring print and graphic capabilities in-house.
- Clients consolidating, merging, relocating—including overseas—and centralizing their print purchases by, for example, forming national purchasing organizations. (p. 3)

A New Approach

Along with the general waves of innovation influencing world society, publishing technology has also developed significantly over the past 20 years. Developments in publishing technology have been highly correlated to progress within the world of Information Technology (IT). According to Davis and Walter (2003, November), the rate at which the power of technology doubles, or the cost per capability halves, has been 9 months for networking technology, 12 months for storage technology, and 18 months for computing technology. This rapid development in IT has affected the stages of publishing technology over the last 20 years. According to Davis and Walter (2003, November) these stages are:

- Desktop stage: started in the 1980s
- Server stage: started in the late 1980s
- World Wide Web stage: began in the early 1990s
- Networked Services stage: emerging now
- Semantic Web stage: on the horizon.

Both DAM and VDP are offspring of the Server stage. Among other developments, this stage focused on document and content management, where an applications-specific central repository could communicate with workstations using databases and proprietary metadata. This capability gave birth to print-on-demand businesses and variable data printing. However, since the dawn of this stage, both DAM and VDP have developed significantly. An example of this development appeared in the World Wide Web

stage, when connectivity through browser access was provided to both DAM and VDP technologies.

Today's industry features the emergence of the Networked Services stage. Davis and Walter (2003, November) describe this stage as being "… characterized by a shared-resource architecture, integration of content publishing with core business and supply-chain processes, and multichannel, rich-media content delivery" (p. 9).

This publishing workflow will allow users to create content once and publish everywhere with total integration with other processes. Davis and Walter describe the effect on printers as "… more and more repositioning themselves as media producers, and reaching both upstream into the creation cycle and downstream into packaging, fulfillment, and distribution" (p. 10).

As the industry moves into the Semantic Web stage, technology will advance even further, and content will be separated from the knowledge of what it represents. This workflow will focus on ontology, knowledge technology, Semantic Web services, and semantic tools, which will result in a new kind of platform and new forms of processes. Therefore, it is safe to say that in the future, the publishing industry will introduce more demands on employees to master technology and comply with the businesses and needs of customers. Romano (2005) explains the new approach printers must have in the world of competing media. Strategy is everything in the context of driving the demand for print, as well as moving beyond print and focusing on all possibilities within graphic communications.

When examining the commercial and quick printing industry segments, certain technology revolutions can be placed in an historical perspective. Romano (2005) defines the two most recent as the Internet revolution from 1993 to 2001, and the workflow revolution from 2002 to the present. The latest revolution calls for workflows to be structured around the strategy of a business, because just offering technology is no longer a market driver. According to Romano, some of the most important trends in the printing industry involve the changing requirements of print buyers: shorter, low-cost, and highly targeted print runs will be expected. These print runs will co-exist in a mix of media, and therefore print buyers will likely become media buyers. Printers must also offer value-added services to expand their businesses. Here the revolution in workflow technology comes into play, as printers need to offer a wider mix of graphic communications media.

The business of printing can be supported by ancillary services such as binding and finishing, shipping, warehousing, mailing, and fulfillment. Other possible media offerings include hosting Web sites, designing Web sites, cross-media solutions, signage, and offering email campaigns. If printers are able to implement the necessary technologies, there is potential for success. The demand for print might increase when complemented with a mix of new media and value-added services. For this, new skill sets are needed in the industry.

DAM Technology

A DAM system is a subset of the media asset management systems family. Roszkiewicz (2004, November) lists four types of media asset management systems:

- digital asset management
- content management
- enterprise publishing, and
- records management.

These four systems types are all based on a central file repository, but their applications and therefore their features vary. The principle of DAM can be described as a further development and enhancement of simple file management with databases. DAM is organized data storage, and its functionality is focused on search features based on file-names and metadata, file synchronization, version control, and security. A DAM system builds on an integral database, but does not usually perform archiving and data ware-housing unless an extension is added.

However, with the diversity of DAM systems, it is hard to define exactly what DAM does and does not do. Further categorization of DAM systems can be found in Frey et al., 2004.

In order to successfully implement and utilize a DAM system, several technological issues must be addressed. One of these is the concept of *metadata*. Roszkiewicz explains that a DAM system itself, and other systems integrated with it, read and write metadata describing the content, so that this content can be readily accessed and utilized for the desired medium (2004, July). However, Roszkiewicz points out that the definition of metadata has expanded from simply being information about content, such as author, creation data, version, and file type, to being relevant, precise, contextual information of greater semantic meaning in a large-scale, multi-contractor workflow. Roszkiewicz (2004, July) explains the enhanced purpose of metadata in this way:

> Professional asset and content management systems use metadata every day to describe content and propel business processes. It is embedded in files, stored as separate associated files in databases and used ad hoc as an event trigger in a workflow process. (p. 6)

The task of managing metadata in DAM systems is defining taxonomies, controlled vocabularies, and keywords used in the system to navigate and to locate content. Mastering this discipline gives the advantage of being able to precisely locate files and retrieve information about content for analysis, licensing, and piping to other integrated systems (Roszkiewicz, 2004, July).

Other important tasks of implementing and maintaining a DAM system involve controlling the IT network, server platform, hard- and software, and databases of the system; however, it does not stop there. A DAM system needs to be integrated with

other systems in a workflow in order to offer the full spectrum of optimizing benefits. Roszkiewicz (2004, July) explains that "content and asset management systems do not inherently interoperate with production systems" (p. 6). Integration with other systems can be troublesome, but there is no doubt about the optimization that integration can provide. Roszkiewicz (2005, April) states that possible interfaces with DAM systems could include a content-collaborating workflow, a job-tracking system, a portal, or a rights management system. These integrations usually demand connections using database-to-database calls, XML, rules, Web services, and other standard-based approaches.

DAM and Printing Industry Changes

Bury (2004, December) comments on the increased importance of DAM to the printing industry. In the 21st century, customers expect the printer to be able to facilitate the creation of printed products. This includes managing electronic files with the right specifications for print and other imaging purposes. Customers today want more than just print layouts and print; they also want access to images suitable for Web, multimedia, posters, and other usages. Roszkiewicz (2004, November) presents a broader perspective of this:

> Over the last 10 years, competitive pressures have pushed more companies, regardless of industry, to publish to the Web to satisfy demands from their customers for more and better services. Mergers and acquisitions have forced content from different systems to coexist. Collaboration on projects is required across time zones and continents. (p. 6)

Fox (2004, September) explains how many printers are changing their business models to suit the future demands of customers by implementing VDP. DAM will enable these printers to reach their goals. DAM will help reduce the cost of operations and streamline the workflow, thus increasing productivity. DAM also enables printers to provide more value-added services to their customers, which in turn will help to drive new business and expand geographic reach. At the same time, DAM will enable printers to become an integral part of customer business models by becoming storehouses for customer content.

Fox (2004, September) elaborates: "DAM enables turnkey applications that allow clients to manage their content and to order documents online by supplying the necessary information and document assets" (p. 5).

Skill Sets for DAM

The skill sets needed to implement and operate a DAM system are closely connected to the technology deployed in the system. Taschek (2001) explains how a DAM system functions on one or more databases and connects to databases in other systems. The technologies for connecting can be XML or ODBC. For example, storage-intensive files usually arrive at other databases and are then transferred to the DAM system using a XML interface. The integrator of the system will decide on what metadata and integration standards, taxonomies, and integration will be utilized in the workflow.

Taschek (2001) goes on to caution: "We'll warn you, however, entry into the digital asset management market is not easy for integrators. There's a big learning curve, and the practice requires the command of a wide range of skills."

When it comes to specifying the skills of staff members, as well as the primary integrator, Taschek advises that they have an expertise in databases, Java and XML programming, database platforms, and even a degree in or extensive knowledge of library science.

Boiko (2002) explains that there are certain roles involved in implementing and operating a content management system (CMS), which can be compared to implementing and operating DAM systems. These roles and their tasks do not necessarily have to be fulfilled by only one person each, and the roles may change over time and with the status of the system. The roles and corresponding tasks are:

- **Manager**—Responsible for leading the CMS staff in implementation and operation. Over time this role might change to one or more of the following: digital asset manager, project manager, or operations manager.
- **Business analyst**—Must understand the business and analyze how a CMS will meet the needs of the organization. Must facilitate the integration of the CMS in the strategy of the business operation.
- **Information analyst**—Responsible for creating and implementing strategies for formatting, accessing, and displaying information. Must have a good understanding of the business process design, XML, and database technology used in cataloging schemes and Web and print publication systems; and must provide metadata training and guidance, and enforce the chosen metadata standards.
- **Infrastructure staff**—Responsible for the technical backbone of the system. Tasks include administering profiles for users, resolving system errors, managing integrations with other systems, documentation, and training. This role might evolve to one or more of the following: CMS administrator, implementation analyst, trainer, and technical writer.
- **Software developer**—Analyzes requirements and writes the program code for templates and interfaces to other systems. Responsibilities might include developing custom applications and templates, modifying database code, enhancing features, and testing.
- **Publication staff**—Designs and creates publications using the system.
- **Content staff**—Responsible for entering content after the cataloging schemes and further requirements.

VDP Technology

Variable data printing is based on digital printing technology's ability to change the print image between each impression. Alexander (2004, January) explains how these digital printing devices are being fed with digital information for print. Usually, VDP involves a template created as an unfinished document, where variable information can

be added to the unfinished areas. This information can be both text and images. The process can also result in other documents, such as PDF and HTML files for publishing with other media.

Alexander (2004, January) also categorizes the different types of VDP from the variable data technology they deploy and the resulting end product. These categories are:

- **Variable data printing**—process color jobs with relatively sophisticated design and typography.
- **Transaction printing**—phone and utility bills, bank statements, and the like.
- **Mail merge and direct mail packages**—large volume mailing pieces for marketing and fundraising.
- **Correspondence systems**—responses to written inquiries.
- **Variable document systems**—long documents that contain variable-text standardized sections.
- **Web-driven variable printing**—user-provided data via Web forms, which determine the variable content of the end document.

Depending on the category, different software applications are required, but the same approach is used. A template controls the position of the variable data stream being fed from a database.

VDP and Printing Industry Changes

Davis (2005) describes VDP as a growing print niche and a key opportunity area for 2005 and 2006. He asserts that the direct marketing printing niche in particular should continue to grow at above-average rates. He argues that this growth is in both business-to-consumer marketing and business-to-business marketing.

Alexander (2004, January) refers to variable data printing as a "killer niche" and describes it in this way:

> Margins are much higher on variable jobs, and variable printing inevitably involves a lot of cooperation between printer and customer, which means it is more likely than ordinary print-buying procedures to lead to long-term partnerships. (p.6)

The printing industry definitely believes strongly in the future market of VDP. When NAPL (2004) asked how survey participants would rate the growth potential in their major markets over the next five years, direct mail/direct marketing got the highest score. Over 73% rated this business area as above average, 23.4% as average, and only 2.9% as below average. When asked how important direct mail/direct marketing would be to them in the next five years, 60.5% said it would increase, 3.5% said it would decrease, and 26.7% felt this area would remain steady.

The reason for this can be found in the changing role of print media. According to Cost (2005), on average, 60% of magazines on newsstands are never purchased, two-thirds of direct mail pieces are discarded before ever being opened, and organizations typically spend twice the amount they need to on both internally-produced and externally-procured documents. Overproduction is a huge problem in print media matters, and there exists a huge opportunity to improve the value delivered to users of print. Cost explains that this opportunity is paving the way for an emerging medium based on a mix of computing, high-speed Internet access, rationalized print manufacturing, digital print, and new distribution channels. He calls this the new medium of print.

With the enhancements that VDP brings to customers (from simply placing text and images in blank areas of a document to more sophisticated solutions developed by parties such as ad agencies), new attractive business opportunities arise as well (Alexander, 2004, January). VDP fits the media strategies of today's print media buyer, because it is strategic, measurable, and can utilize the capabilities of the Internet. However, to boost its overall performance, a DAM system must also be in place, as Fox (2004) describes:

> Variable data printing is gaining attention, and becoming an essential part of the business model of many printers. For enterprises using variable printing communications or companies seeking to sell these services, a DAM system provides the foundation for managing the potentially hundreds of images and other content that correspond to a particular job. (p. 5)

Skill Sets for VDP

Wolf (2004, February) explains some of the skill set issues of creating a successful workflow around digital printing at the German printing company SRZ. He explains that the success of this automatic workflow could only have been achieved because SRZ contributed a considerable amount of programming effort on its own. For this reason, the workflow is difficult to copy, which narrows the competition in this market niche.

One of the survey participants in the *2004–2005 State of the Industry Report* (NAPL, 2005) states that direct mail marketing will prove to dramatically impact an end user's bottom line, if structured correctly with all the necessary components. The participant mentions database and creative skills as the key components.

Skill sets for successful VDP implementation and operation flow from technical tasks such as database programming, operating VDP software, and setting up workflow and system integration. Burmeister (2002) explains the following about skills for operating VDP technology:

> Variable data printing technology requires a thorough knowledge of computer and database technology; it may be difficult to train a traditional printing press operator in the necessary computer skills. The necessary training in this case would include computer training, digital printing technology, and database operations. If you choose to retrain rather than hire a person with the required skills,

> you should be prepared for a longer learning curve and more time to realize the benefits of the technology. (pp. 75–76)

The Future Labor Market

An analysis of the 21st century labor market in the U.S. shows important trends that in time will affect the graphic communications industry as well. Alverson (1999) explains how the work force's ethnic, age, racial, and gender composition will change considerably. Labor force growth will slow, which, combined with an increasing demand for labor, will create a tight market. Already, significant changes in technology require both technical skills and people skills in employees. Potential employees who are able to tackle a number of disciplines and have strong interpersonal skills (in particular, team and diverse group work abilities) will be in demand.

On the management side, open-mindedness, diplomacy, persuasiveness, ethics, and educational interests will be increasingly important. To attract and retain highly skilled workers, employers must offer more benefits, flexibility, telecommunication, and leave options. The technological revolution, especially within high-speed, reliable telecommunications fields, will provide workers with new options for dealing with distances and face-to-face contact, and will increase the possibility of working from home offices. As the graphic communications industry must compete with other industries for skilled workers, this must be taken into consideration.

When competing in an information-based, knowledge-driven, service-intensive economy, it becomes important to recognize that skilled and motivated people are central to success (Bartlett, Goshal, 2002). Competency-based strategies depend on people. The core of this flexible market responsiveness is knowledge and expertise on the part of employees, that will drive the development of new products and personal relationships with key clients. Bartlett and Goshal (2002) state:

> In short, people are the key strategic resource, and strategy must be built on a human-resource foundation. As more and more companies come to that conclusion, competition for scarce human resource heats up. (p. 35)

The challenge in this transition is for top executives to transform themselves from analytically-driven strategy directors to people-oriented strategy framers. This transformation will be vital for companies to make the transition into the new economy. In the effort to change senior managers' roles, Bartlett and Goshal point out that senior managers now must articulate company values in order to define a community to which individuals want to belong. This means that the development of organizational processes has to focus not only on getting work done effectively, but also on ensuring the development, empowerment, and commitment of the members. They explain: "The philosophical shift requires executives to expand beyond strategy, structure and systems to a simultaneous focus on the company's purpose, process and people" (p. 36).

Company Culture

A key element in this transition is changing the culture of the company. Kampas (2003) states: "When culture is aligned with the needs of the market, it can enable very high levels of organizational performance, but when the market changes significantly, the culture may have to change as well" (p. 41). Kampas goes on to explain how companies in a technology-driven industry go through a three-stage development over time.

- First, they face the *creation* stage, where the vendors possess high power and the customers low power.
- The development then reaches the *transition* stage, as the dominant product design emerges.
- Then comes the *commoditization* stage, where the customers possess the high power and vendors the low power.

Kampas offers this advice:

> To navigate from the creation stage through to the commoditization stage successfully, established vendors must adapt to two dramatic shifts: the shift in what customers find valuable and the shift in customer bargaining power. Adapting to those shifts requires companies to change their practices and competencies—and therefore their cultural biases. (p. 44)

Kampas also views companies as having multiple layers of capabilities. He speaks of

- the outer company,
- the middle company, and
- the inner company.

Facing the external context is the outer company. Here business is executed and results are obtained. The quality of execution and the results in the outer company are highly affected by the cultural assumptions in the inner company. The middle company guides and unifies the efforts of the company through infrastructure and steering. This layer therefore contains the mechanisms of motivation, coordination, and control. The inner company layer contains the cultural assumptions of the company, which form the tacit code that shapes the operation of the middle and outer company layers. As employees become completely imprinted with the company's cultural assumptions, their perceptions and judgments become unconsciously biased.

Kampas addresses problems with strategy: "Strategy problems in the middle company and execution problems in the outer company often can be traced to misalignments between strongly-held cultural assumptions in the inner company and shifting external conditions" (p. 43). Graphic communications companies must therefore prepare themselves to compete for the in-demand highly skilled employees with empowerment and

benefits, people-oriented strategy, and cultural assumptions that support this all the way to the marketplace.

New Labor Force

In the new economy, graphic communications companies are having to shift from a product-focus to a customer-focus. In this change, they must redefine their labor forces, since clients, competition, and business models are being redefined as well (Valentino, 2005). Valentino states:

> Printing companies are now hiring database managers, fulfillment directors, Web-page designers, marketing directors, and a host of other positions that generally had not been part of a traditional printing organization. This is a reflection of new activities and the changing nature of our industry. (p. 6)

Valentino (2005) also explains how intense competition in the industry forces printers to establish an integrated, highly efficient digital workflow with no bottlenecks and minimum tolerance in the processes. To enable this workflow and to achieve this state of precision, printers have to invest in a skilled and productive workforce to implement and to operate it. Therefore, the trends in the industry are towards both creating new positions, and adding new skill sets to existing positions. A good candidate must have good people and communications skills so that he or she can interact with the customer effectively. However, this breed of employees is in demand economy-wide, so the printing industry must sharpen its strategies for recruiting and retaining qualified individuals.

Upon further research, it becomes clear that these challenges cannot be addressed effectively without making a frank assessment of the organizational culture of a company, the attitude it has towards employees, and its commitment to develop a workforce that fits new demands. This might result in replacing traditional practices with new strategies. Valentino asserts that: "Printers must develop an organizational culture where the best and the brightest will want to stay" (p. 9).

An issue to be considered in this context is compensation. This new brand of employees is being offered jobs in other industries, and therefore compensation in the printing industry has to compete with other offerings. This issue leads to discussions about compensation levels for database managers and IT professionals. Competing levels are necessary to attract and retain quality employees in this area as well. Furthermore, this new breed of highly skilled, professional, business-savvy employees has high professional aspirations. The traditional annual review plus a 3% salary increase is not enough. A new employee wants a clear career path and does not want to wait a long time for advancement (Valentino 2005, p. 11). Valentino adds: "Printing companies historically have not been good at that" (p. 11).

Conclusion

An interesting future lies ahead for the graphic communications industry. The new economy, new skill sets, and the changing focus to fulfilling the needs of customers

will definitely take significant development and renewal. Furthermore, a lot of underlying issues, such as culture and leadership approaches, have to be addressed. Valentino (2005) acknowledges that some organizations are further along in making this transition than others. For the industry as a whole, it is a major change that has been on its way for a long time, and it will continue indefinitely into the future.

Research Objectives and Methodology

Research Objectives

The objective of this study is to obtain an overall impression of the skill sets printing companies require, and the training options being offered to existing employees to gain these skill sets. This has been accomplished through a survey of printers using the network of printing companies currently engaged with the Printing Industry Center's research activities. In order to understand the characteristics of the digital printing market segment in the U.S. in 2005, a demographic study of the respondent group was conducted as part of the survey.

Specific research objectives and questions include:

- What skill sets need to be available in the workforce for the successful integration and use of DAM and VDP?
- How can a printer attract the right people with the right skills when competing with other industries?
- What management strategies are needed to keep people with such skills?
- How are professional networks changing to adapt to new requirements in the workforce?
- How do employees working on new technologies fit into the existing workforce?

Research Methodology

A literature search on the changing skill sets needed in the printing industry was conducted. Based on discussions with industry experts, a survey was constructed to address the research questions outlined above.

The survey was conducted by telephone with individuals who had been contacted previously by letter, with an explanation of the key research goals.

The survey was structured into the following areas:

- **Company demographics**
  Company size and growth rate were selected as demographic characteristics which could potentially indicate both the level of success in implementing digital printing, and the availability of resources to invest in new technologies.

These growth rates were related to the year of entry into digital printing. Types of printing jobs performed were tabulated, along with the proportion of VDP used for them. Respondents were asked to identify a job type that they viewed as being a key contributor to future growth. The types and numbers of digital presses and their acquisition years were documented, along with an account of the other printing technologies that were being used in company operations.

- **DAM and VDP services**
  Respondents were asked to provide information on their current and future business involvement in the areas of DAM and VDP.
- **Hires over the past two years**
  Respondents were asked for information on hires made over the past two years. Specifically, questions concerning skill sets for new employees were explored. Questions were also asked regarding the ways companies are looking for new hires.
- **Training for current employees that work in the areas of DAM and VDP**
  Companies were asked what types and how much training they offer to their current employees to get up to speed in the areas of DAM and VDP.
- **Company culture**
  Finally, a set of questions was asked to get a better idea of company culture.

Sample of Respondents

A total of 103 printing companies listed in the RIT Printing Industry Center (PIC) database responded to the telephone survey. This database includes companies across the U.S. and Canada. Market segmentation for participating companies includes commercial printers, label/packaging printers, large format printers, book/magazine publishers, full service digital printers and inplant quick print shops. The research was conducted in conjunction with a concurrent PIC study investigating questions related to digital paper selection and usage. Respondents were asked to confirm that they had the necessary knowledge and information to answer questions in either one or both of the areas of demographics and skill sets. In some cases, two different respondents within a company answered questions in these two areas. For purposes of confidentiality, company names are not disclosed, nor are any facts that would indicate the identity of the participating companies.

It is important to note that this analysis is based on a sample of 103 printing companies that offer digital printing services, all of them able and willing to respond to this survey. Some of the responses and inferences may not be representative of the digital printing market segment as a whole (see Research Limitations section). Refer to the Appendix for a complete summary of research responses.

Data Analysis

Data was analyzed using SPSS software (www.SPSS.com), incorporating standard parametric and non-parametric statistical techniques (Fink, 2003). Unless otherwise stated, statistical inferences and hypothesis testing were calculated at the 95% confidence level.

Survey Results

The responses to the survey questions from 103 respondents are summarized below. First the company demographics are explored, and then the responses to questions regarding skill sets and training needs for DAM and VDP are discussed and related to the demographic findings where possible.

