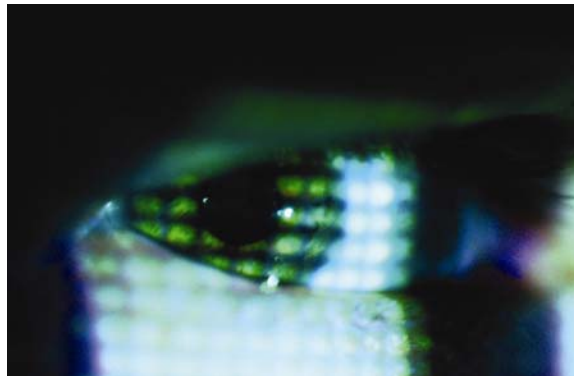


# An Evaluation Study of the National Academies Press's E-Publishing Initiatives

Final Report  
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*Public Version*<sup>1</sup>



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<sup>1</sup> This *Public Version* does not include specific pricing strategies as they apply to the National Academies Press.

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## EXECUTIVE SUMMARY

The National Academies Press (NAP), publisher for the National Academies (National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council), has been a leader in the electronic publishing industry since launching its dedicated Web site ([www.nap.edu](http://www.nap.edu)) in 1994. With annual sales revenue from all distribution channels of more than \$7 million, NAP is one of the larger mid-size publishers within the university press community. NAP posts the text of all of its titles on the Web in page-by-page image format free for anyone to browse, search, and read. NAP's dual mission is *to disseminate the works of the National Academies to the greatest possible extent while fully supporting the cost of its own operation without subsidy from its parent institution.*

To better fulfill NAP's dissemination mission, the leadership of the National Academies and of NAP are examining ways to deliver print-quality electronic content (e-content) to anyone wishing to print chapters or entire books. Within this context, the study focused on four research objectives: (1) to compare NAP's offline and online customers on dimensions of attitudes and behavior toward electronic content, (2) to measure the effectiveness of free online browsing and its impact on the purchase of printed and electronic formats, (3) to determine the optimal design and pricing of NAP's e-content (specifically the PDF format), and (4) to study the demand for unbundled e-content. The study used a mix of survey-based descriptive research and experiment-based causal research in order to answer the research questions.

Our study illuminated the continued strength of demand for printed books. Even when customers were offered a PDF for free, more than half opted to pay for the printed book instead. On the other hand, we found that there is a segment of customers who are willing to pay a premium for access to downloadable and printable digital content.

The study reveals that NAP's online customers are much more enthusiastic about e-content than customers who typically order via offline methods. Offline customers generally have poorer perceptions of the quality of e-content and most likely will need more experience with high-quality online content to change their perceptions. Among online customers, our study shows that there exist specific segments of customers, some with strong preferences for Print and some with equally strong predilection for PDF format, even to the extent of a willingness to pay more for PDF than Print. In general, however, our results indicate that customers are less willing to pay for e-content than for Print — and they believe that PDFs should be cheaper than Print. The study also illustrates that, as customers interact with e-content more — in terms of browsing and downloading content, and sampling PDFs — they are more likely to improve their perceptions of PDF and might be more likely to buy e-content.

Our findings also indicate that unbundling content (selling books by the chapter) can result in higher market expansion than offering only fully bundled content. This market expansion can, in fact, mitigate the cannibalizing effect of unbundled content on the revenue from printed books. NAP's customers tend to be quite price inelastic in regard to chapter prices as compared to full PDF prices in the ranges of prices studied. Our study also demonstrates that Internet speed has an impact on the purchase of the PDF format, but only in the case of the full PDF.

Overall, our results suggest that the time is ripe for NAP and perhaps other scholarly book publishers to begin selling PDF format e-content to take advantage of customers' demand for digital books. Getting customers used to the experience of electronic content now will sow the seeds for a future bumper crop of e-content-hungry customers.

## REPORT

### 1. Background

The National Academies Press (NAP), publisher for the National Academies (National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council), has been viewed as a leader in the electronic publishing industry since launching its dedicated Web site ([www.nap.edu](http://www.nap.edu)) in 1994. NAP publishes more than 170 books a year in simultaneous printed and electronic page image formats, selling close to 400,000 printed books annually. Sales revenue from all distribution channels is more than \$7 million per year, making NAP one of the larger mid-size publishers within the university press community. NAP posts the text of all of its titles on the Web in page-by-page image format free for anyone to browse, search, and read.

Currently, NAP's business model is to use its content-rich Web site as a marketing tool for printed books and as a relatively inexpensive means of increasing the dissemination of the important scholarly information contained in its publications. NAP has developed a complete e-commerce interface for selling printed books. When customers browse an NAP book online, they are only a click away from ordering it. At the same time, some of the most authoritative books in science, engineering, health, and education are now fully accessible around the world via the NAP Web site.

NAP's dual mission is *to disseminate the works of the National Academies to the greatest possible extent while fully supporting the cost of its own operation without subsidy from its parent institution*. This dual mission was the main reason that NAP went online with free page-by-page text in 1994. The Internet has proven to give publishers such as NAP unprecedented exposure in its core markets. Allowing customers to read or browse entire books online is like encountering all of NAP's books in a bookstore, available to be examined so that anyone can make an informed buying decision or consume the books directly. Although bricks-and-mortar bookstores carry NAP books, only a very small number of NAP's 2,000 titles in print are carried in bookstore inventory. NAP realized early on that the Web offered a major marketing channel for reaching a large percentage of its target audience. Because NAP's readers happen to include the types of innovators who actually developed the Internet and who tend to be first adopters — researchers, scientists, and engineers — the Web could only be an exceptional medium for gaining exposure and creating word-of-mouth awareness for NAP's books.