All participants offer digital printing in some shape or form, but are not necessarily basing their business solely on digital printing technology. It transpires that there is some ambiguity in the definition of "digital printing," evident from the press brands and technologies reported by respondents (see Appendix A, Table 1). Evidently some computer-to-plate and direct-to-press technologies have been regarded as "digital" by respondents.

Company Demographics

The size of the respondent firms was measured using both number of employees and 2004 annual revenues. The changes in both metrics over the last few years were explored. The number of years participating companies have been in business ranges broadly from 3 to 197 years, with a median of 28 years (Figure 1). More than 30% of respondents have been in business for over 50 years, and 6 firms have been in business for more than 100 years. This skews the mean of 40; the 5% trimmed mean is approximately 37 years.

Figure 2 shows the 5-year change in the distribution of the number of employees from 1999 to 2004. In 1999, 6.3% of our participants had over 200 employees, which decreased to 4.9% in 2004. However, there is a more significant change in the 50–99 employee range, with 18.4% of companies in this size range in 2004 compared to only 11.5% in 1999.

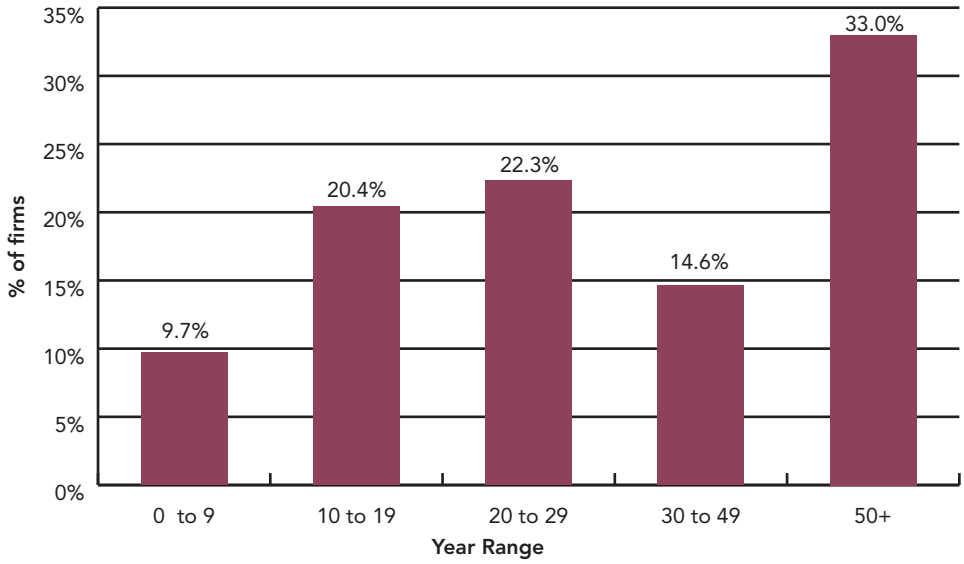

Figure 1. Number of years the respondent firms have been in business.

The relative changes in number of employees can be seen more clearly in Figure 3. Overall there is no significant difference in the mean number of employees between 1999 and 2004 at the 95% confidence level. However, within certain size categories there is some significant change; Figure 3 shows the decrease in number of employees in the 10–19 and 20–49 size ranges, and a slight decrease in the 200+ category. The increase in the 50–99 employee category is significant. A detailed research study examining demographics in the printing industry was published by the Printing Industry Center in 2003. This research monograph, entitled An Investigation into Printing Industry Trends, explains the increase in the number of employees within the 50–99 employee category (Romano, 2003).

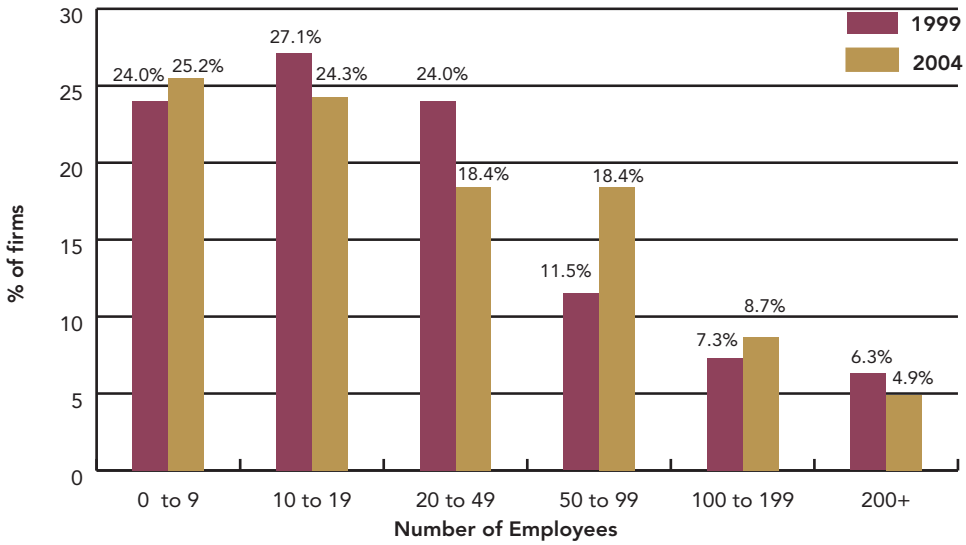

Figure 2. The distribution of the number of employees in the respondent firms over the five-year period 1999 to 2004.

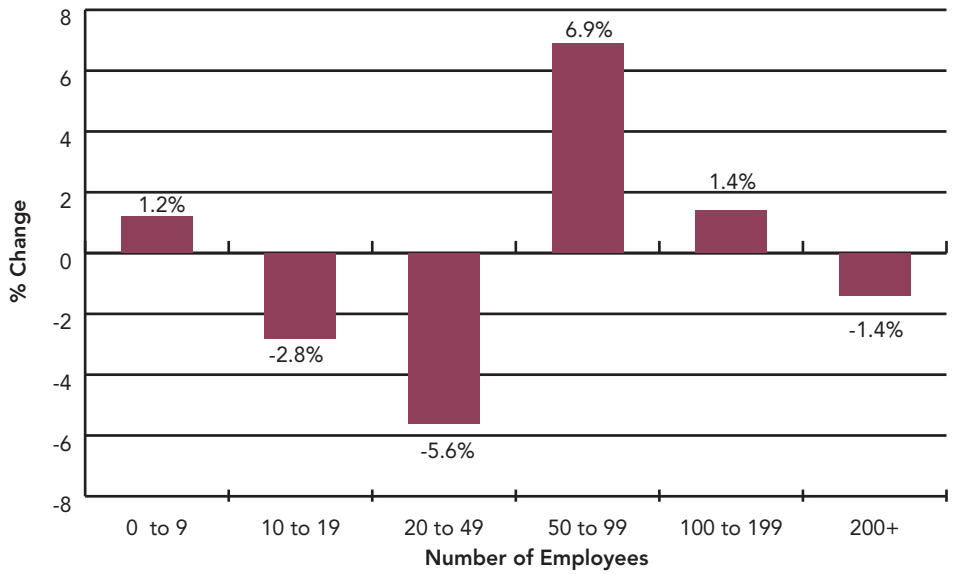

Figure 3. The percent change in the number of employees from 1999 to 2004 by size category.

There was no significant correlation between the number of employees and number of years in business, indicating that company size depends on factors other than age.

Figure 4 shows the mean distribution of employees over five functions in our participants' companies. The functions are print production, prepress, information technology, sales, and customer service. Almost half of our respondents' employees work in production, followed by customer service (17%), prepress (15%), sales (13%) and information technology (IT) (6%). The choices that were presented to the participants did not include post-press operations, and it is possible that some printers included this category (which may entail binding, finishing, and distribution) into production. The balance of different functions is also different over the size ranges; the companies with the most employees had a lower proportion in the production segment compared with smaller companies.

The second measure of respondent company size is the reported 2004 annual revenues, shown by category in Figure 5. The distribution is far from normal, which limited potential correlations with other response statistics using parametric methods. The median 2004 annual revenue was approximately $1M, with 55.3% of participants in the less than $3M category, which confirms the predominance of small- and medium-size enterprises (SMEs) in the printing industry.

The respondent firms were asked to reveal qualitatively how revenues have changed over the last 12 months, with the option to select whether they had grown, decreased, or stayed the same. The distribution of the response to this question is shown in Figure 6. The majority (66%) experienced an increase in annual revenues in 2004 compared with 2003, while 11% had decreases and 23% reported no change over this time period. Figure 7 shows the change in annual revenues for 2004 compared with 2003, by size category.

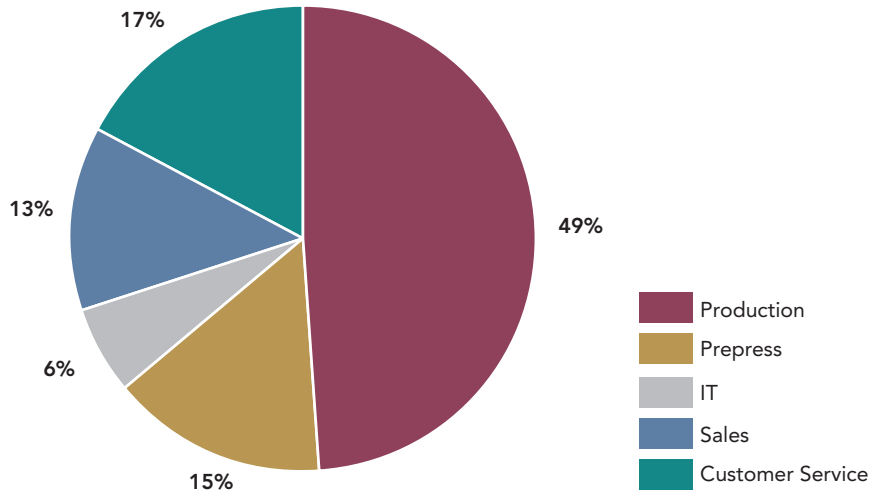

Figure 4. The distribution of employees over five job functions.

Respondents reporting revenue growth were asked to give the approximate percentage of change over the 2003–2004 time period. Figure 8 shows the mean percent of annual growth within each 2004 revenues range category (Note, this includes only those companies that reported growth). The $5–$10 million range shows the highest growth rate of about 25%. Interestingly, the larger companies with over $20 million in revenues are reporting a relatively low level of growth.

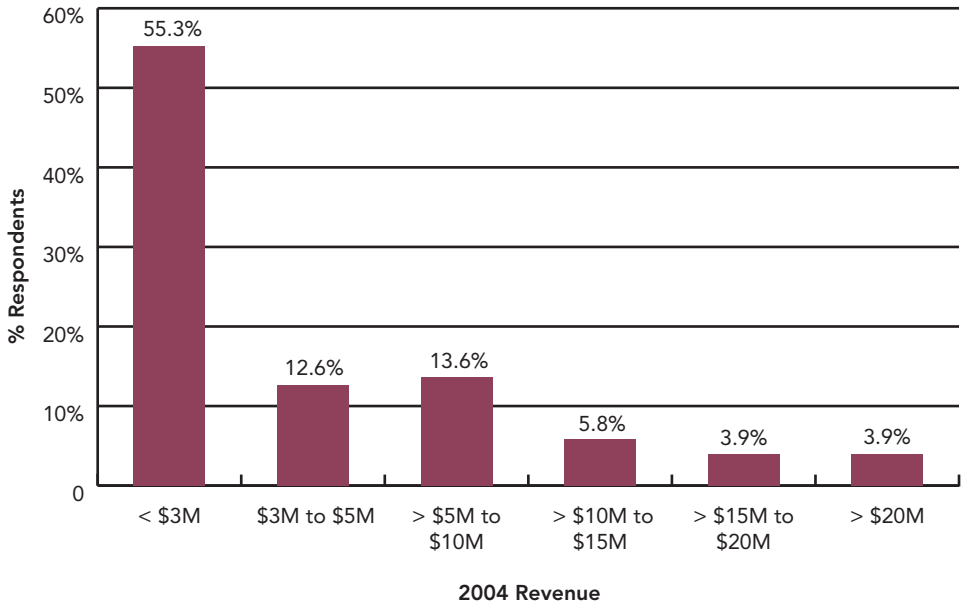

Figure 5. Printing companies' reported annual 2004 revenues, by size category.

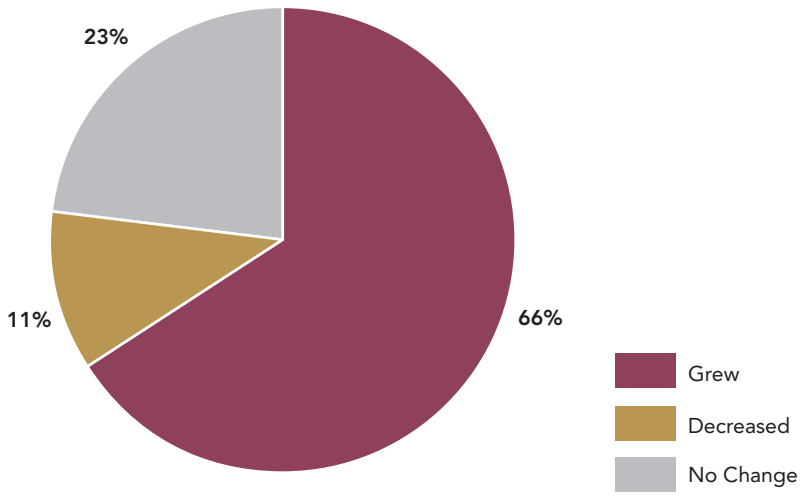

Figure 6. Change in annual revenues for 2004 compared with 2003.

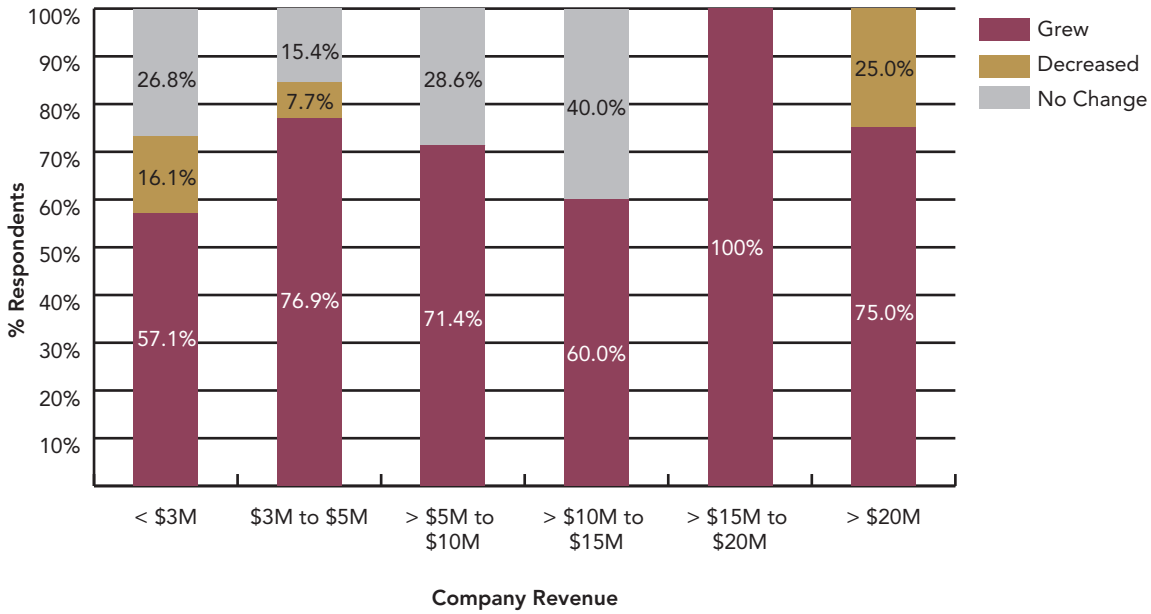

Figure 7. Change in annual revenues for 2004 compared with 2003, by size category.

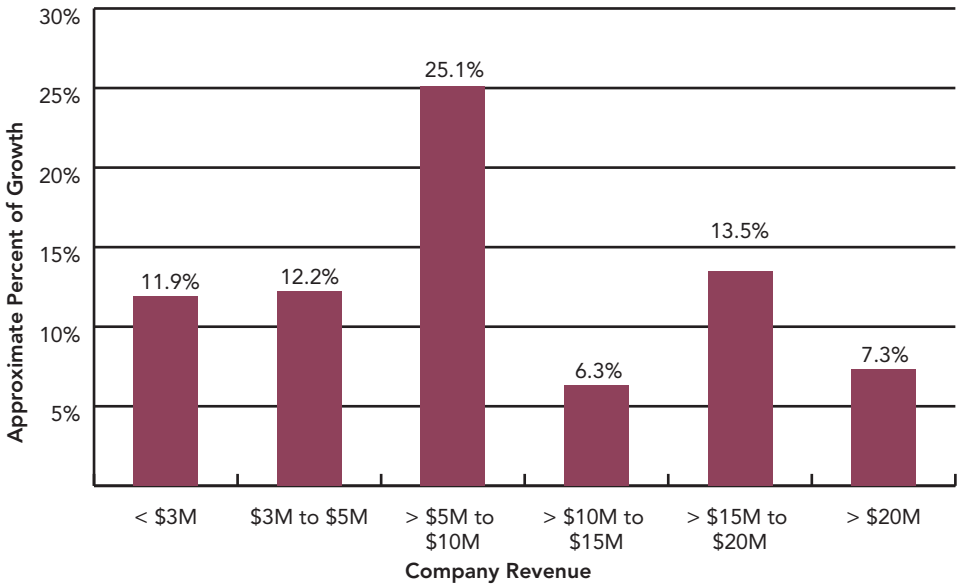

Figure 8. Revenues vs. percent of growth.

Figure 9 shows digital printing applications, and identifies whether these job-types are considered a major portion of the companies' businesses, a minor portion, are rarely performed, or never performed by respondents. The leading categories when ranked by "major portion" are marketing and promotional materials, quick printing applications, and direct mail.

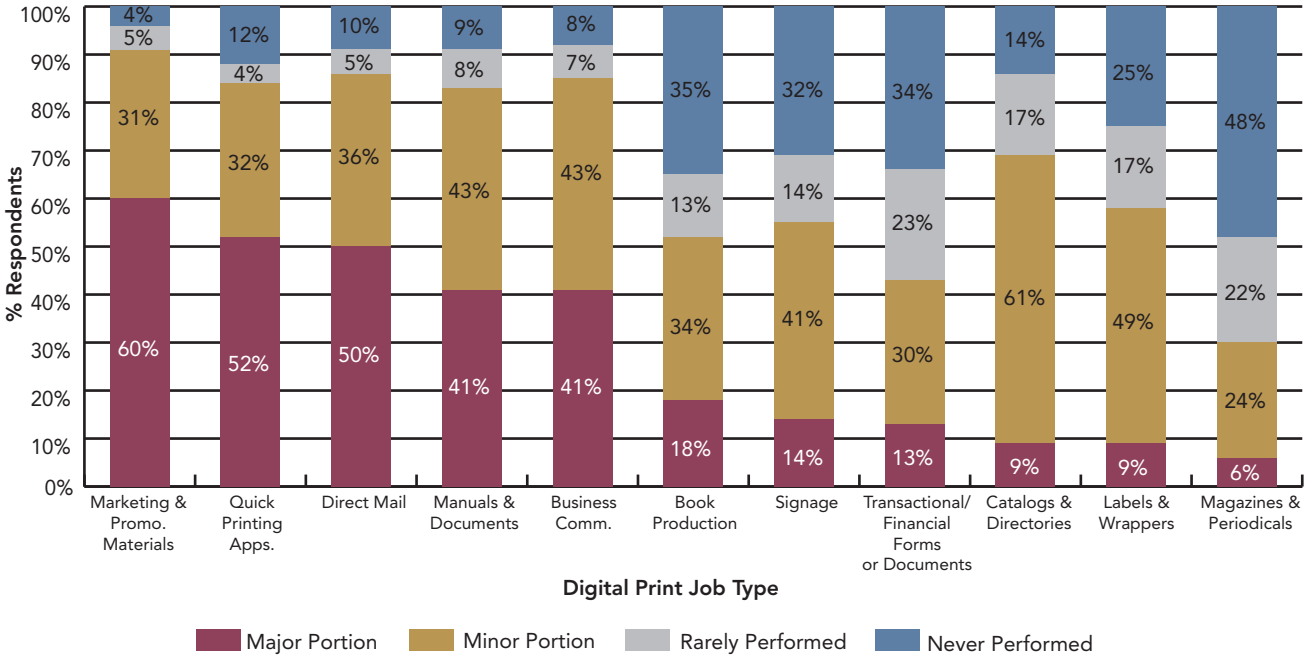

Figure 9. Digital printing applications by relative importance.

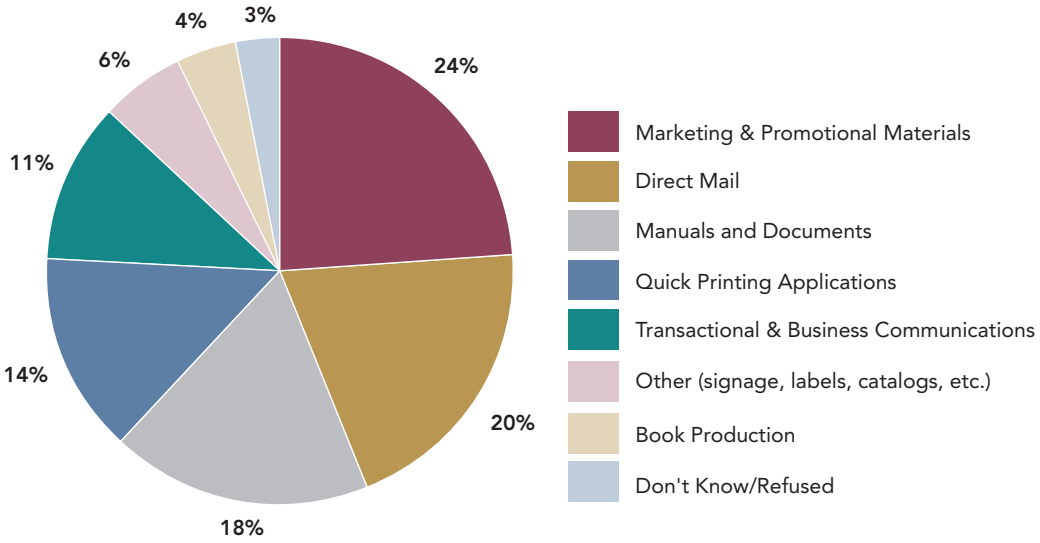

Figure 10. Digital printing applications identified as predominant job types.

When asked in a separate question to indicate only one job type as predominant (Figure 10), respondents again replied that the leading application is marketing and promotional materials (24%), followed by direct mail (21%), manuals and documents (19%), and quick printing applications (14%). These job types generate the greatest revenues for digital printing businesses. The low percentage for book production can be attributed to our sample demographics; most of our participants are commercial printers and not book publishers.

Respondents were asked whether there was another job type that was not listed in the structured responses of the question presented above, and if so, to identify it and then indicate whether it was considered a major portion of their business, a minor portion, rarely performed, or never performed. Only 10% identified other job types, and most of these were niche markets such as fine art, personal invitations, statistical/surveys, imprints, etc. Forty percent of these respondents indicated that these other job types constituted a major portion of their business, indicating that these firms are highly specialized in specific and in some cases, niche markets.

The approximate percentage of revenue growth in 2004 was linked with the job types generating the greatest revenues. Figure 11 indicates the percentage of growth for the main job categories as follows: marketing and promotional about 16%, direct mail about 12%, business communications at 13%, manuals and documents at 8%, and quick printing, the lowest growth rate, at only 7%. The greatest revenue growth was in the categories of transactional/financial, and signage (both 19%). It is possible that some signage involves inkjet technology, a segment with considerable growth and profitability potential.

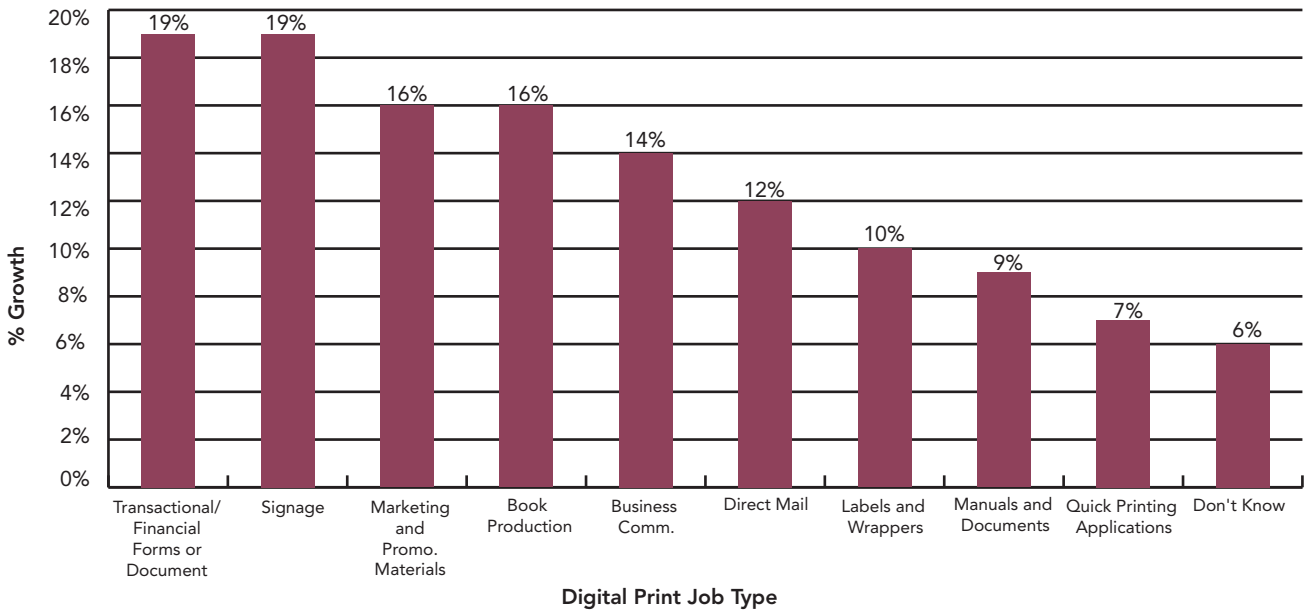

Figure 11. Job type vs. percent growth in revenue.

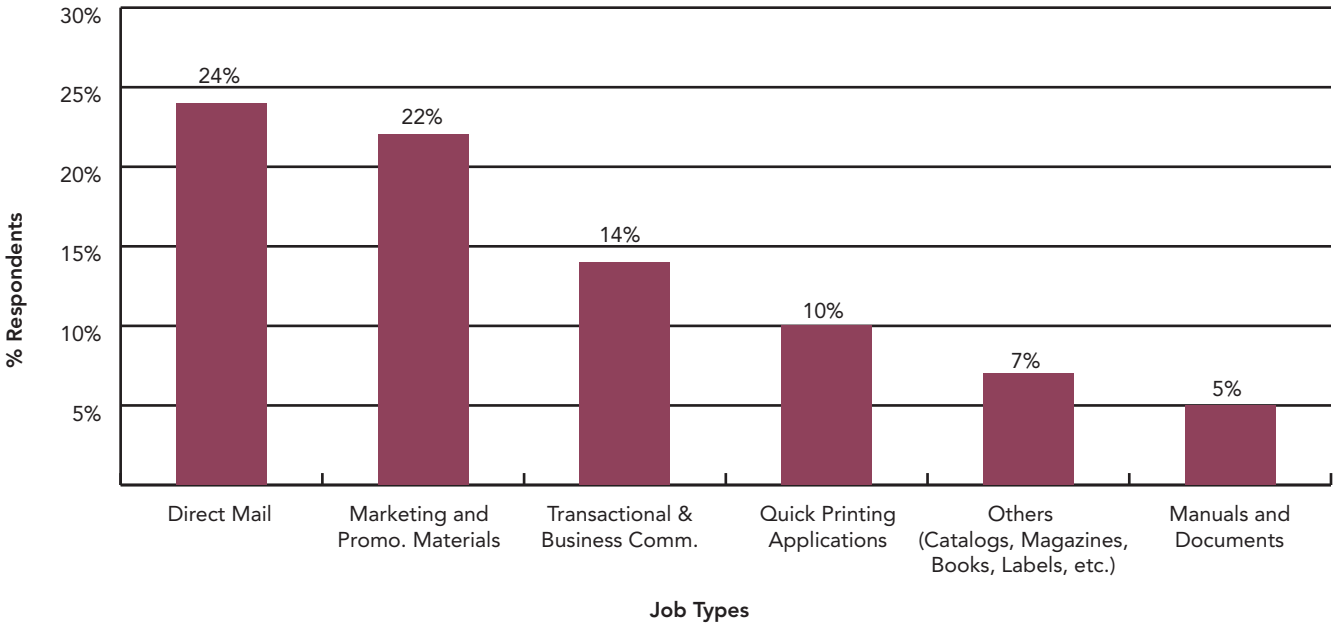

Figure 12. Jobs types that respondents expect to be keys to success and future growth.

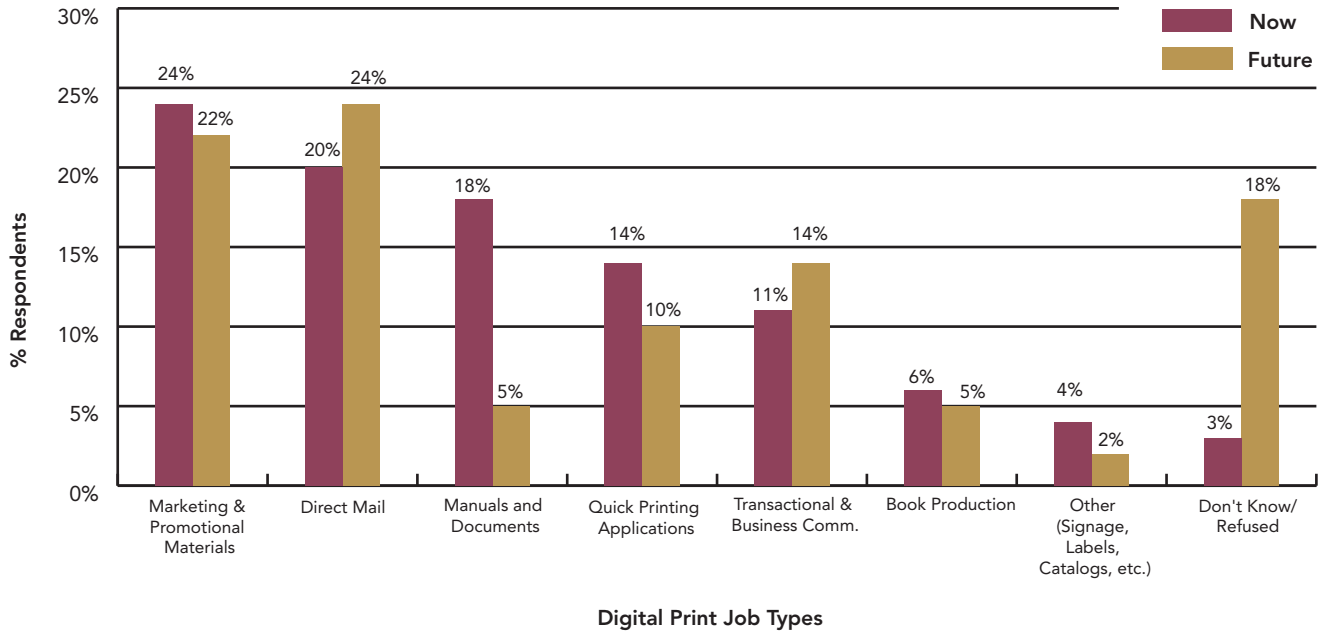

Figure 13. Revenue-generating jobs now and in the future.

When asked which job types printers have to be successful at to ensure future growth, 24% of our respondents said direct mail, 22% mentioned marketing and promotional materials, 14% mentioned transactional and business communications, and 10% mentioned quick printing applications. Figure 12 shows a distribution of the jobs that our respondents expect will ensure future growth.

Figure 13 compares revenue-generating jobs now and in the future. The categories of (a) manuals and documents and (b) quick printing applications are not anticipated to be major revenue generators in the future even though they are now. The marked decrease in outlook for revenue potential for manuals and documents may be related to the increased use of electronic forms and software manuals and the use of PDF document formats. The change in marketing materials may not be significant within this data set. Direct mail and transactional and business communications jobs are projected to show an increase in potential revenue generation in the future.

The question concerning the percentage of variable data jobs performed on digital presses yielded some interesting answers that are depicted in Figure 14. Only just under 5% of participants have produced 80% or more variable data printing jobs in the last 12 months; 80% did less than half of their output with variable data; and 56% reported that less than 10% of their output was variable data.

When asked what percent of the variable data printing jobs involved color (Figure 15), 45.5% of respondents reported more than 60% of VDP jobs involved color; about 31% reported that less than 30% involved color, and 23% reported that between 30 and 60% involved color. There was no significant linear correlation between the percent of color jobs and the percent of variable data jobs.

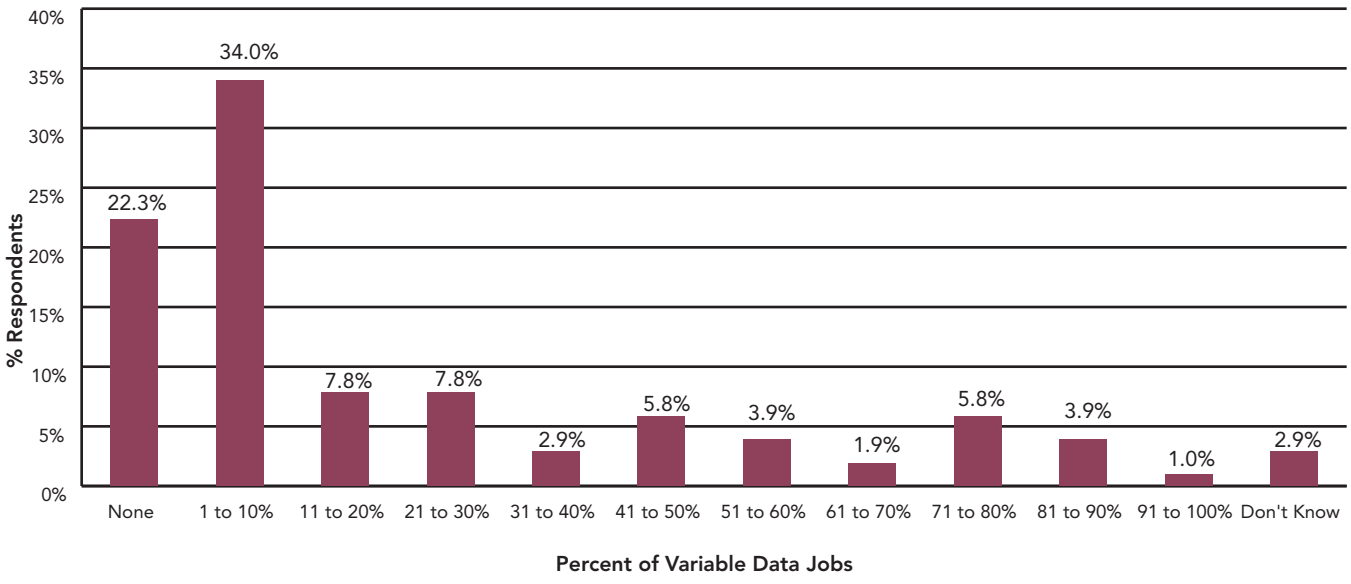

Figure 14. Percentage of variable data printing jobs conducted in the last 12 months.

Relating the percent variable data to job type (Fig. 16), the clear leader is in the business communications category, with about 62% variable. Labels and wrappers are second with about 43%, and then comes direct mail with 33%. Interestingly, no variable data printing was associated with the either the catalogs and directories or the magazines and periodicals categories, and the percentage was very low in the book production and quick printing categories. Transactional and financial was low at 21%, which is indicating that a low proportion of bills, statements and individually targeted communications are normally included within this job category. The percent of variable data was found not to correlate with either the number of employees or with years in business.

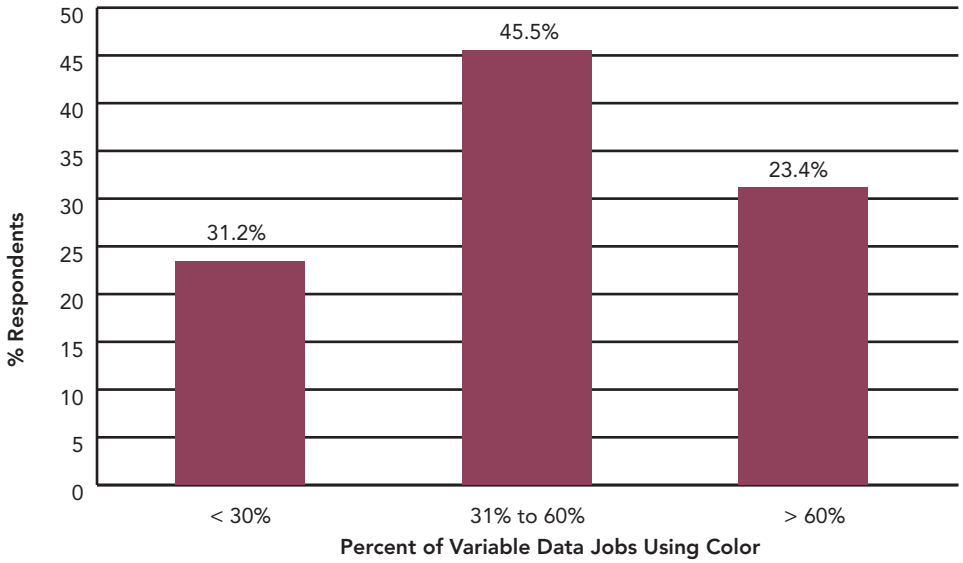

Figure 15. Percent of variable data printing jobs in color.

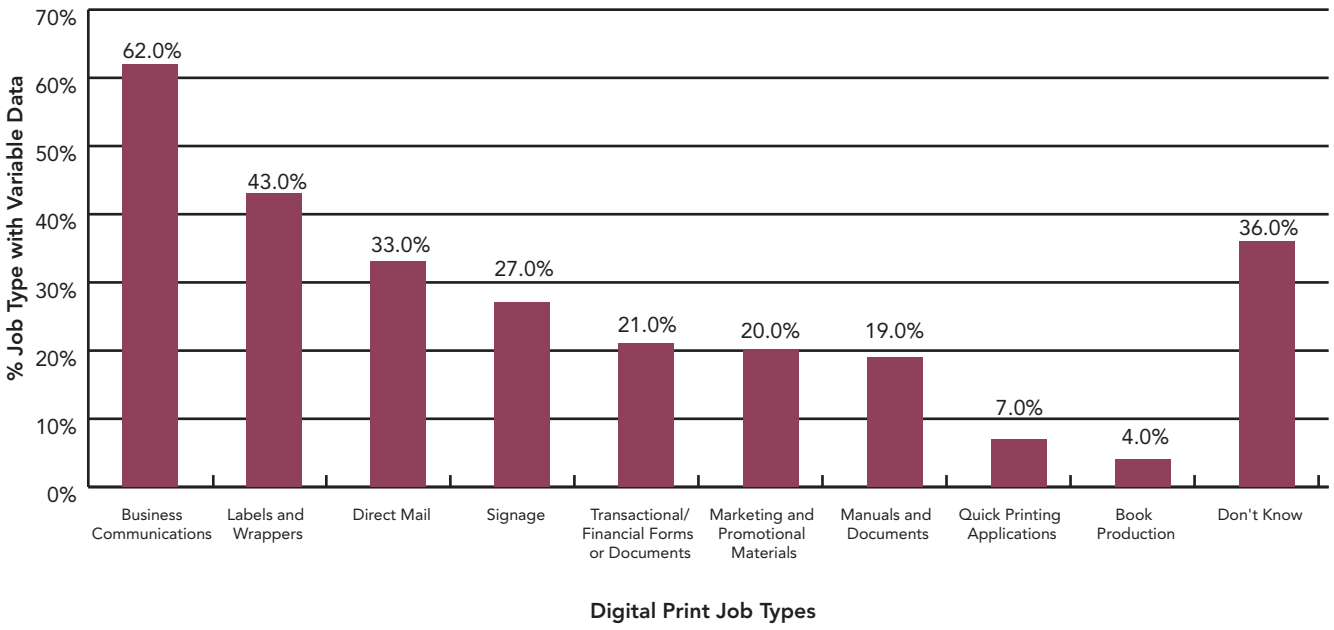

Figure 16. Percentage of variable data jobs within each product category.

The digital printing equipment that our respondents utilize in their businesses is shown in Figure 17. The distribution of press types as judged by the researchers is not necessarily representative of the production digital printing market segment nationally. A wide range of printer brands and models was reported (38% in the "other" category), some not necessarily digital in the sense of a "no fixed plate" technology. A specification of these other presses can be found in Figure A1 and Table A2 in Appendix A.

When asked to specify their year of entry into digital production, 15% of respondents reported purchasing their first digital press in 1995. This may correspond to the market introduction of the Indigo and the Xeikon Digital Color presses. As Figure 18 shows, these were the early adopters, and subsequent investment levels were mixed year by year. There was a significant boom in 2002 when 12% purchased their first digital presses, closely followed by a decrease in 2003 when only 6% entered the market. Subsequent years have shown a slight decline in new entrants— only 5% of respondents purchased digital presses in 2004 and 2005. The year of entry was found not to correlate significantly with the percentage of variable data jobs, or with overall 2004 company revenues, although for those companies entering the market in 2001 (4% of respondents), the revenues were higher than reported in other years. This may be a case of stepping into the market void left by print providers closing during the recession, or to new product and technology opportunities. However, the number in this category is small.

The number of digital presses owned by companies was tracked over the period 1999–2004. By the end of 2004, 28% owned one digital press, 19% had two presses and 16% had three presses. Further specifications of the distribution of digital presses in the respondent companies can be found in Appendix A, Tables A3 and A4.

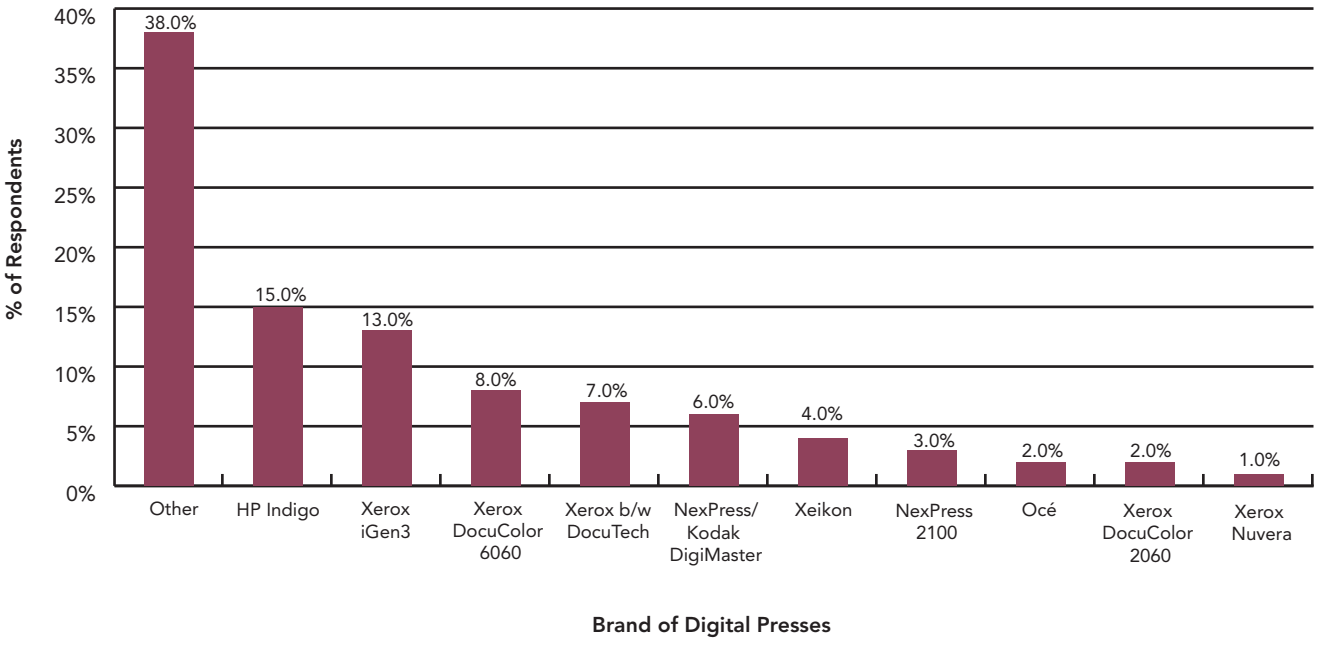

Figure 17. Brand and model of production digital equipment.
Details available in Appendix A, Figure A1 and Table A2.

The participants of our survey are not solely digital printers. In fact, most are commercial printers with other non-digital presses. Only 20% have only digital printing technology. As shown in Figure 19, of the 103 respondents, 72 have sheetfed offset presses, 14 have web offset presses, 13 have inkjet, 3 have flexography presses, and 1 participant has a gravure press. Included in the 13 "Other" category responses are engraving/letterpress presses, screen printing presses, and a Risograph.

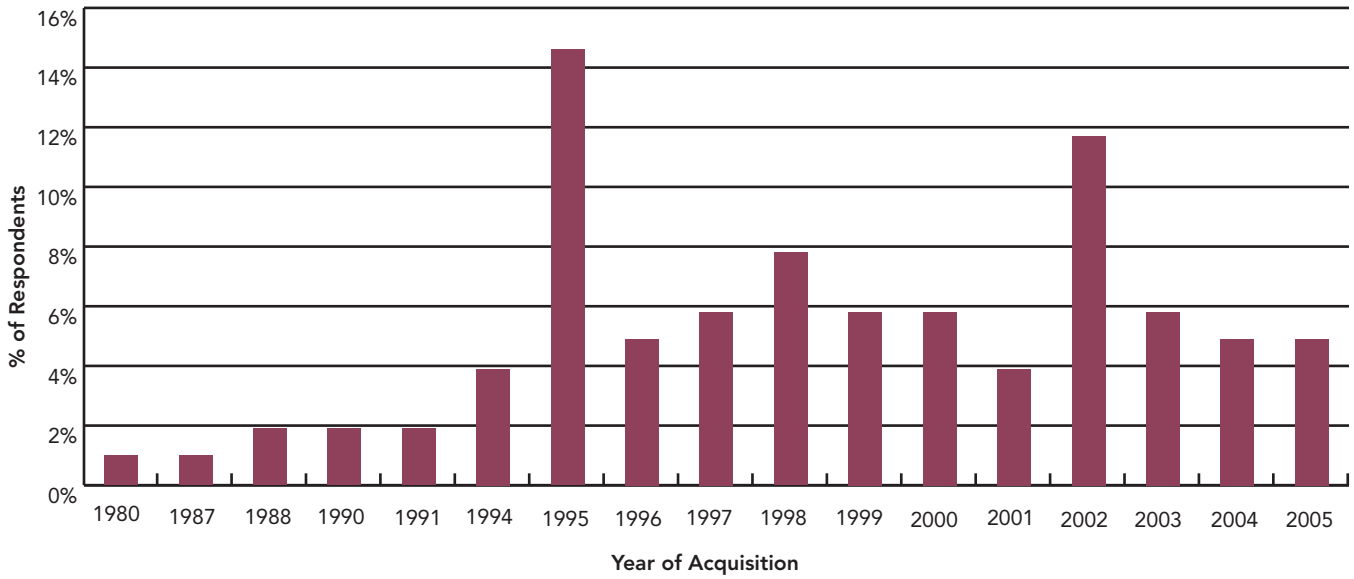

Figure 18. Year of market entry into digital production, indicated by purchase of the first digital press.

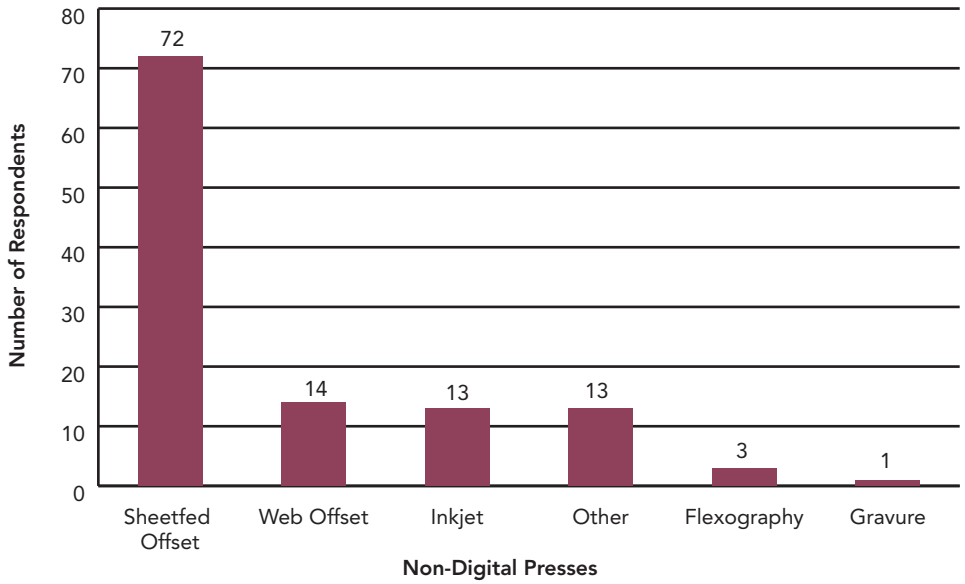

Figure 19. The non-digital printing equipment owned by the respondents.

Skill Sets for DAM and VDP

In this statistical analysis, the acronym DAM is used for digital asset management and VDP is used for variable data printing. They are used both for referencing businesses with these technologies as well as the technologies themselves.

DAM and VDP Services

Out of the pool of respondent companies, 27% (22% + 5%) have established businesses with DAM, and 49% (27% + 22%) have established businesses with VDP (Fig. 20). However, only 5% have established businesses using DAM but not VDP, whereas a significantly larger 27% have established businesses using VDP and not DAM.

When the respondent companies, who have deployed DAM, were asked how DAM was handled in their company, 19% answered that an outsourced resource was handling their DAM, while 77% of them used in-house services (Figure 21).

When the same question was raised about VDP, the respondent companies who have deployed VDP indicated that 6% are using an outsourced resource for handling VDP, and 90% are using an in-house service and 2% used both (Figure 22).

Figure 23 shows the companies' expectations for the demand for DAM over the next two years.

Figure 24 shows the respondent companies' expectations for the demand for VDP over the next two years.

There is no doubt that the respondent companies, generally speaking, believe firmly in an increasing future demand for DAM and VDP.

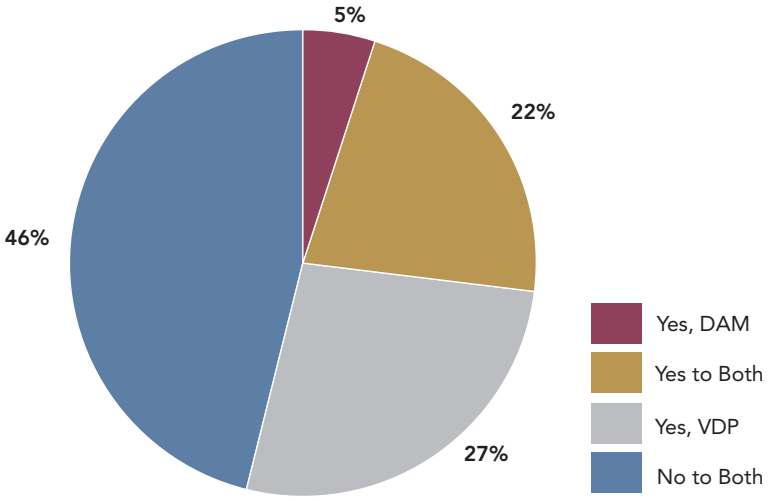

Figure 20. The distribution of respondent companies that have established businesses using DAM and/or VDP technology.

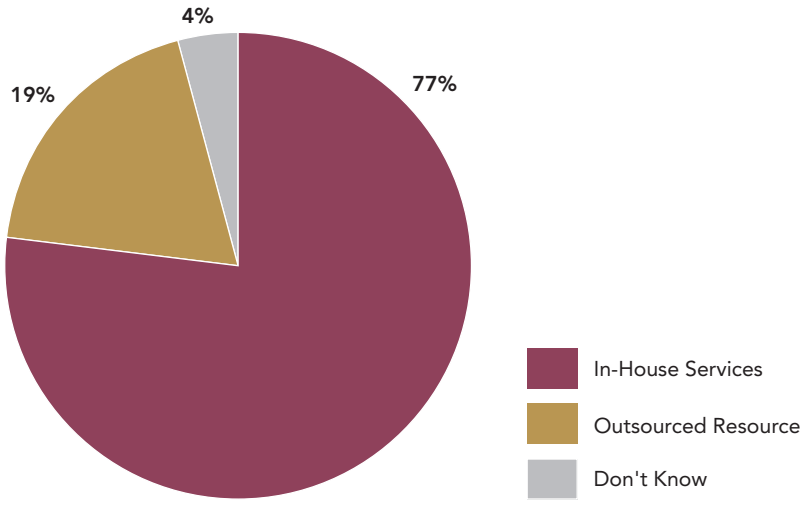

Figure 21. The distribution of how DAM is handled in the respondent companies.

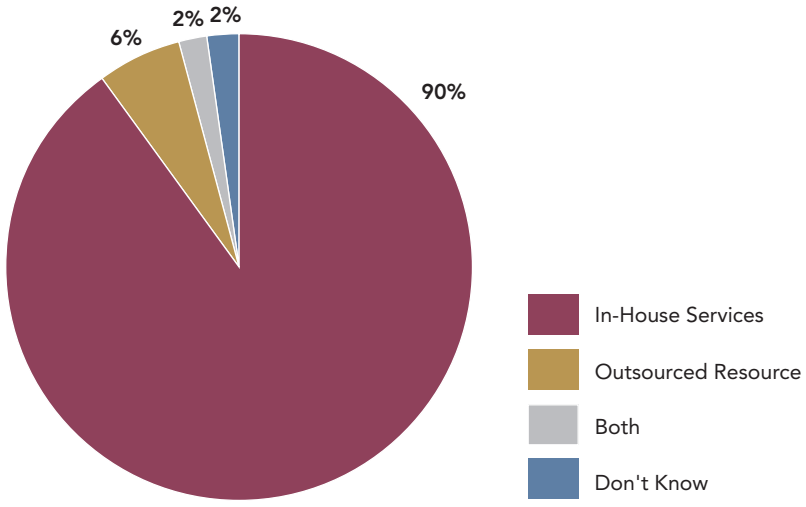

Figure 22. The distribution of how VDP is handled in the respondent companies.

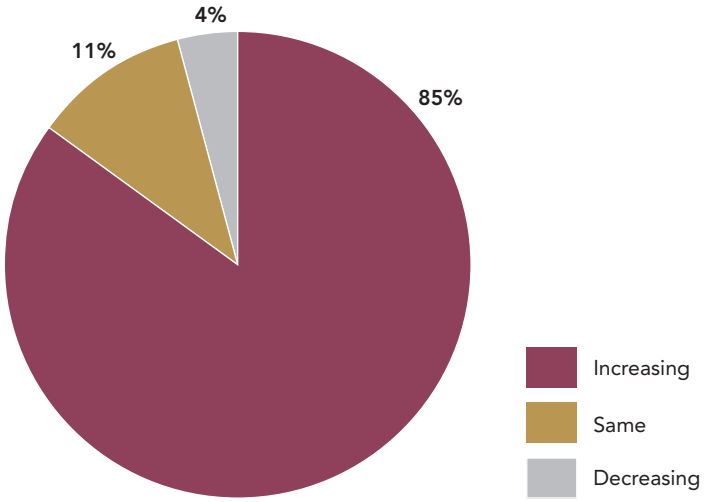

Figure 23. The respondent companies' views on the demand for AM over the next two years.

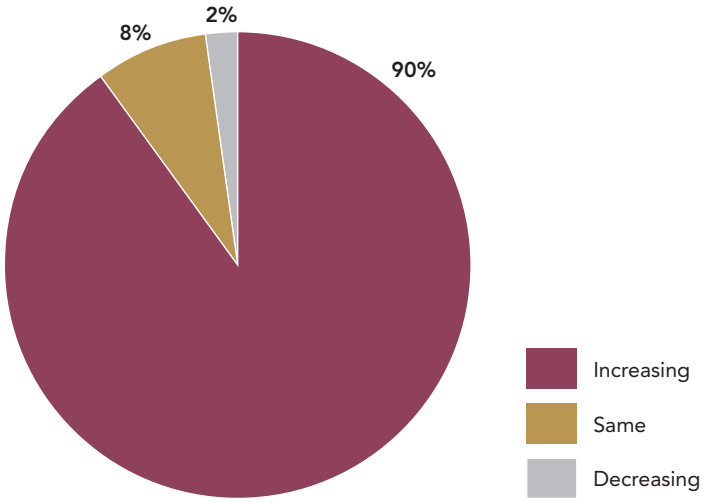

Figure 24. The respondent companies view on the demand for VDP in the next two years.

Hires Over the Past Two Years

The respondent companies were asked how many employees they have hired in the last two years within the functional areas specified in Table 1 The count column in Table 1 represents the number of companies that have hired new employees within the given functional area.

Table 1. The distribution of hiring in each of the functional areas over the last two years in the respondent companies.

How many employees were hired for each of the following functional areas over the last two years?	Count	Mean	Min	Max	SD
Customer service	55	2.5	1	20	3.8
Estimating and planning	21	1.3	1	3	0.6
IT administration	24	1.3	1	3	0.6
Prepress	42	1.8	1	8	1.4
Printing	48	3.2	1	20	4.3
Production management	18	1.6	1	5	1.2
Digital asset management (DAM)	8	1.6	1	4	1.1
Variable data printing (VDP)	17	2.0	1	5	1.3
Sales	45	2.3	1	10	1.9
Other functional area	7	6.0	1	20	8.0

Customer service, printing, sales, and prepress are the functional areas where the most companies have hired employees within the last two years. Only 8 of the respondent companies have hired within DAM and 17 within VDP, and that with a mean of 1.6 employees for DAM and 2.0 for VDP. This corresponds to the fact that DAM and VDP technologies are not deployed in all of the respondent companies, whereas the four functional areas with the most hires are common for the majority of companies in the printing industry.

The respondent companies also were asked whether these new employees had to have new skill sets that the company had not possessed before. Figure 25 shows the distribution of replies in each functional area for the respondent companies.

DAM and VDP are the functional areas where most of the respondent companies have required new skill sets. IT administration closely follows. However, only 8 of the respondent companies hired employees in the DAM area, 17 of them in the VDP area, and 24

of them in the IT administration area, and these functional areas have a mean of 2.0 employees or lower.

Skill Sets for New Hires

The respondent companies were asked what skill sets they had been looking for. Figure 26 shows the distribution over several categories of skill sets.

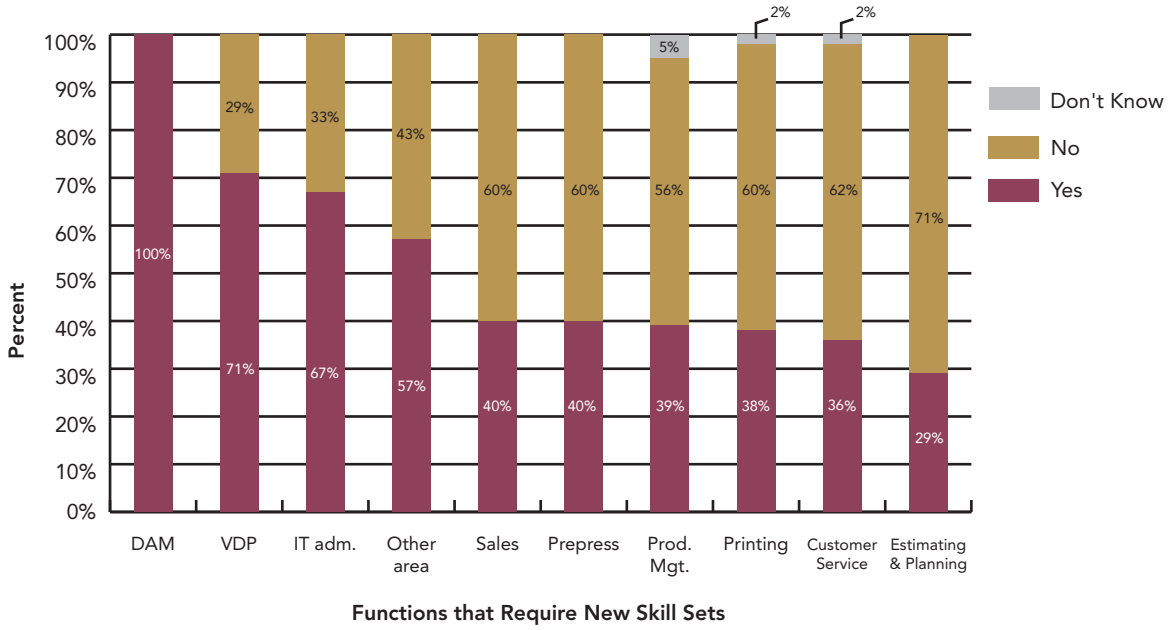

Figure 25. The functional areas in the respondent companies that required new skill sets of the employees hired within the last two years.

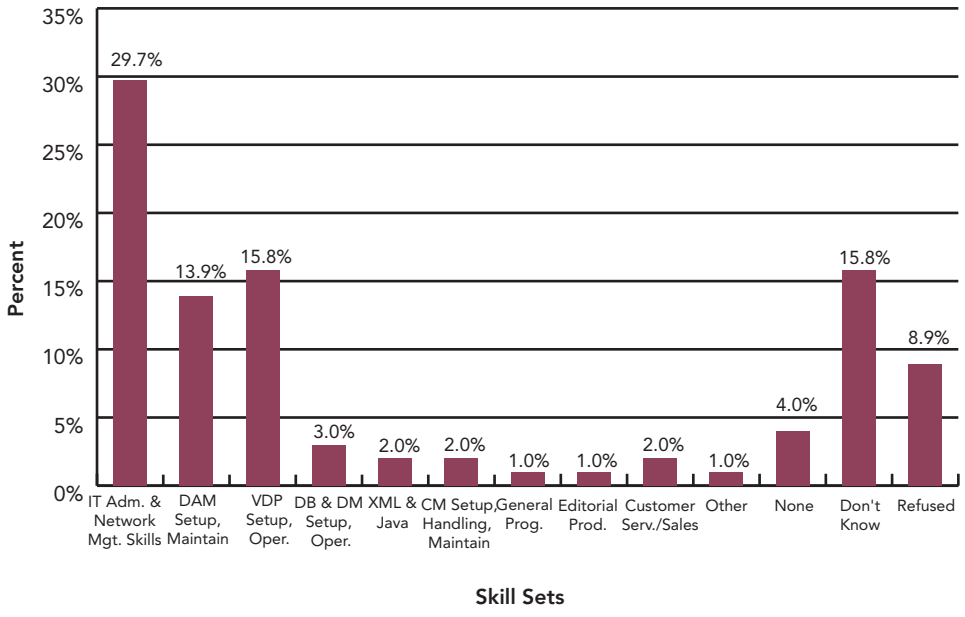

Figure 26. The skill sets that respondent companies have been pursuing.

IT administration and network management skills were sought by 29.7% of the respondent companies. About 14% looked for DAM setup and maintenance skills, and 15.8% for VDP setup and operation skills. The remaining categories were only sought by a low percentage of the respondent companies.

The companies were also asked what skill sets they had been pursuing most aggressively. The distribution of the replies is shown in Figure 27. Some of the respondents have been pursuing more than one skill set most aggressively, which is why the percentages shown in Figure 27 do not add up to 100%. VDP setup and operation is the skill set pursued most aggressively by the respondent companies.

DAM and VDP Jobs

The respondent companies use a wide variety of titles for employees with DAM and VDP skill sets. As Table 2 shows, there are no common titles used for these employees, and 44.6% of the respondent companies admit that they don't know what the title is or should be in their company.

Table 2. The titles used in the respondent companies for employees with DAM and VDP skill sets.

Titles used for DAM and VDP employees	Percent
Systems manager	6.9
Publishing systems technician	1.0
Digital workflow specialist	1.0
Asset manager	1.0
DAM specialist	2.0
Application specialist	1.0
Data manager	1.0
Graphic artist/designer	5.0
Digital press operator	4.0
Production manager	5.0
Prepress	2.0
Account rep	1.0
Color specialist	1.0
Consultant	1.0
Director of content management	1.0
IT/technician	5.0
POP services	1.0
Variable data specialist	2.0
Other	1.0
Don't know	44.6
Refused	12.9
Total	100.0

With regards to the education level required for employees handling DAM and VDP, 26.7% of the respondent companies required certified formal technical training. However, 25.7% required a bachelor's degree as a minimum, and 19.8% stated that they would train employees themselves. Figure 28 shows this distribution of replies.

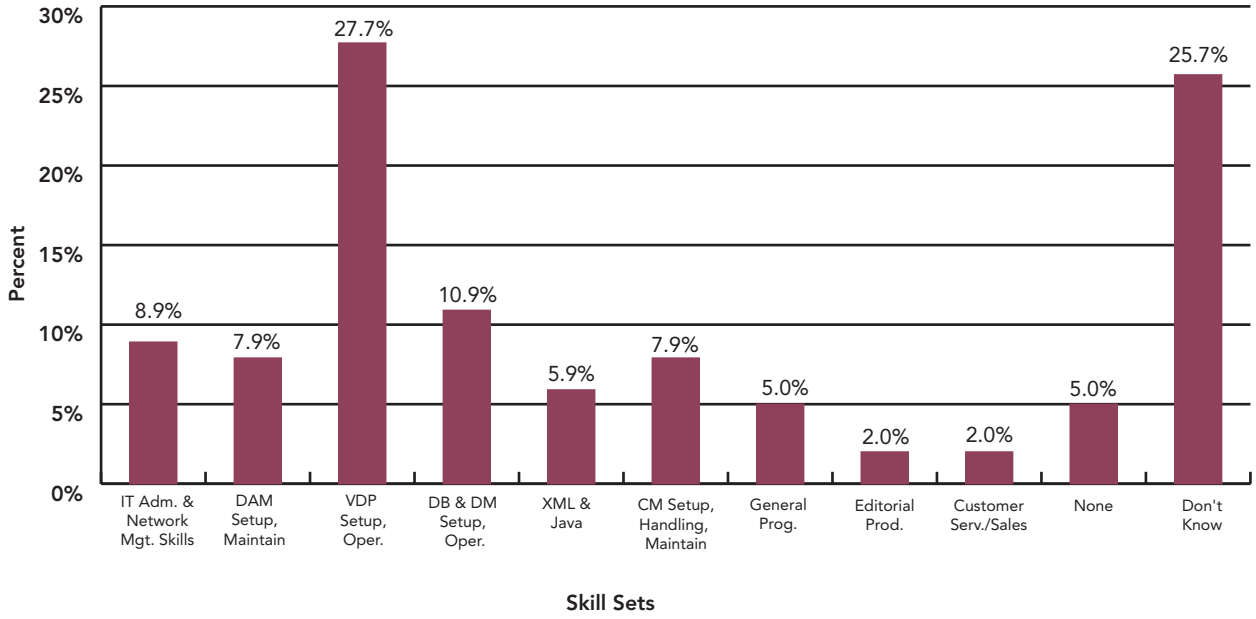

Figure 27. The skill sets that respondent companies have been pursuing most aggressively.

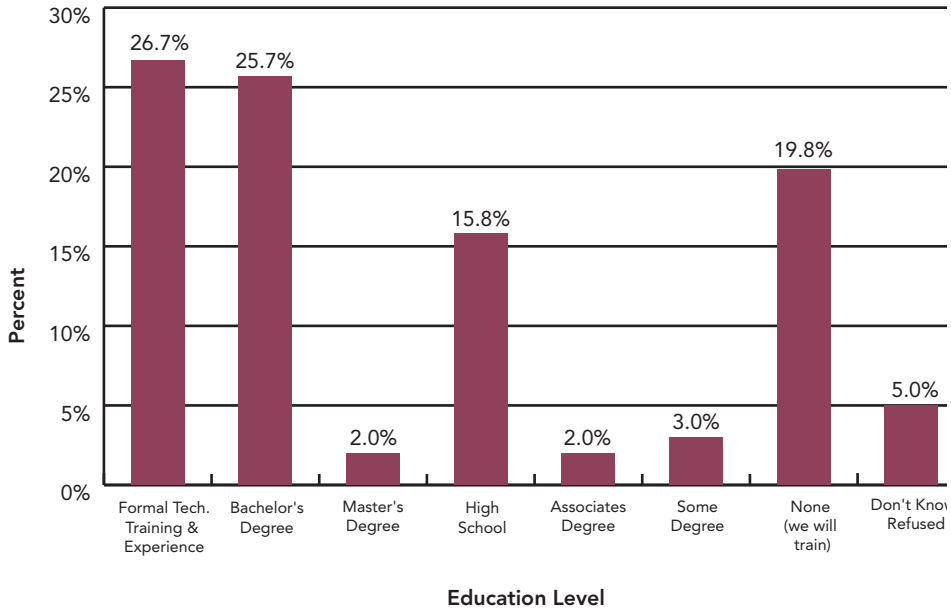

Figure 28. Education level required by the respondent companies for DAM and VDP employees.

The respondent companies were also asked whether an entry-level salary is or would be higher for employees with DAM and VDP skill sets compared to employees with traditional printing industry skill sets. The distribution of replies is shown in Figure 29.

The 35% percent that replied "Yes" were subsequently asked what percentage the entry-level salary is or would be higher. The distribution of percentages is shown in Figure

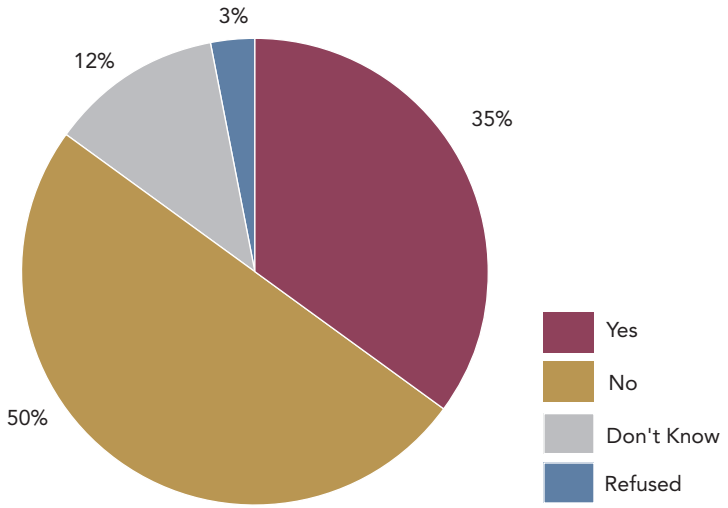

Figure 29. The respondent companies reply on the matter of entry-level salaries being higher for employees with DAM and VDP skill sets.

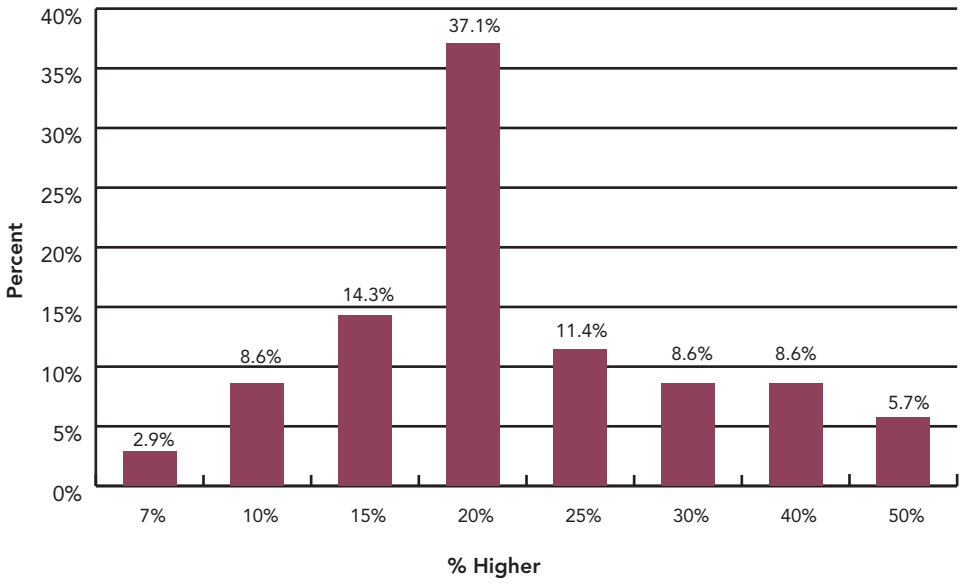

Figure 30. The distribution of how much higher the entry-level salaries are higher for employees with DAM and VDP skill sets in the respondent companies.

30. The predominant percentage increase for entry-level salaries of new employees with DAM and VDP skill sets (over employees with traditional printing industry skill sets) was 20% in the companies we queried. The distribution of percentage increases is normal, with a mode of 20%.

Hiring Methods

The most common methods of seeking new employees was the topic of the next question. The distribution of replies is shown in Figure 31. Advertisement of job openings is the predominant method.

The respondent companies were then asked about their business and social networks. Figure 32 shows the distribution of replies. Most (63.4%) of the respondents have business and social networks that only reach within the printing industry itself. The remaining 34.6% have business and social networks that reach outside the printing industry, but there is no overall tendency within this reach. The distribution is spread out over a variety of different industries.

Figure 33 shows the replies to the question of whether companies are trying to broaden their current business and social networks to reach into other industries.

Figure 34 shows how the 59% of the companies that are trying to broaden their networks are handling this.

Attending conferences and joining organizations are the predominant methods of attempting to broaden the business and social networks of the respondent companies.

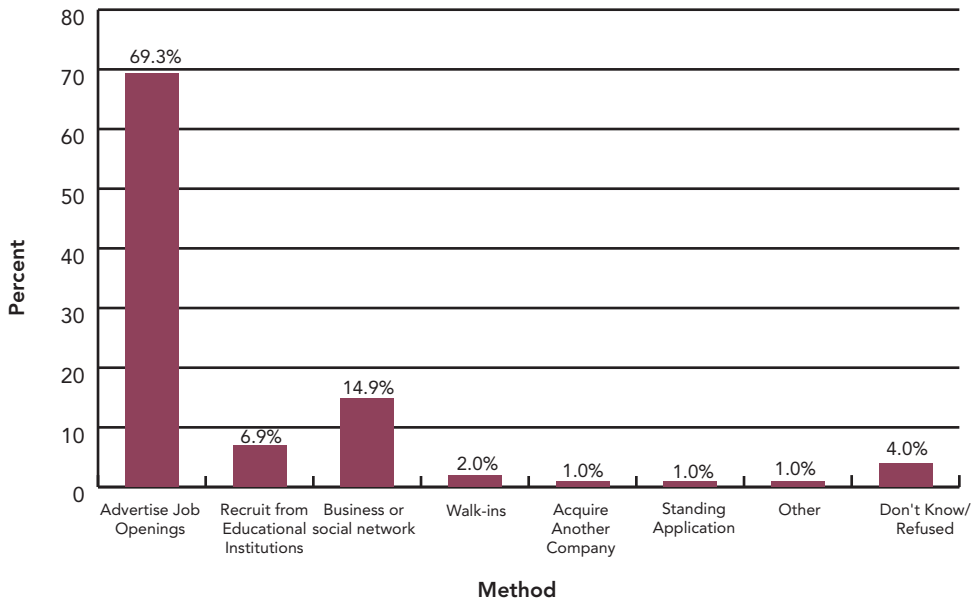

Figure 31. How the respondent companies seek their new employees.

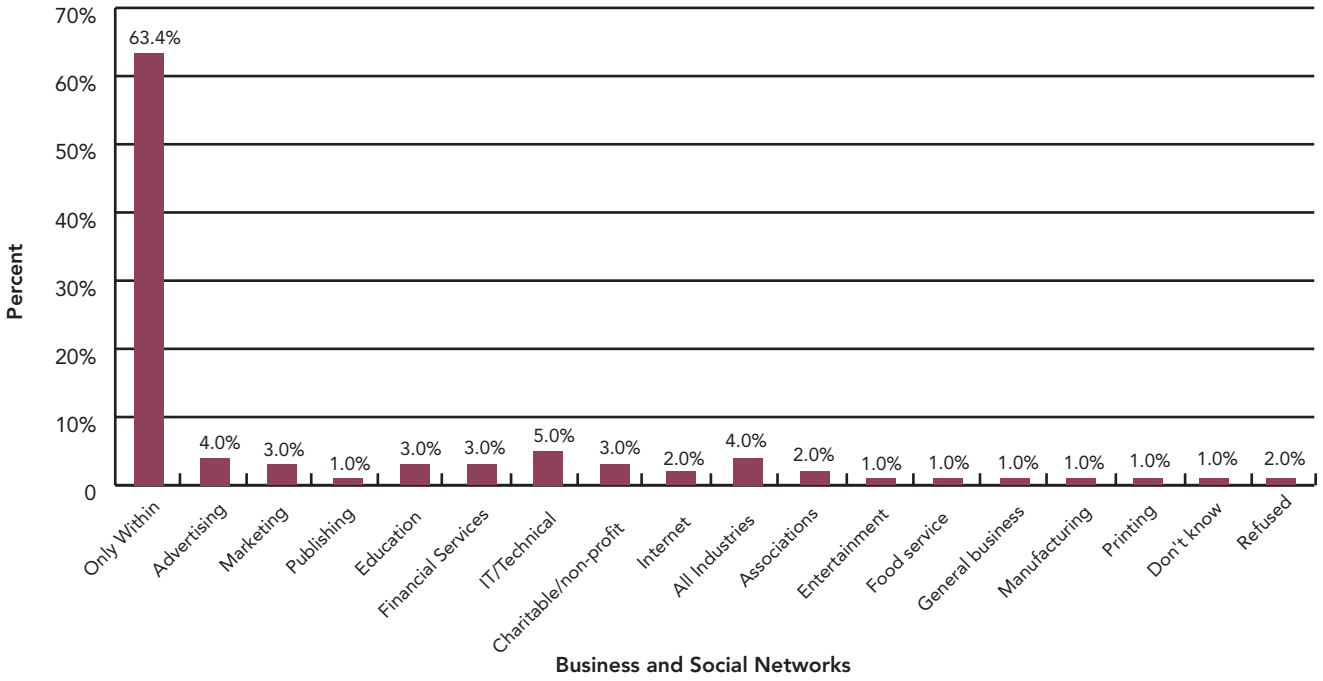

Figure 32. The business and social networks of the respondent companies and how far these networks reach.

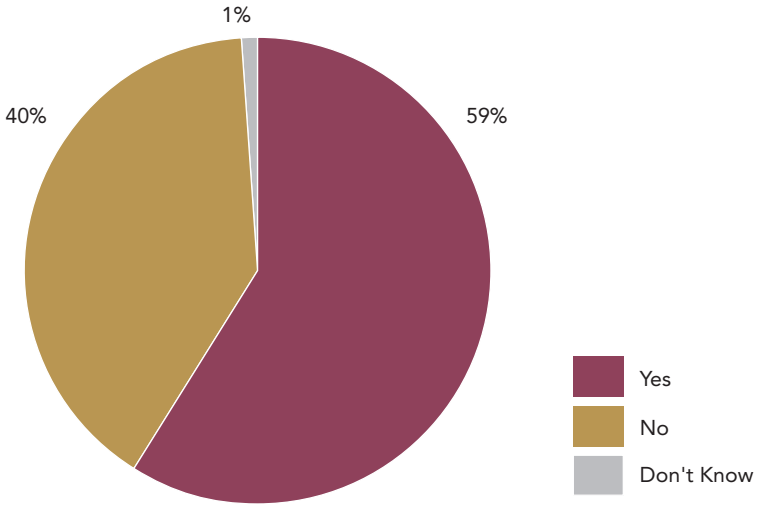

Figure 33. The respondent companies' replies on whether or not they are trying to broaden their business and social networks.

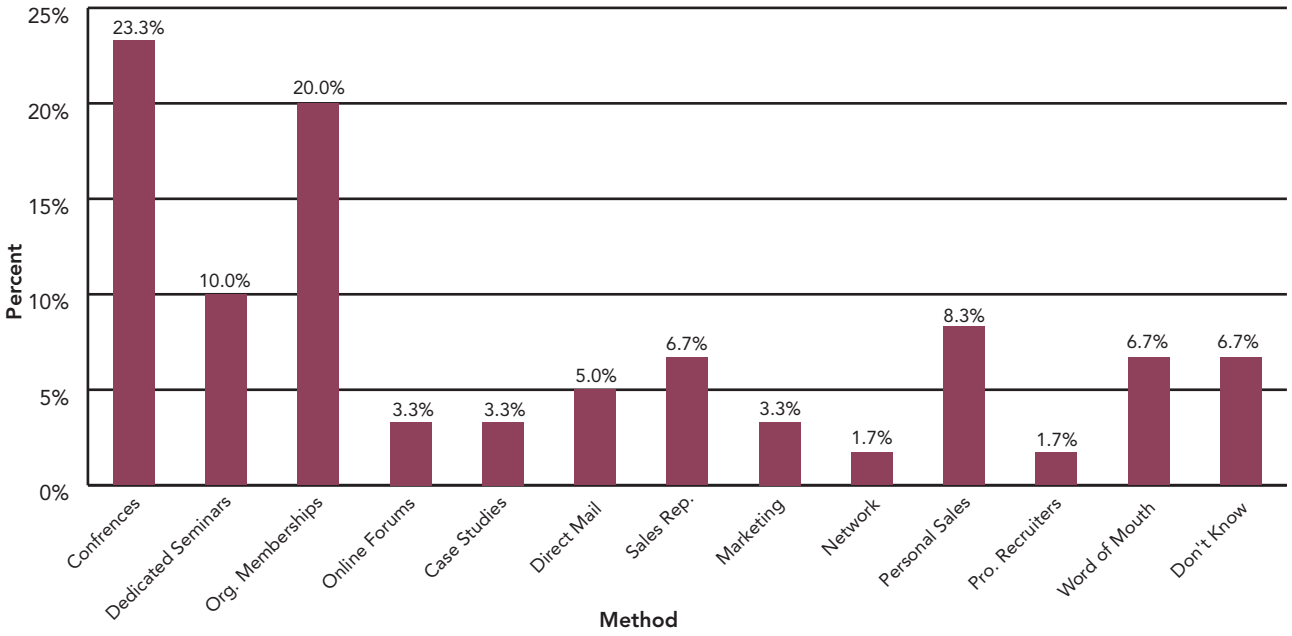

Figure 34. The respondent companies method of broadening their networks.

Training Current Employees for DAM and VDP

The respondents were asked how much time they allot for training current employees to effectively take on DAM and VDP. Figure 35 shows the distribution of replies for DAM and Figure 36 shows replies for VDP.

More than 100 hours is the predominant response for those companies that offer training in both technologies. Figure 37 shows different types of training and how often they are used. In-house training by company personnel is the preferred type of training for the most companies.

The topics of training offered to existing employees in the respondent companies are shown in Figure 38. About forty percent of the respondent companies offer "spreadsheet usage" as a topic of training, while 33.7% offer training in "variable data applications." These are the predominant topics of training. The higher incidence of spreadsheet usage training may indicate a less complex workflow or low levels of customer knowledge about VDP and DAM.

Company Culture

As part of the investigation of company culture, the presence of a human resource function was sought; 55% of the companies in the study replied "Yes". This 55% were further asked whether the human resource function was discrete or had other responsibilities. The replies are shown in Figure 39. Figure 40 shows that 92% of the respondents regard company culture as important as strategy and mission

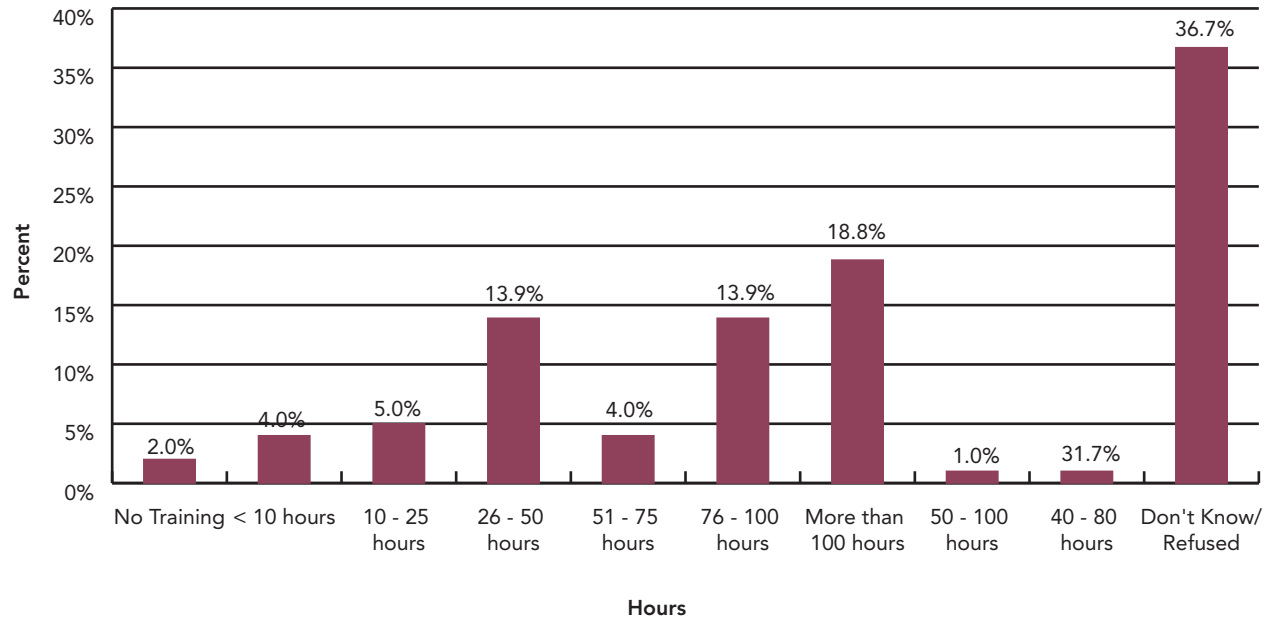

Figure 35. The distribution of the amount of time allotted to training existing employees to effectively take on DAM.

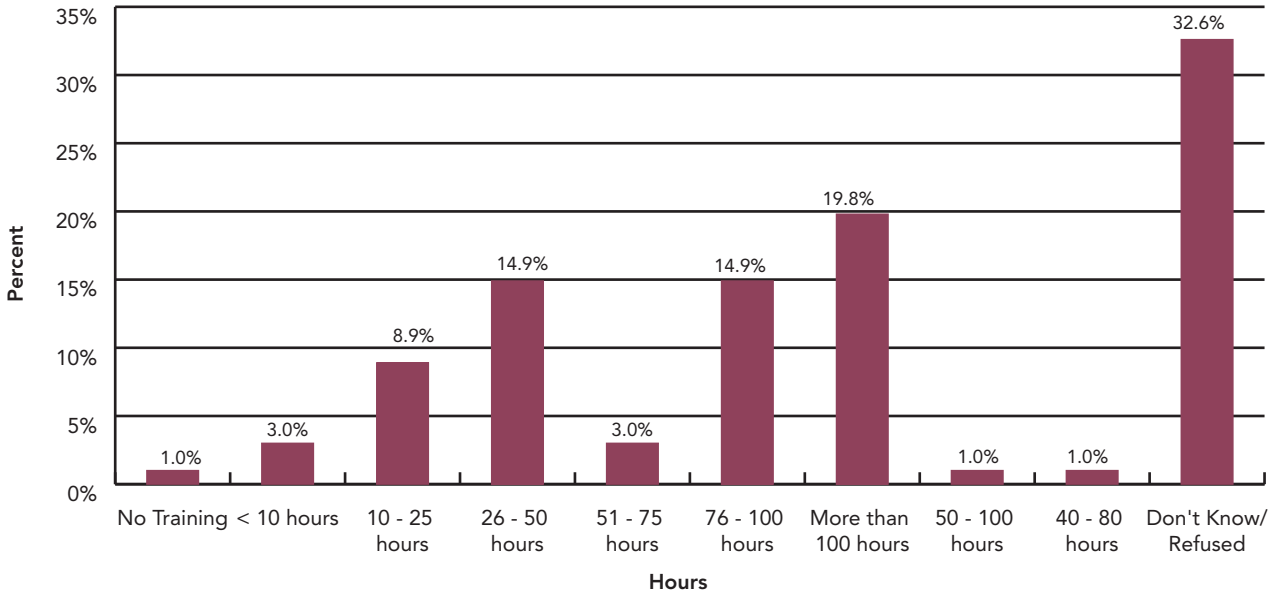

Figure 36. The distribution of the amount of time allotted to training existing employees to effectively take on VDP.

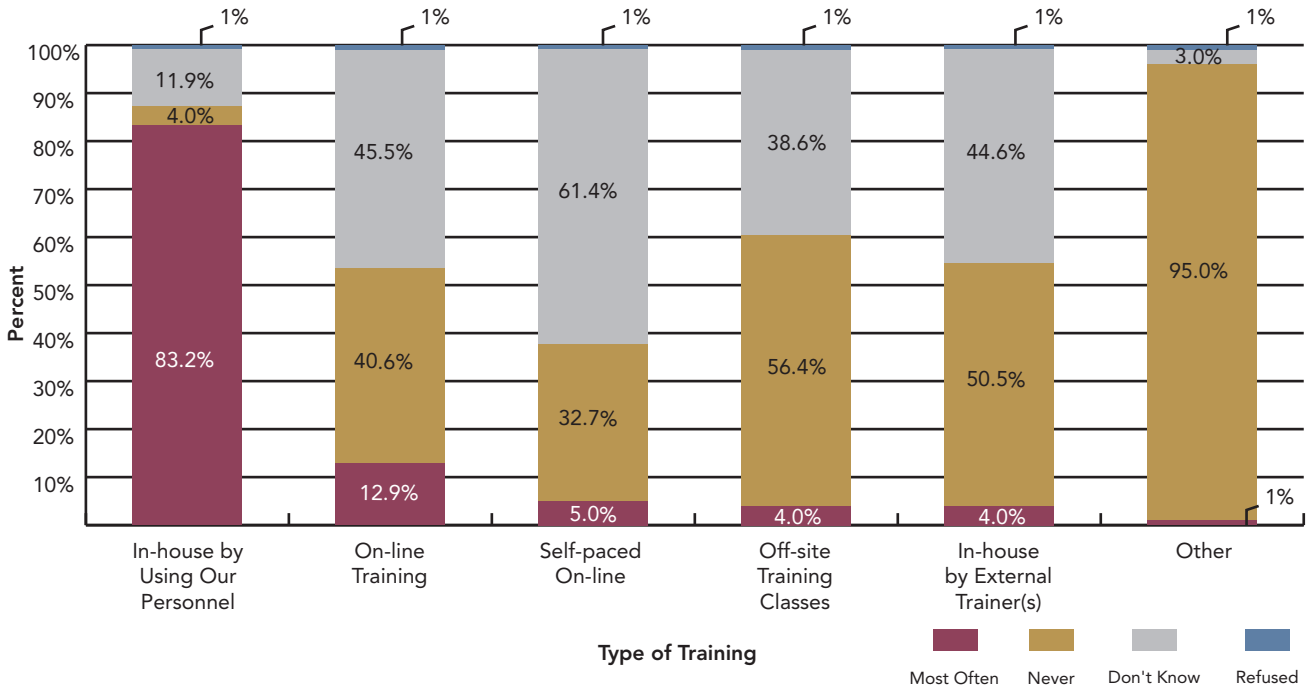

Figure 37. The type of training used in the respondent companies on existing employees.

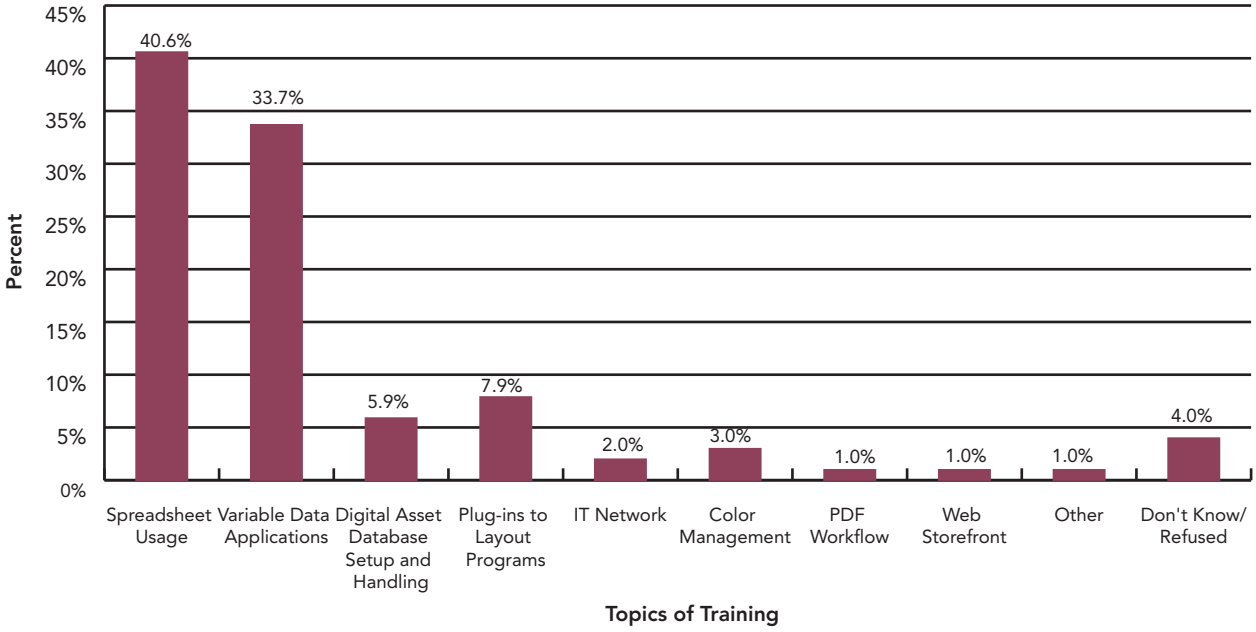

Figure 38. The topics of training for existing employees at respondent companies.

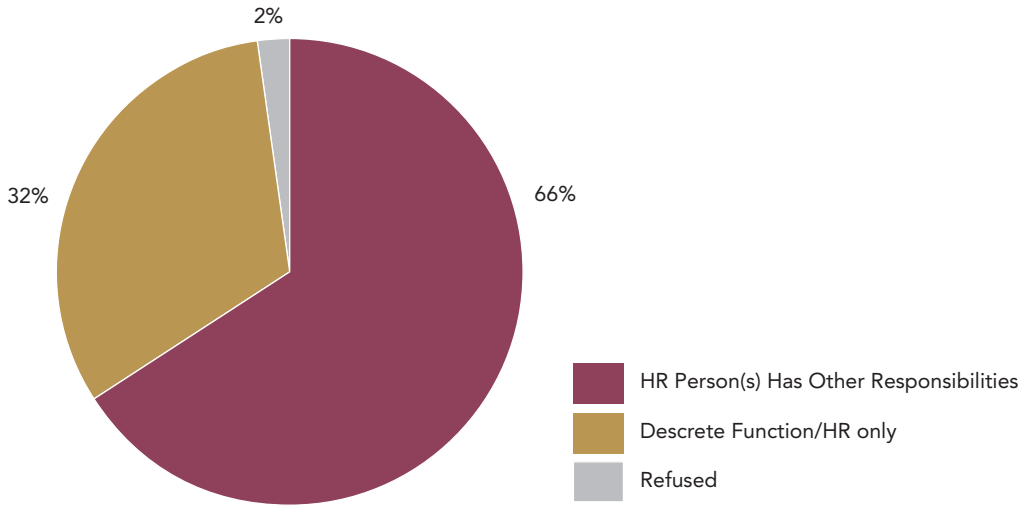

Figure 39. Is this a discrete human resource function or does it have other responsibilities?

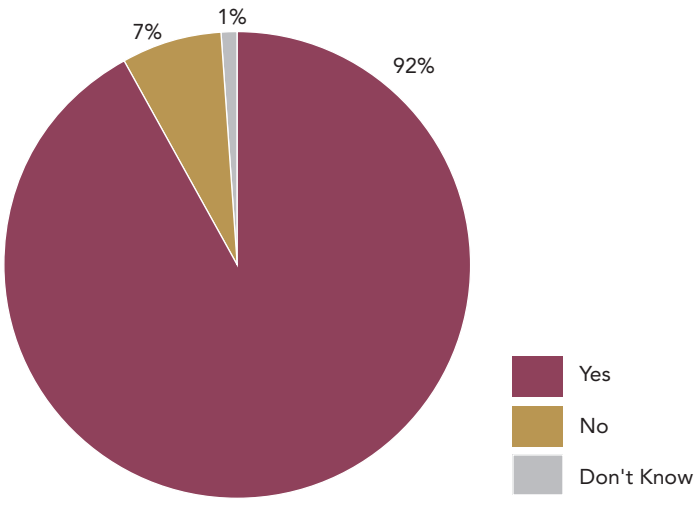

Figure 40. The respondent companies view upon the importance of company culture over strategy and mission.

In order to explore the companies' views on company culture and management values further, a series of questions was developed. The respondents were presented a list of paired statements that describe two companies, and they were asked to decide which one of the two statements in each pair was most descriptive of their company, pertaining to achieving future success over the next 1 to 2 years. These six paired statements are presented in Table 3, with the responses in Figure 41.

The series of questions shows that the respondents are focused on both technology and company culture; the nearly even split between Company G's views (focus on technology) and Company H's views (focus on the social network) especially affirms this observation. However, the preference of Company B's views over Company A's shows that there is a general tendency to trust more efficient and effective technology over human capital in order to achieve business success, which is a very typical perception in the industry. On the other hand, Company C's belief in employee motivation ranks far above Company D's favoring of strict management direction. This view is reiterated in by the results presented in Company E vs. Company F, with the bottom-up approach slightly more popular than a top-down one. Company I's philosophy of motivating employees based on fairness and trust wins out over Company J's plan for motivation based on financial incentives. But the idea of working to enhance horizontal communication channels (between employees) is not generally preferred to the idea of strengthening vertical ones (between management and employees),as shown in Companies K vs. L.

The last question explored which magazines, research reports, and white papers were read by the respondents in the areas of printing technology, imaging technology, photography, information technology, binding and finishing, business and management, and other areas as well. These answers are tabulated in Appendix B under question 2.25.

The responding companies predominantly read magazines, research reports, and white papers targeted directly at the printing industry. However, a full 70.8% of the respondent companies did not read magazines, research reports, and white papers that dealt with information technology, and only about half of them read magazines, research reports, and white papers that deal with business and management. Within the area of imaging technology, 63.9% replied "none" (they read no magazines or reports on this topic); for photography, 94.1% replied "none;" and for binding and finishing, 78.1% replied "none." The most widely read materials are three industry trade magazines, *American Printer*, *Graphic Arts Monthly*, and *Printing Impressions*.

Table 3. List of Paired Statements Describing Two Companies

Company A vs. Company B	
Company A sees the majority of its business success coming from the investments it is making in human resource capital.	Company B sees the majority of its business success coming from new investments in more efficient and effective technology.
Company C vs. Company D	
Company C sees business success more likely achieved by being singly focused on attaining the financial imperatives set by the board of directors—doing what it takes to achieve these financial objectives.	Company D sees its business success being largely a function of creating an employee-centered environment that self-motivates individual and collective achievement.
Company E vs. Company F	
Company E sees success being more likely with a philosophy that the employees (who are closest to the day-to-day work) have the intimate knowledge to recommend savvy changes that really make a difference—a bottom-up approach.	Company F sees success being more likely when upper management defines an organizational structure with a purpose and mission that is clear, and everyone knows his or her responsibilities—more of a top-down approach.
Company G vs. Company H	
Company G sees a lot more potential for business success coming out of developing and/or shoring up an efficient infrastructure with better technology.	Company H sees a lot more potential coming from a better human/employee social network—a human collaborative infrastructure of trust.
Company I vs. Company J	
Company I sees the motivation of its employees as critical, and feels that more can be achieved by having a fairer and more trusted employee evaluation system.	Company J sees the motivation of its employees as critical and feels that a financial incentive system would really make a difference.
Company K vs. Company L	
Company K believes that it could make real headway in achieving its business growth goals by making significant improvements in the horizontal communication channel across employees.	Company L believes that it could make real headway in achieving its business growth goals by making significant improvements in its vertical communication channel—management to employees.

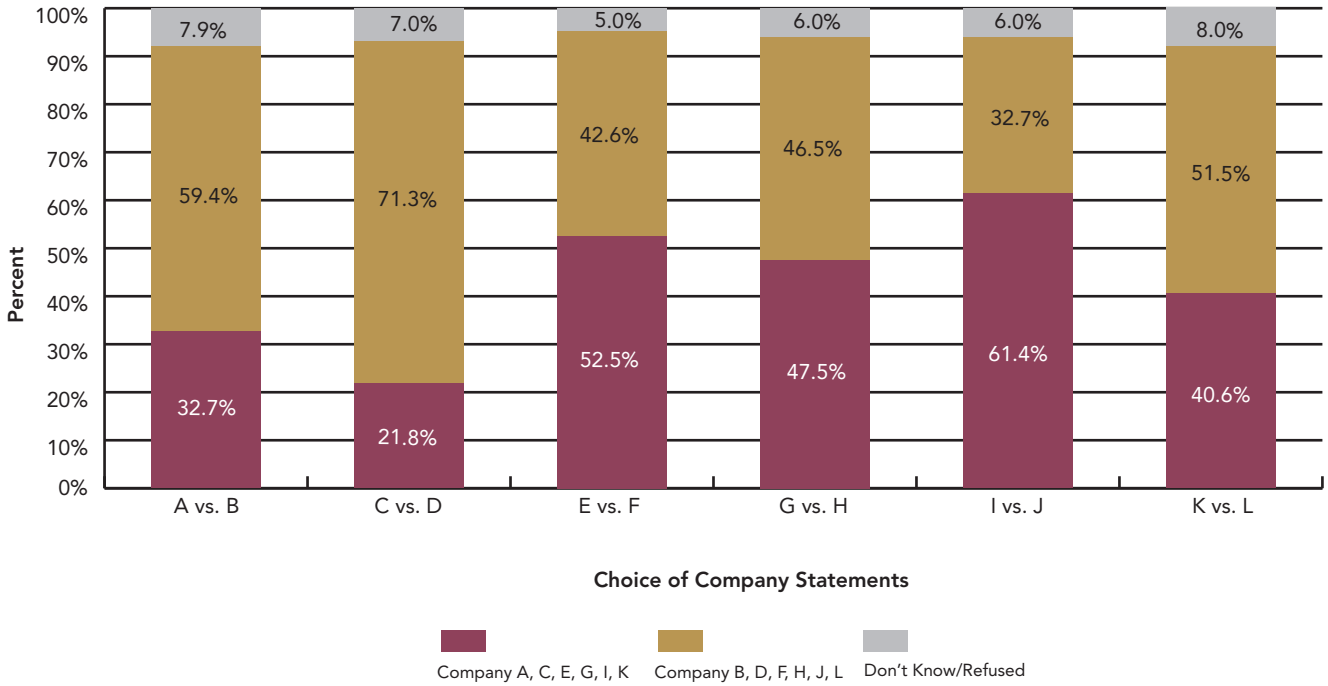

Figure 41. The respondent companies' choices in the pairs of statements.

Summary of Findings

Company Demographics

There was no significant correlation between the number of employees and number of years in business, indicating that company size depends on factors other than age. The balance of different job functions was found to differ with company size range; the larger companies have a lower proportion of production employees compared with "front office" and support functions. This may indicate the implementation of efficient technologies and processes in the larger companies, requiring initial financial investments inaccessible to smaller firms. For the overall sample, the "front office" and IT categories together account for 36% of employees, with the hands-on "productive" categories including prepress and production amounting to 64%. A "functional ratio" relating these two metrics can be used to gauge efficiency and lean structure within a company or an industry. As technology advances and printers enter new and diverse market, the distribution of employees can change. New functional areas will inevitably be incorporated into the company structure and this distribution (and the functional ratio) will change over time.

This sample is dominated by smaller companies, with 55.3% of participants generating 2004 revenues of less than $3M. This confirms the predominance of small- and medium-sized enterprises (SMEs) in the printing industry. It is particularly encouraging that 66%

of firms experienced an increase in annual revenues in 2004 compared with 2003. Since so many of the firms in this sample are relatively small, they may not have the financial robustness and asset structure to weather significant year-over-year revenue decreases.

The job categories which are predicted to experience the greatest revenue growth potential (in dollar terms) are marketing and promotional materials, direct mail, and transactional and business communications. The greatest revenue growth in percentage terms was projected to be in the categories of transactional/financial, and signage. (Signage grew significantly from 2003 to 2004, although was still a relatively minor category.) The signage category could include inkjet wide-format and other non-toner technologies, a segment with considerable growth and profitability potential. Interestingly, manuals and documents and quick printing applications are predicted by respondents to generate a lower proportion of revenues compared with current levels. This may be related to the increased use of electronic forms and software manuals and the use of PDF document formats.

The use of variable data was relatively low in this sample (80% of companies reported that less than half of their jobs contain variable data, and 56% reported that less than 10% did), compared with a previous PIC research study by Pat Sorce (2004). No monotonic relationship between the use of color and the level of variable data content was found. Business communications was the leading variable data category (62%), labels and wrappers came second (43%), and direct mail was third (33%).The transactional/financial category was surprisingly low at 21%, which is interesting in light of the nature of bills, statements and individually targeted communications normally included within this job category. Evidently this sample is not capturing the inplant check, billing and statement production segment. The percent of variable data did not correlate with either the number of employees or with years in business.

There was a wide range of digital printing equipment utilized in respondents' businesses, some brands not fully digital in the sense of having no fixed plate and no capability to produce different impressions and do variable data. It should be noted that the survey sample may not necessarily be representative of the production digital printing market segment nationally. In addition to digital technologies, the majority of respondents have other non-digital presses, with the majority owning sheetfed offset presses. Few had flexographic or gravure presses. Only 20% employ exclusively digital printing technology.

The year of entry into digital print production, indicated by the year of the first digital press acquisition, was found not to correlate significantly with the percentage of variable data jobs, or with overall 2004 company revenues. There was a spike of digital equipment purchases in 1995 and again in 2002 that may relate to the introduction of new technologies and capabilities (particularly in 1995). The 2002 spike may relate to both recession-driven aggressive price positioning and new market opportunities.

Skill Sets for DAM and VDP

Of the respondent companies, 27% have established businesses with DAM, and 49% with VDP. However, only 5% of the respondent companies have established business-

es using DAM and not VDP, while a significantly larger 27% have established business using VDP and not DAM. Almost 20% answered that an outsourced resource handled their DAM, while 77% use in-house services. Similarly, only 6% use an outsourced resource for VDP, while 90% use in-house services. The respondent companies believe firmly in an increasing future demand for DAM and VDP.

DAM and VDP are two functional areas where most of the respondent companies require new employee skill sets. IT administration closely follows these two areas. However, only 8 of the respondent companies hired employees in the DAM area, 17 of them in the VDP area, and 24 of them in the IT administration area, and these functional areas have a mean of 2.0 employees or lower. In comparison, the job areas in which, by far, the most companies have hired employees in the last two years are: customer service, printing, sales, and prepress. This corresponds to the fact that DAM and VDP technology are not deployed in all of the respondent companies, whereas the four functional areas with most hiring are common for the majority of companies in the printing industry. Therefore, it's not possible to conclude that the movement of new skill sets into these areas is of a significant amount yet, but it is definitely in areas that require new skill sets.

On average, the companies that did hire DAM, VDP, and/or IT administration employees were larger than companies that did not hire in these areas. They also experienced a higher revenue growth than the companies that did not hire in these areas.

A comparison of the number of companies that are involved in DAM and VDP and the number of employees hired in these functional areas shows a preference for companies educating their own employees in these two technologies. In fact, 83.2% of the respondents stated that they most often use in-house training to educate their DAM and VDP employees. This correlates well with the presence of a craftsman mentality, where DAM and VDP technology is deployed in order to support the print service provider status. However, in such an environment, DAM and VDP technology may not be deployed to their full capabilities. No specific titles are used for employees with DAM and VDP skills, which can indicate a limited experience in deployment of these technologies.

The most common topics in the training of DAM and VDP employees are spreadsheet usage (40.6%) and variable data applications (33.7%). This shows that the focus of training is on operation, not setup and workflow integration, where significant competitive advantages exist.

Technology deployment could be lacking in complexity. This might be due to a craftsman approach, indicated by three facts that emerged from the survey:

1. Certified technical training was the most preferred level of training for DAM and VDP employees. High school was also added as a possible education level.
2. The preferred training method was in-house by a company's own personnel, and averaged around 100 hours for both technologies. This training could only be sufficient for operation of the technologies, not set-up and system integration.

3. Spreadsheet usage was mentioned the most often as a training topic. However, this topic might be a product of a low level of customer knowledge about these technologies, and not the preference of respondents..

Regarding company culture, 63.4% of the respondent companies have business or social networks that only reach within the printing industry, but 59.4% are trying to broaden these networks through conferences, dedicated seminars, and organization memberships. The current networking traditions make it harder for printers to get connected to new pools of possible employees with new skill sets.

A human resource function was embedded in 55.4% of the respondent companies, but only one third of these were dedicated solely to human resources issues. This may be due to size, and may not necessarily indicate a lack of recognition of the importance of this function.

The vast majority of the respondents find that company culture is just as important as the strategy and mission of the company. However, the survey revealed that respondent companies are focused equally on technology. There appeared to be a general belief that trusting in efficient and effective technology was a better way to achieve business success than trusting in human capital, which is a very typical perception in the industry. On the other hand, results pointed to a widespread belief in motivating employees rather than using strict management direction. But then, the predominant opinion in the respondents (mostly made up of managers) was that this employee motivation can be achieved through fairness and trust instead of through financial incentives! However, the respondents also preferred enhancing horizontal communication channels (between employees) over enhancing vertical communication channels (between managers and employees).

The interviewees at responding companies and also employees at the companies predominantly read magazines, research reports, or white papers targeted directly to the printing industry. The most widely read materials were the standard trade magazines: *American Printer*, *Graphic Arts Monthly*, and *Printing Impressions*. Over 70% of the respondents do not read magazines or reports dealing with information technology, and only approximately half of them read about business and management issues. A majority of respondents do not read any literature in the areas of imaging technology, photography, and binding and finishing.

The survey responses reflected that many decisions in the printing industry are made with a "craftsman" and "technology" approach. There is a strongly-held belief that by simply adding new technology, opportunities for profit will arise. Representatives of the respondent companies predominantly read magazines focused on technology, targeted directly to the printing industry, and are therefore influenced highly by a strong magazine/vendor relationship. These traditional printing magazines generate their revenues from ad spending by equipment vendors. This implies that they are to some extent controlled by these vendors, whose main focus is, of course, to sell equipment.

Let's elaborate by providing some insight into this relationship. When equipment vendors place their annual ad budget with a magazine, a process of negotiation occurs. This will partly control what equipment the magazine writes about and at what time, the placement of articles, and which industry customers or representatives will be interviewed. When new equipment is released, journalists are invited to events where they receive a press kit with all the specifications of the new equipment and the main statements the vendor wishes to make. This information may very well become the foundation of subsequent magazine articles. Images and graphics provided by the vendors make the journalists' work easier. It is safe to say that messages sent to the printing industry through these paths are to a large extent determined by the vendors.

Printers will have a hard time developing a strategic competitive advantage if their own employees do not have the skill sets to move beyond the choices offered by manufacturers.

Future Research

Follow-up interviews with printers will be conducted to confirm the findings of the survey. A deeper quantitative analysis will be conducted to see whether certain aspects of company culture can be defined for companies that have successfully hired employees with new skill sets in the areas of DAM and VDP.

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Appendix A: Additional Data

Digital Press Brands and Models as Reported by Survey Respondents

Table A1 The digital printing equipment deployed in the respondents' businesses.

Brand	Percent
HP Indigo	15%
IBM	0%
Nexpress 2100	2%
Nexpress/Kodak DigiMaster	4%
Océ	2%
Xerox 200 series	0%
Xerox black and white DocuTech	6%
Xerox DocuColor 2060	2%
Xerox DocuColor 6060	7%
Xerox DocuColor 8000	0%
Xerox iGen3	8%
Xerox Nuvera	1%
Xeikon	3%
Other	38%
Don't know	9%
Refused	4%
Total	100%

Other Types of Digital Presses as Reported by Research Participants

Table A2 Specification of the brand and model number of digital presses in the "other" category.

Brand and Model Number	Percent
Canon (other)	23%
Konica	10%
Xerox 2045	8%
Xerox (other)	6%
Xerox 6135	6%
Hewlett Packard/HP	6%
DocuTech	6%
DocuColor 12	4%
Heidelberg	4%
Toshiba	4%
AB Dick	2%
Akiyama	2%
CAC 3900	2%
NCAD	2%
Quick Master	2%
Ricoh	2%
Ryobi	2%
CLC 4000	2%
Karat	2%
Viewtech	2%
Canon 7200	0%
Lanier	0%
MP 8500	0%
Savin	0%
Sakurai	0%
Other	0%
Don't know	0%
Refused	0%
Total	100%

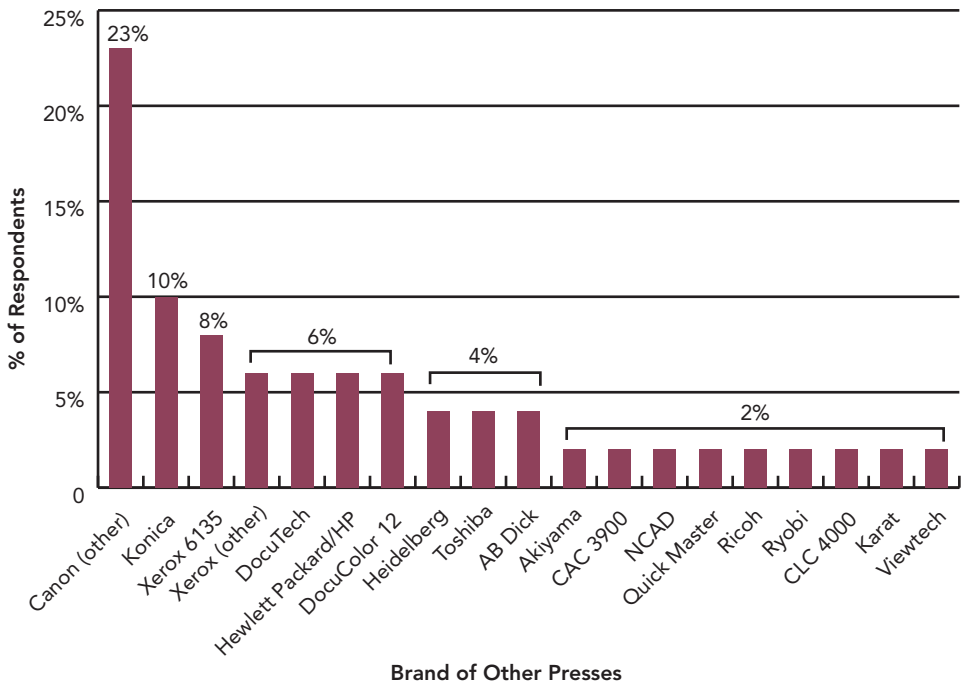

Figure A1. Specification of the brands and model numbers of other digital presses used by respondent companies.

Number of Digital Presses Owned by the End of Each Year, as Reported by Research Participants

Table A3 Specification of the number of digital printing presses owned by the respondents at the end of each year.

# of Presses	1999	2000	2001	2002	2003	2004
0						9%*
1	6%	7.5%	15%	14.3%	12.3%	28%
2	26%	30.0%	28%	33.9%	29.2%	19%
3	17%	22.5%	21%	12.5%	21.5%	16%
4	11%	10.0%	11%	16.1%	15.4%	10%
5	0%	0.0%	2%	3.6%	3.1%	6%
6	3%	5.0%	6%	3.6%	6.2%	4%
7	0%	0.0%	0%	0.0%	0.0%	1%
8	0%	0.0%	0%	1.8%	1.5%	0%
9	3%	2.5%	2%	1.8%	0.0%	0%
10	0%	0.0%	0%	0.0%	1.5%	2%
Don't know	23%	12.5%	6%	5.4%	3.1%	2%
Refused	11%	10.0%	9%	7.1%	6.2%	4%
Total	100%	100%	100%	100%	100%	100%

*Some of the printers did not have any digital printing equipment by the end of 2004. See *Digital Color—Where is the Market?* (PICRM-2002-02) for an explanation of the development of the color digital market.

Table A4 The mean number of presses by the end of each year.

Case Summaries	2004	2003	2002	2001	2000	1999
Mean	2.70	3.05	2.89	2.87	2.93	3.00
Minimum	1	1	1	1	1	1
Maximum	10	10	9	9	9	9
Std. Deviation	1.89	1.75	1.74	1.69	1.65	1.73
Median	2	3	2	2	3	3

Table A4 shows that overall there are no consistent trends over time in the number of presses in each size category. However the mean number of presses year by year increased slightly between 2002 and 2003, and then decreased between 2003 and 2004 (significant at 95% confidence), as can be seen in Table 2. Other differences were either not significant or close to borderline significance at this level. Looking at the yearly distributions by number of presses, the data is mixed, showing no clear trend in any size grouping; however there is an increase in the number of companies with just one digital press over the years 1999 to 2004.

Appendix B: Tabulated Questions and Answers

Spreadsheet with questions and tabulated answers (was sent out to partners)

Demographics							
A1	How many years has your firm been in business?	Count	Mean	Median	Min	Max	SD
		103	40	28	3	197	33
A2	How many employees are currently in your company?	Count	Mean	Min	Max	SD	
		103	79	1	2500	265	
A3	How many employees were in your company five years ago?	Count	Mean	Min	Max	SD	
		101	83	1	2700	295	
A4	How many employees do you have in each of the following functions?	Count	Mean	Min	Max	SD	
	Production	103	49	5	95	20	
	Prepress	103	15	0	40	9	
	IT	103	6	0	33	7	
	Sales	103	13	0	50	10	
	Customer service	103	17	0	61	12	
A5	Which of the following best describes your company's 2004 revenues?	Count	Percent				
	Less than $3 million	70	68.0				
	$3 million to $5 million	20	19.4				
	More than $5M to $10 M	8	7.8				
	More than $10 M to $15 M	0	0.0				
	More than $15 to $20 M	0	0.0				
	More than $20 M	5	4.9				
	Total	103	100				
A6	Did your revenues grow, decrease, or stay the same over the past 12 months?	Count	Percent				
	Grew	67	65.1				
	Decreased	11	10.7				
	No change	24	23.3				
	Don't know	1	1.0				
	Refused	0	0.0				
	Total	103	100				
	What was the approximate percent of growth?	Count	Mean	Min	Max	SD	
		67	13.9	1	75	11.6	
	What was the approximate percent of decline?	Count	Mean	Min	Max	SD	
		24	10.7	2	25	8.3	

Appendix B

A7	In the last 12 months what have the presentation been of these 11 types of digital printing jobs been in your business?	Count	Percent				
	Marketing and promotional materials	103	100				
	Major Portion	62	60				
	Minor Portion	32	31				
	Rarely Performed	5	5				
	Never Performed	4	4				
	Don't know	0	0				
	Refused	0	0				
	Manuals and documents	103	100				
	Major Portion	42	41				
	Minor Portion	44	43				
	Rarely Performed	8	8				
	Never Performed	9	9				
	Don't know	0	0				
	Refused	0	0				
	Catalogs and directories	103	100				
	Major Portion	9	9				
	Minor Portion	63	61				
	Rarely Performed	17	17				
	Never Performed	14	14				
	Don't know	0	0				
	Refused	0	0				
	Magazines and periodicals	103	100				
	Major Portion	6	6				
	Minor Portion	25	24				
	Rarely Performed	23	22				
	Never Performed	49	48				
	Don't know	0	0				
	Refused	0	0				
	Transactional / financial forms or documents	103	100				
	Major Portion	13	13				
	Minor Portion	31	30				
	Rarely Performed	24	23				
	Never Performed	35	34				
	Don't know	0	0				
	Refused	0	0				
	Book production	103	100				
	Major Portion	19	18				
	Minor Portion	35	34				
	Rarely Performed	13	13				
	Never Performed	36	35				
	Don't know	0	0				
	Refused	0	0				
	Direct mail	103	100				

A7	In the last 12 months what have the presentation been of these 11 types of digital printing jobs been in your business? CONTINUED	Count	Percent				
	Major Portion	51	50				
	Minor Portion	37	36				
	Rarely Performed	5	5				
	Never Performed	10	10				
	Don't know	0	0				
	Refused	0	0				
	Signage	103	100				
	Major Portion	14	14				
	Minor Portion	42	41				
	Rarely Performed	14	14				
	Never Performed	33	32				
	Don't know	0	0				
	Refused	0	0				
	Labels and wrappers	103	100				
	Major Portion	9	9				
	Minor Portion	50	49				
	Rarely Performed	18	17				
	Never Performed	26	25				
	Don't know	0	0				
	Refused	0	0				
	Quick printing applications	103	100				
	Major Portion	54	52				
	Minor Portion	33	32				
	Rarely Performed	4	4				
	Never Performed	12	12				
	Don't know	0	0				
	Refused	0	0				
	Business communications	103	100				
	Major Portion	42	41				
	Minor Portion	44	43				
	Rarely Performed	7	7				
	Never Performed	8	8				
	Don't know	2	2				
	Refused	0	0				
A8	Is there another type of digital printing job that you do that is not included?	Count	Percent				
	No	89	86				
	Don't know	0	0				
	Refused	4	4				
	Yes						
	Art work/fine art	2	2				
	Digital color printing	1	1				
	Imprints	1	1				

A8	Is there another type of digital printing job that you do that is not included? CONITNUED	Count	Percent				
	Large format	1	1				
	Media one off	1	1				
	Personal invitations	1	1				
	Statistical/surveys	1	1				
	Variable	2	2				
	Total	103	100				
	This other type is that a major portion of your business, Minor portion, Rarely Performed, or never performed?	Count	Percent				
	Major portion	4	40				
	Minor portion	6	60				
	Rarely performed	0	0				
	Never performed	0	0				
	Don't know	0	0				
	Refused	0	0				
	Total	10	100				
A9	Of the jobs the represent the major portions of your digital printing business, which one generates the greatest revenue?	Count	Percent				
	Marketing and promotional materials	23	24				
	Manuals and documents	17	18				
	Catalogs and directories	1	1				
	Magazines and periodicals	1	1				
	Transactional / financial forms or documents	5	5				
	Book production	4	4				
	Direct mail	19	20				
	Signage	2	2				
	Labels and wrappers	2	2				
	Quick printing applications	14	14				
	Business communications	6	6				
	Other	0	0				
	Don't know	3	3				
	Refused	0	0				
	Total	97	100				
A10	Which one of these job types do you really have to be successful at to ensure your future growth?	Count	Percent				
	Marketing and promotional materials	23	22				
	Manuals and documents	5	5				
	Catalogs and directories	2	2				
	Magazines and periodicals	1	1				
	Transactional / financial forms or documents	5	5				
	Book production	2	2				
	Direct mail	25	24				
	Signage	1	1				
	Labels and wrappers	1	1				

A10	Which one of these job types do you really have to be successful at to ensure your future growth? CONTINUED	Count	Percent				
	Quick printing applications	10	10				
	Business communications	9	9				
	Other	0	0				
	Don't know	14	14				
	Refused	4	4				
	0ther Category	1	1				
	Total	103	100				
A11	Of the digital printing jobs that you did over the past 12 months, what percent of these jobs were variable data print jobs?	Count	Percent				
	0	23	22				
	1	3	3				
	2	2	2				
	3	2	2				
	4	1	1				
	5	15	15				
	9	1	1				
	10	11	11				
	15	5	5				
	20	3	3				
	25	4	4				
	30	4	4				
	35	1	1				
	40	2	2				
	45	1	1				
	50	5	5				
	60	4	4				
	70	2	2				
	75	1	1				
	80	5	5				
	85	1	1				
	90	3	3				
	97	1	1				
	Don't know	3	3				
	Refused	0	0				
	Total	103	100				
	What percent of those jobs involved color?	Count	Percent				
	0	5	7				
	1	1	1				
	2	4	5				
	5	3	4				
	10	5	7				
	15	1	1				

A11	Of the digital printing jobs that you did over the past 12 months, what percent of these jobs were variable data print jobs? CONTINUED	Count	Percent				
	18	1	1				
	20	2	3				
	30	2	3				
	40	2	3				
	50	9	12				
	60	7	9				
	80	3	4				
	85	1	1				
	90	4	5				
	95	2	3				
	96	1	1				
	98	1	1				
	100	23	30				
	Don't know	0	0				
	Refused	0	0				
	Total	77	100				
A12	What is the brand and model number of each digital press used in your company?	Count	Percent				
	HP Indigo	20	15				
	IBM	0	0				
	Nexpress 2100	2	2				
	Nexpress/Kodak DigiMaster	5	4				
	Océ	3	2				
	Xerox 200 series	0	0				
	Xerox black and white DocuTech	8	6				
	Xerox DocuColor 2060	2	2				
	Xerox DocuColor 6060	9	7				
	Xerox DocuColor 8000	0	0				
	Xerox iGen3	10	8				
	Xerox Nuvera	1	1				
	Xeikon	4	3				
	Other	49	38				
	Don't know	12	9				
	Refused	5	4				
	Total	130	100				
	Specify the brand and model number for your first press under other to question 1.12 CONTINUED	Count	Percent				
	AB Dick	1	2				
	Akiyama	1	2				
	CAC 3900	1	2				
	Canon (other)	11	23				
	Canon 7200	0	0				

A12	What is the brand and model number of each digital press used in your company? CONTINUED	Count	Percent				
	CLC 4000	1	2				
	DocuTech	3	6				
	Heidelberg	2	4				
	Hewlett Packard/HP	3	6				
	Karat	1	2				
	Konica	5	10				
	NCAD	1	2				
	Quick Master	1	2				
	Ricoh	1	2				
	Ryobi	1	2				
	Toshiba	2	4				
	Viewtech	1	2				
	Xerox (other)	3	6				
	Xerox 2045	4	8				
	Xerox 6135	3	6				
	DocuColor 12	2	4				
	Lanier	0	0				
	MP 8500	0	0				
	Savin	0	0				
	Sakurai	0	0				
	Other	0	0				
	Don't know	0	0				
	Refused	0	0				
	Total	48	100				
	Specify the brand and model number for your second press under other to question 1.12	Count	Percent				
	AB Dick	0	0				
	Akiyama	0	0				
	CAC 3900	0	0				
	Canon (other)	6	12				
	Canon 7200	2	4				
	CLC 4000	0	0				
	DocuTech	1	2				
	Heidelberg	1	2				
	Hewlett Packard/HP	0	0				
	Karat	0	0				
	Konica	1	2				
	NCAD	0	0				
	Quick Master	0	0				
	Ricoh	1	2				
	Ryobi	1	2				
	Toshiba	1	2				

A12	What is the brand and model number of each digital press used in your company? CONTINUED	Count	Percent				
	Viewtech	0	0				
	Xerox (other)	4	8				
	Xerox 2045	0	0				
	Xerox 6135	0	0				
	DocuColor 12	3	6				
	Lanier	1	2				
	MP 8500	1	2				
	Savin	0	0				
	Sakurai	0	0				
	Other	1	2				
	Don't know	0	0				
	Refused	0	0				
	No other	25	51				
	Total	49	100				
	Specify the brand and model number for your third press under other to question 1.12	Count	Percent				
	AB Dick	0	0				
	Akiyama	0	0				
	CAC 3900	0	0				
	Canon (other)	3	13				
	Canon 7200	1	4				
	CLC 4000	0	0				
	DocuTech	0	0				
	Heidelberg	0	0				
	Hewlett Packard/HP	1	4				
	Karat	0	0				
	Konica	0	0				
	NCAD	0	0				
	Quick Master	0	0				
	Ricoh	1	4				
	Ryobi	0	0				
	Toshiba	0	0				
	Viewtech	0	0				
	Xerox (other)	1	4				
	Xerox 2045	0	0				
	Xerox 6135	0	0				
	DocuColor 12	0	0				
	Lanier	0	0				
	MP 8500	0	0				
	Savin	0	0				
	Sakurai	1	4				
	Other	0	0				
	Don't know	0	0				

	Specify the brand and model number for your third press under other to question 1.12 CONTINUED	Count	Percent				
	Refused	0	0				
	No other	16	67				
	Specify the brand and model number for your fourth press under other to question 1.12	Count	Percent				
	AB Dick	0	0				
	Akiyama	0	0				
	CAC 3900	0	0				
	Canon (other)	1	12.5				
	Canon 7200	0	0				
	CLC 4000	0	0				
	DocuTech	0	0				
	Heidelberg	0	0				
	Hewlett Packard/HP	0	0				
	Karat	0	0				
	Konica	0	0				
	NCAD	0	0				
	Quick Master	0	0				
	Ricoh	0	0				
	Ryobi	0	0				
	Toshiba	1	12.5				
	Viewtech	0	0				
	Xerox (other)	0	0				
	Xerox 2045	0	0				
	Xerox 6135	0	0				
	DocuColor 12	0	0				
	Lanier	0	0				
	MP 8500	0	0				
	Savin	0	0				
	Sakurai	0	0				
	Other	0	0				
	Don't know	0	0				
	Refused	0	0				
	No other	6	75				
	Total	8	100				
	Specify the brand and model number for your fifth press under other to question 1.12	Count	Percent				
	AB Dick	0	0				
	Akiyama	0	0				
	CAC 3900	0	0				
	Canon (other)	0	0				
	Canon 7200	0	0				
	CLC 4000	0	0				
	DocuTech	0	0				

	Specify the brand and model number for your fifth press under other to question 1.12 CONTINUED	Count	Percent				
	Heidelberg	0	0				
	Hewlett Packard/HP	0	0				
	Karat	0	0				
	Konica	0	0				
	NCAD	0	0				
	Quick Master	0	0				
	Ricoh	0	0				
	Ryobi	0	0				
	Toshiba	0	0				
	Viewtech	0	0				
	Xerox (other)	0	0				
	Xerox 2045	0	0				
	Xerox 6135	0	0				
	DocuColor 12	0	0				
	Lanier	0	0				
	MP 8500	0	0				
	Savin	0	0				
	Sakurai	0	0				
	Other	0	0				
	Don't know	0	0				
	Refused	0	0				
	No other	2	100				
	Total	2	100				
A13	In what year did you get your first digital press?	Count	Percent				
	2005	5	5				
	2004	5	5				
	2003	6	6				
	2002	12	12				
	2001	4	4				
	2000	6	6				
	1999	6	6				
	1998	8	8				
	1997	6	6				
	1996	5	5				
	1995	15	15				
	1994	4	4				
	1991	2	2				
	1990	2	2				
	1988	2	2				
	1987	1	1				
	1980	1	1				
	Don't know	10	10				
	Refused	3	3				
	Total	103	100				

A14	And how many digital presses did you have at the end of these following years?	Count	Percent				
	2004						
	0	9	8.7				
	1	29	28.2				
	2	20	19.4				
	3	16	15.5				
	4	10	9.7				
	5	6	5.8				
	6	4	3.9				
	7	1	1.0				
	10	2	1.9				
	Don't know	2	1.9				
	Refused	4	3.9				
	Total	103	100				
	2003						
	1	8	12.3				
	2	19	29.2				
	3	14	21.5				
	4	10	15.4				
	5	2	3.1				
	6	4	6.2				
	8	1	1.5				
	10	1	1.5				
	Don't know	2	3.1				
	Refused	4	6.2				
	Total	65	100				
	2002						
	1	8	14.3				
	2	19	33.9				
	3	7	12.5				
	4	9	16.1				
	5	2	3.6				
	6	2	3.6				
	8	1	1.8				
	9	1	1.8				
	Don't know	3	5.4				
	Refused	4	7.1				
	Total	56	100				
	2001						
	1	7	15				
	2	13	28				
	3	10	21				
	4	5	11				
	5	1	2				

	2001 CONTINUED						
	6	3	6				
	9	1	2				
	Don't know	3	6				
	Refused	4	9				
	Total	47	100				
	2000						
	1	3	7.5				
	2	12	30.0				
	3	9	22.5				
	4	4	10.0				
	6	2	5.0				
	9	1	2.5				
	Don't know	5	12.5				
	Refused	4	10.0				
	Total	40	100				
	1999						
	1	2	6				
	2	9	26				
	3	6	17				
	4	4	11				
	6	1	3				
	9	1	3				
	Don't know	8	23				
	Refused	4	11				
	Total	35	100				
	In what year did you you acquire each additional press?	Count	Percent				
	2004						
	-1	3	3				
	0	58	56				
	1	27	26				
	2	5	5				
	Don't know/refused	10	10				
	Total	103	100				
	2003						
	-1	1	1				
	0	64	62				
	1	22	21				
	2	4	4				
	3	1	1				
	Don't know/refused	11	11				
	Total	103	100				
	2002						
	-1	4	4				
	0	60	58				

	2002 CONTINUED						
	1	24	23				
	2	3	3				
	4	1	1				
	Don't know/refused	11	11				
	Total	103	100				
	2001						
	0	78	76				
	1	11	11				
	2	1	1				
	Don't know/refused	13	13				
	Total	103	100				
	2000						
	-1	1	1				
	0	75	73				
	1	8	8				
	2	3	3				
	Don't know/refused	16	16				
	Total	103	100				
	Before 2000						
	0	38	37				
	1	28	27				
	2	9	9				
	3	6	6				
	4	4	4				
	6	1	1				
	9	1	1				
	Don't know/refused	16	16				
	Total	103	100				
A15	How many other non-digital presses do you have in your company?	Count	Mean	Min	Max	SD	
	Web Offset presses	14	0.4	0	13	1.6	
	Sheetfed Offset presses	72	3.0	0	20	3.2	
	Flexography presses	3	0.1	0	6	0.8	
	Gravure presses	1	0.0	0	1	0.1	
	Inkjet presses	13	0.2	0	4	0.7	
	Other	13	0.5	0	20	2.6	
	What kinds of other presses do you have?	Count	Percent				
	Engraving press/letter press	7	54				
	Cisograph	0	0				
	Screen printing	2	15				
	Water press	1	8				
	Risograph	2	15				
	Don't know	1	8				
	Refused	0	0				
	Total	13	100				

Appendix B

DAM & VDP Part							
2.1	At this point, has your company established a business using digital asset management and variable data printing?	Count	Percent				
	Yes, digital asset management	5	5.0				
	Yes, variable data printing	27	26.7				
	Yes to both	22	21.8				
	No to both	47	46.5				
	Total	101	100.0				
2.2	Does an outsourced resource, in-house services, or someone else provide digital asset management?	Count	Percent				
	An outsourced resource	5	18.5				
	In-house services	21	77.8				
	Don't know	1	3.7				
	Total	27	100.0				
2.3	Does an outsourced resource, in-house services, or someone else provide variable data printing?	Count	Percent				
	An outsourced resource	3	6.1				
	In-house services	44	89.8				
	Both	1	2.0				
	Don't know	1	2.0				
	Total	49	100.0				
2.4	Do you see the demand for digital asset management increasing, decreasing or staying the same over the next 2 years?	Count	Percent				
	Increasing	23	85.2				
	Decreasing	1	3.7				
	Staying the same	3	11.1				
	Total	27	100.0				
2.5	Do you see the demand for variable data printing increasing, decreasing or staying the same over the next 2 years?	Count	Percent				
	Increasing	44	89.8				
	Decreasing	1	2.0				
	Staying the same	4	8.2				
	Total	49	100.0				
2.6	How many employees were hired for each of the following functional areas over the last two years?	Count	Mean	Min	Max	SD	
	Customer Service	55	2.5	1	20	3.8	
	Estimating and planning	21	1.3	1	3	0.6	
	IT administration	24	1.3	1	3	0.6	
	Prepress	42	1.8	1	8	1.4	
	Printing	48	3.2	1	20	4.3	
	Production management	18	1.6	1	5	1.2	
	Digital asset management	8	1.6	1	4	1.1	
	Variable data printing	17	2.0	1	5	1.3	
	Sales	45	2.3	1	10	1.9	
	Other functional area	7	6.0	1	20	8.0	

2.6a	What other functional area were you thinking of?	Count					
	Administration	1					
	Finance	1					
	Copy center	1					
	Delivery	1					
	Designers/production drawers	2					
	Editorial production	1					
	Electrical production	1					
	General IT	1					
	Total	9					
2.7	You said that you hired employees in the following functions over the last two years. Did these functions require a new skill set or not of the employees that you hired?	Count	Percent				
	Customer Service						
	Yes	20	36.0				
	No	34	62.0				
	Don't know	1	2.0				
	Total	55	100.0				
	Estimating and planning						
	Yes	6	29.0				
	No	15	71.0				
	Don't know	0	0.0				
	Total	21	100.0				
	IT administration						
	Yes	16	67.0				
	No	8	33.0				
	Don't know	0	0.0				
	Total	24	100.0				
	Prepress						
	Yes	17	40.0				
	No	25	60.0				
	Don't know	0	0.0				
	Total	42	100.0				
	Printing						
	Yes	18	38.0				
	No	29	60.0				
	Don't know	1	2.0				
	Total	48	100.0				
	Production management						
	Yes	7	39.0				
	No	10	56.0				
	Don't know	1	5.0				
	Total	18	100.0				

	Digital asset management						
	Yes	8	100.0				
	No	0	0.0				
	Don't know	0	0.0				
	Total	8	100.0				
	Variable data printing						
	Yes	12	71.0				
	No	5	29.0				
	Don't know	0	0.0				
	Total	17	100.0				
2.7	You said that you hired employees in the following functions over the last two years. Did these functions require a new skill set or not of the employees that you hired? CONTINUED	Count	Percent				
	Sales						
	Yes	18	40.0				
	No	27	100.0				
	Don't know	0	0.0				
	Total	45	100.0				
	Other functional area						
	Yes	4	57.0				
	No	3	43.0				
	Don't know	0	0.0				
	Total	7	100.0				
2.8	Which specific skill sets has your company been looking for?	Count	Percent				
	IT administration and network management skills	30	29.7				
	Digital asset management set-up and maintenance	14	13.9				
	Variable data printing set-up and operation	16	15.8				
	Database and direct marketing set-up and operation	3	3.0				
	XML and Java	2	2.0				
	Color management setup, handling, and maintenance	2	2.0				
	General programming	1	1.0				
	Editorial production	1	1.0				
	Customer service/sales	2	2.0				
	Other	1	1.0				
	None	4	4.0				
	Don't know	16	15.8				
	Refused	9	8.9				
	Total	101	100.0				
2.9	For those skill sets you said you were or are seeking, which one or two of them is your company pursuing most aggressively?	Count	Percent				
	IT administration and network management skills	6	5.9				
	Digital asset management set-up and maintenance	7	6.9				
	Variable data printing set-up and operation	22	21.8				
	Database and direct marketing set-up and operation	7	6.9				
	XML and Java	4	4.0				

2.9	For those skill sets you said you were or are seeking, which one or two of them is your company pursuing most aggressively? CONTINUED	Count	Percent				
	Color management setup, handling, and maintenance	6	5.9				
	General programming	5	5.0				
	Editorial production	2	2.0				
	Customer service/sales	2	2.0				
	Other	2	2.0				
	None	5	5.0				
	Don't know	26	25.7				
	Refused	7	6.9				
	Total	101	100.0				
2.10	What job titles is your company using for employees handling digital asset management and variable data printing?	Count	Percent				
	Systems manager	7	6.9				
	Publishing systems technician	1	1.0				
	Digital workflow specialist	1	1.0				
	Asset manager	1	1.0				
	DAM specialist	2	2.0				
	Application specialist	1	1.0				
	Data manager	1	1.0				
	Graphic artist/designer	5	5.0				
	Digital press operator	4	4.0				
	Production manager	5	5.0				
	Prepress	2	2.0				
	Account rep	1	1.0				
	Color specialist	1	1.0				
	Consultant	1	1.0				
	Director of content management	1	1.0				
	IT/technician	5	5.0				
	POP services	1	1.0				
	Variable data specialist	2	2.0				
	Other	1	1.0				
	Don't know	45	44.6				
	Refused	13	12.9				
	Total	101	100.0				
2.11	What level of education do you require of an employee hired to set-up and operate digital asset management and variable data printing equipment?	Count	Percent				
	Formal technical training (certificate) and experience	27	26.7				
	Bachelor's degree	26	25.7				
	Master's degree	2	2.0				
	High school	16	15.8				
	Associates degree	2	2.0				
	Some college	3	3.0				
	None (we will train)	20	19.8				

2.11	What level of education do you require of an employee hired to set-up and operate digital asset management and variable data printing equipment? CONTINUED	Count	Percent				
	Don't know	4	4.0				
	Refused	1	1.0				
	Total	101	100.0				
2.12	Are the entry-level salaries for employees with digital asset management and variable data printing skills significantly higher than for employees with the traditional printing industry skill sets?	Count	Percent				
	Yes	35	34.7				
	No	51	50.5				
	Don't know	12	11.9				
	Refused	3	3.0				
	Total	101	100.0				
2.12 a	By what percentage is that higher?	Count	Percent				
	Don't know	1	2.9				
	7%	1	2.9				
	10%	3	8.6				
	15%	5	14.3				
	20%	13	37.1				
	25%	4	11.4				
	30%	3	8.6				
	40%	3	8.6				
	50%	2	5.7				
	Total	35	100.0				
2.13	How do you seek new employees?	Count	Percent				
	Advertise job openings	70	69.3				
	Recruit from educational institutions	7	6.9				
	Business or social network	15	14.9				
	Walk-ins	2	2.0				
	Acquire another company	1	1.0				
	Standing application	1	1.0				
	Pther	1	1.0				
	Don't know	2	2.0				
	Refused	2	2.0				
	Total	101	100.0				
2.14	Do the business or social networks of your company reach outside of the graphic arts industry or is it mainly within?	Count	Percent				
	Only within	64	63.4				
	Advertising	4	4.0				
	Marketing	3	3.0				
	Publishing	1	1.0				
	Educational	3	3.0				
	FINANCIAL SERVICES	3	3.0				
	IT/TECHNICAL	5	5.0				
	CHARITABLE/NON-PROFIT	3	3.0				

2.14	Do the business or social networks of your company reach outside of the graphic arts industry or is it mainly within? CONTINUED	Count	Percent				
	INTERNET	2	2.0				
	ALL INDUSTRIES	4	4.0				
	ASSOCIATIONS	2	2.0				
	ENTERTAINMENT	1	1.0				
	FOOD SERVICE	1	1.0				
	GENERAL BUSINESS	1	1.0				
	MANUFACTURING	1	1.0				
	PRINTING	1	1.0				
	DON'T KNOW	1	1.0				
	REFUSED	1	1.0				
	Total	101	100.0				
2.15	Is your company trying to broaden its network of contacts into other industries?	Count	Percent				
	Yes	60	59.4				
	No	40	39.6				
	DON'T KNOW	1	1.0				
	Total	101	100.0				
2.16	How is this done?	Count	Percent				
	Conferences	14	23.3				
	Dedicated seminars	6	10.0				
	Organization memberships	12	20.0				
	Online forums	2	3.3				
	CASE STUDIES	2	3.3				
	DIRECT MAIL	3	5.0				
	SALES REP	4	6.7				
	MARKETING	2	3.3				
	NETWORK	1	1.7				
	PERSONAL SALES	5	8.3				
	PROFESSIONAL RECRUITERS	1	1.7				
	WORD OF MOUTH	4	6.7				
	DON'T KNOW	4	6.7				
	Total	60	100.0				
2.17	When you train a current employee to take on digital asset management, on average, how many hours does it take to get them up-to-speed to be effective?	Count	Percent				
	No Training	2	2.0				
	Less than 10 hours	4	4.0				
	10 - 25 hours	5	5.0				
	26 - 50 hours	14	13.9				
	51 - 75 hours	4	4.0				
	76 - 100 hours	14	13.9				
	More than 100 hours	19	18.8				
	50-100 HOURS	1	1.0				
	40-80 HOURS	1	1.0				

2.17	When you train a current employee to take on digital asset management, on average, how many hours does it take to get them up-to-speed to be effective? CONTINUED	Count	Percent				
	Don't know	32	31.7				
	Refused	5	5.0				
	Total	101	100.0				
2.18	When you train a current employee to take on variable data printing, on average, how many hours does it take to get them up-to-speed to be effective?	Count	Percent				
	No Training	1	1.0				
	Less than 10 hours	3	3.0				
	10 - 25 hours	9	8.9				
	26 - 50 hours	15	14.9				
	51 - 75 hours	3	3.0				
	76 - 100 hours	15	14.9				
	More than 100 hours	20	19.8				
	50-100 HOURS	1	1.0				
	40-80 HOURS	1	1.0				
	Don't know	27	26.7				
	Refused	6	5.9				
	Total	101	100.0				
2.19	How frequently are you using each of the following types of training for your existing employees so that they will meet the skill sets required for handling digital asset management and variable data printing?	Count	Percent				
	In-house by using our personnel						
	Most Often	84	83.2				
	Never	4	4.0				
	Don't know	12	11.9				
	Refused	1	1.0				
	Total	101	100.0				
	In-house by external trainer(s)						
	Most Often	4	4.0				
	Never	51	50.5				
	Don't know	45	44.6				
	Refused	1	1.0				
	Total	101	100.0				
	On-line training						
	Most Often	13	12.9				
	Never	41	40.6				
	Don't know	46	45.5				
	Refused	1	1.0				
	Total	101	100.0				

	Off-site training classes						
	Most Often	4	4.0				
	Never	57	56.4				
	Don't know	39	38.6				
	Refused	1	1.0				
	Total	101	100.0				
	Self-paced on-line						
	Most Often	5	5.0				
	Never	33	32.7				
	Don't know	62	61.4				
	Refused	1	1.0				
	Total	101	100.0				
	Other						
	Most Often	1	1.0				
	Never	96	95.1				
	Don't know	3	3.0				
	Refused	1	1.0				
	Total	101	100.0				
2.19 a	What other type(s) of training were you thinking of?	Count	Percent				
	Equipment providers	1	100				
2.20	What are the topics of training?	Count	Percent				
	Spreadsheet usage	41	40.6				
	Variable data applications	34	33.7				
	Digital asset database setup and handling	6	5.9				
	Plug-ins to layout programs	8	7.9				
	IT network	2	2.0				
	Color management	3	3.0				
	PDF workflow	1	1.0				
	Web storefront	1	1.0				
	Other (Specify)	1	1.0				
	Don't know	1	1.0				
	Refused	3	3.0				
	Total	101	100.0				
2.20 a	Specification of the topics under Other in 2.20	Count					
	Application training	1					
	Desktop publishing	1					
	Document repositories	1					
	Exact machinery usage	1					
	General press production	1					
	Graphic design	1					
	Illustration programs	1					
	New application	1					
	Prepress	1					
	Sales	1					

2.20 a	Specification of the topics under Other in 2.20 CONTINUED	Count					
	Software design	1					
	Adobe	1					
2.21	Do you have a human resource function in your company?	Count	Percent				
	Yes	56	55.4				
	No	45	44.6				
	Total	101	100.0				
2.22	Is it a discrete function or does the HR employee(s) have other functional responsibilities in the company or organization?	Count	Percent				
	Discrete function/ HR only	18	32.1				
	HR person(s) has other responsibilities	37	66.1				
	Refused	1	1.8				
	Total	56	100.0				
2.23	Do you view the culture of your company as being as important as the strategy and mission of the company?	Count	Percent				
	Yes	93	92.1				
	No	7	6.9				
	Don't know	1	1.0				
	Total	101	100.0				
2.24	Tell me which of the two statements is more descriptive of your company as it pertains to achieving future success over the next 1 to 2 years.	Count	Percent				
	Company A: Sees the majority of their business success coming from the investments they are making in human resource capital.						
	Company B: Sees the majority of their business success coming from new investments in more efficient and effective technology.						
	Company A	33	32.7				
	Company B	60	59.4				
	Don't know	8	7.9				
	Refused	0	0.0				
	Total	101	100.0				
	Company C: Sees business success more likely achieved by being singly focused on attaining the financial imperatives set by the board of directors - doing what it takes to achieve financial objectives.						
	Company D: Sees their business success being largely a function of creating an employee-centered environment that self-motivates individual and collective achievement.						
	Company C	22	21.8				
	Company D	72	71.3				
	Don't know	5	5.0				
	Refused	2	2.0				
	Total	101	100.0				
	Company E: Sees success being more likely when you adopt a philosophy that the employees close to the day-to-day work have the intimate knowledge to recommend savvy changes that really make a difference - a bottom-up approach.						
	Company F: Sees success being more likely when upper management defines an organizational structure with a purpose and mission that is clear and everyone knows their responsibility - more of a top-down approach.						
	Company E	53	52.5				
	Company F	43	42.6				
	Don't know	3	3.0				
	Refused	2	2.0				
	Total	101	100.0				

2.24	Tell me which of the two statements is more descriptive of your company as it pertains to achieving future success over the next 1 to 2 years. CONTINUED	Count	Percent				
	Company G: Sees a lot more potential for business success coming out of developing and/or shoring up an efficient infrastructure with better technology.						
	Company H: Sees a lot more potential coming from a better human/employee social network - a human collaborative infrastructure of trust.						
	Company G	48	47.5				
	Company H	47	46.5				
	Don't know	4	4.0				
	Refused	2	2.0				
	Total	101	100.0				
	Company I: Sees the motivation of its employees as critical and feels that more can be achieved by having a fairer and more trusted employee evaluation system.						
	Company J: Sees the motivation of its employees as critical and feels that a financial incentive system would really make a difference.						
	Company I	62	61.4				
	Company J	33	32.7				
	Don't know	4	4.0				
	Refused	2	2.0				
	Total	101	100.0				
	Company K: Sees that they could make real headway in achieving its business growth goals by making significant improvements in the horizontal communication channel across employees.						
	Company L: Sees that they could make real headway in achieving its business growth goals by making significant improvements in its vertical communication channel - management to employees.						
	Company K	41	40.6				
	Company L	52	51.5				
	Don't know	5	5.0				
	Refused	3	3.0				
	Total	101	100.0				
2.25	What magazines, research reports, and white papers read in your company deal with the following subject areas?	Count	Percent				
	Printing technology publications						
	AMERICAN PRINTERS ASSOCIATION	26	13.4				
	ASSOCIATION TRADE MAGAZINES	1	0.5				
	BIG PICTURE	2	1.0				
	CAP VENTURES	1	0.5				
	CONVERTING	1	0.5				
	DIGITAL IMAGING	1	0.5				
	DIGITAL OUTPUT	6	3.1				
	DIGITAL PRINTING COUNCIL	2	1.0				
	ELECTRONIC PUBLISHING	5	2.6				
	FORTUNE	1	0.5				
	GATF WORLD	2	1.0				
	GRAPHIC ARTS MONTHLY	29	14.9				
	HIGH VOLUME PRINTER	8	4.1				
	IMPLANT GRAPHICS/PRINTING	3	1.5				

	Printing technology publications CONTINUED						
	INC.	2	1.0				
	IN-HOUSE	2	1.0				
	INSTANT PRINTING	2	1.0				
	LEGAL PUBLICATIONS	1	0.5				
	NARROW WEB	1	0.5				
	ON DEMAND PRINTING	3	1.5				
	ONE TO ONE	1	0.5				
	PACKAGE PRINTING	2	1.0				
	PIA NEWSLETTERS	1	0.5				
	PODI	5	2.6				
	PRINT ACTION	2	1.0				
	PRINT MAGAZINE	1	0.5				
	PRINTING IMPRESSIONS	28	14.4				
	PRINTING NEWS	4	2.1				
	QUICK PRINT JOURNAL	4	2.1				
	QUICK PRINTER/PRINTING	18	9.3				
	SMALL COMMERCIAL PRINTER	3	1.5				
	TRADE MAGAZINES	2	1.0				
	WIDE FORMAT PRINTING	1	0.5				
	NONE	12	6.2				
	DON'T KNOW	11	5.7				
	Total	194	100.0				
	Imaging technology publications						
	AMERICAN PRINTERS ASSOCIATION	1	1.0				
	DIGITAL IMAGING	3	3.1				
	DIGITAL OUTPUT	1	1.0				
	DIGITAL PRINTING COUNCIL	1	1.0				
	ELECTRONIC PUBLISHING	3	3.1				
	GRAPHIC ARTS MONTHLY	5	5.2				
	PODI	2	2.1				
	PRINTING IMPRESSIONS	2	2.1				
	SMALL COMMERCIAL PRINTER	1	1.0				
	WIDE FORMAT PRINTING	1	1.0				
	WIRED	1	1.0				
	NONE	62	63.9				
	DON'T KNOW	14	14.4				
	Total	97	100.0				
	Photography publications						
	GRAPHIC ARTS MONTHLY	1	1.0				
	MONTHLY PHOTO SHOP	1	1.0				
	POPULAR PHOTOGRAPHY	1	1.0				
	NONE	95	94.1				
	DON'T KNOW	3	3.0				
	Total	101	100.0				

	Information technology publications						
	AMERICAN PRINTERS ASSOCIATION	1	0.9				
	COMPUTER REVIEW	1	0.9				
	COMPUTER WORLD	1	0.9				
	E-WEEK	3	2.7				
	GOVERNMENT COMPUTER NEWS	1	0.9				
	GOVERNMENT SOLUTIONS	1	0.9				
	GRAPHIC ARTS MONTHLY	2	1.8				
	GRAPHIC WORLD	1	0.9				
	INFORMATION WEEKLY	3	2.7				
	IT JOURNAL	1	0.9				
	JAVA MAGAZINE	1	0.9				
	MAC ADDICT	1	0.9				
	MICROSOFT MAGAZINE	1	0.9				
	NETWORK WORLD	1	0.9				
	PRIA JOURNAL	1	0.9				
	QUICK PRINT JOURNAL	1	0.9				
	REDMOND	1	0.9				
	SLASH DOT	1	0.9				
	SUCCESSFUL MEETINGS	1	0.9				
	TRADE MAGAZINES	1	0.9				
	WIRED	1	0.9				
	NONE	80	70.8				
	DON'T KNOW	7	6.2				
	Total	113	100.0				
	Binding and finishing publications						
	AMERICAN PRINTERS ASSOCIATION	1	1.0				
	BINDING AND FINISHING	4	4.2				
	CONVERTING	2	2.1				
	GRAPHIC ARTS MONTHLY	1	1.0				
	PRINTING IMPRESSIONS	1	1.0				
	QUICK PRINT JOURNAL	1	1.0				
	NONE	75	78.1				
	DON'T KNOW	11	11.5				
	Total	96	100.0				
	Business and management publications						
	AMERICAN PRINTERS ASSOCIATION	1	1.0				
	ASSOCIATION TRADE MAGAZINES	1	1.0				
	BUSINESS WEEK	8	7.8				
	CFO	6	5.8				
	FORBES	6	5.8				
	FORTUNE	7	6.8				
	HARVARD BUSINESS REVIEW	2	1.9				
	INC.	3	2.9				
	ONE TO ONE	1	1.0				

	Business and management publications CONTINUED						
	PIA NEWSLETTERS	1	1.0				
	SUCCESSFUL MEETINGS	1	1.0				
	WALL STREET JOURNAL	7	6.8				
	NONE	49	47.6				
	DON'T KNOW	10	9.7				
	Total	103	100.0				
	Other publications						
	CRANES	1	1.0				
	DIGITAL PRINTING COUNCIL	1	1.0				
	LARRY HUNT	1	1.0				
	LASER NEWSLETTER	1	1.0				
	LEGAL PUBLICATIONS	1	1.0				
	MAC MAGAZINE	1	1.0				
	OPTIMIZING	1	1.0				
	PC WORLD	1	1.0				
	PODI	1	1.0				
	PRINT INTERNATIONAL	1	1.0				
	PRINT MAGAZINE	1	1.0				
	PUBLISHERS WEEKLY	1	1.0				
	USPS MAILERS COMPANION	1	1.0				
	WIDE FORMAT PRINTING	1	1.0				
	NONE	87	82.9				
	DON'T KNOW	4	3.8				
	Total	105	100.0				

Rochester Institute of Technology
College of Imaging Arts and Sciences
55 Lomb Memorial Drive
Rochester, NY 14623
Phone: (585) 475-2733
http://print.rit.edu