To better fulfill NAP's dissemination mission, the leadership of the National Academies and of NAP are examining ways to deliver print-quality e-content to anyone wishing to print chapters or entire books. Following that review, NAP is planning to provide electronic delivery of files for reading directly on desktop computers or hand-held devices and for local printing. NAP has provided free browsing of its books online for more than eight years. A cursory analysis of the sales figures for that time period suggests that online print orders have grown steadily since free browsing became available. However, it was not clear whether the increase could be attributed to free browsing or the increased presence of consumers on the Web.

It was in the above context that the grant proposal to the Andrew W. Mellon Foundation was made. The study had two goals: (1) to evaluate the effects of NAP's presence online in meeting its goals of maximum dissemination while remaining self-sustaining, thereby providing valuable lessons to other nonprofit scholarly publishers; and (2) to contribute research findings to a larger theoretical base of knowledge on electronic publishing.

## 2. Research Objectives

The study consisted of four specific research objectives:

1. To compare NAP's offline and online customers with regard to their demographic profiles, reading and purchasing habits, and attitudes toward electronic content.
2. To measure the effectiveness of free online browsing and its impact on purchase of Print and PDF formats.
3. To determine the optimal design and pricing of NAP's e-content, taking into account customers' perceptions of the quality of e-content vis-à-vis Print.
4. To study the demand for electronic unbundling of content — that is, offering the titles in PDF format by the chapter.

## 3. Research Methods

This section provides an overview of the research methods used with short descriptions. More specific details of some of the methodologies can be found in the appendixes.

### *a. Pricing Experiment with Full PDF Content and Survey of Online Customers*

To understand online customers' perceptions of e-content vis-à-vis Print along with their browsing and purchasing behaviors with regard to e-content versus Print content, we designed an innovative experiment involving the actual products — books in Print format as well as in PDF format — and real customers operating in the regular purchasing environment online. This study consisted of three phases: Phase 1 was the experiment, in which customers were offered titles in PDF format to purchase and download. Phase 2 was the online survey, in which those who took part in the experiment completed a questionnaire, and Phase 3 (which was performed simultaneously with Phase 1) involved capturing the click-stream behavior of those customers who took part in the experiment. Specifically, we measured their actions in response to the experimental treatments, how they browsed the free content, their sampling of the PDF format, and the paths they took in downloading the page-by-page free content. A short description of each phase is provided below. More detailed information about the experimental setting and data gathered are provided in Appendix 1

*Phase 1 — The Experiment.* About 500 titles in PDF format were used to conduct the pricing study. Customers were intercepted for the experiment at three points: (1) Those who already had a printed copy of the title in their online shopping cart,

for which a companion PDF was available, were intercepted as they clicked on the “check-out” button. These customers were called Segment A customers — those who had already made a purchase decision. (2) Those who were browsing the contents of a title (in the free-browsing section of the site) for which a companion PDF was available were intercepted as they “turned” a minimum number of pages. These people were categorized as Segment B customers — those who had shown an interest in a title but had not yet made a purchase decision. (3) Those who were browsing at the free browse section of titles that did not have a companion PDF were intercepted with a query soliciting their interest in PDF format books. This group of customers who could potentially show some interest in a PDF format book although they were browsing content for which a PDF was not available were called Segment C customers.

Respondents were shown details of the PDF format including its price (in absolute \$ terms), were given the option to preview a sample PDF, and then the choice to buy the PDF, the Print, both versions, or none, depending on their segment. Prices of PDF formats were set at different levels relative to the Print price (ranging from 0%, or free, to 110% of the Print price). Prices were randomized to enable generalization of the results across subject area of the content, Print price levels, and popularity in terms of Web page views. If respondents declined to purchase the PDF at the original price level, it was dropped one level and the options presented again.

The experiment was specifically designed to estimate the substitution effect of the PDF format over the printed book at different price levels (from Segment A customers), and to estimate the possible market expansion due to PDF at different price levels (from Segments B and C). It also measured price elasticity.

*Phase 2 — Online Survey.* As the respondents finished interacting with the treatments of the experiment, all of them (whether they purchased PDF, Print, both versions, or none) were solicited to answer an online survey, with appropriate incentives (ranging from free shipping to an additional 20% off purchases to free books or totebags). Efforts were made to ensure that the value of the incentives was similar across all conditions. Respondents were asked their reasons for not purchasing PDF (if they did not purchase a PDF form), their perceptions of PDF format vis-à-vis Print, how they use NAP books, and their demographics. The survey was designed to be short and focused, to encourage the participation of a significant number of the respondents in the experiment.

*Phase 3 — Click-Stream Analysis.* Each respondent’s behavior at the NAP Web site was captured at two levels. The action log data captured all of the actions of each individual respondent — the buttons they clicked in response to the various stimuli in the experiment, the titles they purchased, the forms they purchased, the final price they paid, and so on. The Web log file captured other behavior for each respondent, including time spent at the Web site, the specific titles browsed, the number of pages downloaded, and whether they previewed the sample PDF

before making a purchase decision. The basis of this data capture was the IP address of the respondents.

Data from all three phases were merged after the experiment to perform the analysis, details of which are in Appendixes 1, 4, and 5. A total of 11,679 interactions (individual respondents) were recorded for the experiment stage and 14% of them took part in the subsequent online survey.

### ***b. Pricing Experiment with PDF Chapters (Unbundled Content) and Survey of Online Customers***

This experiment was identical to the full PDF content experiment in all aspects, except that the PDF content was sold unbundled — chapter-by-chapter—and the explanatory material was a bit different in that we explained what additional content would be included when customers purchased a chapter (front matter, references, index). The respondents could choose the specific chapters they wanted in the PDF format and pay only for those chapters. They could also choose to purchase all chapters in the title in PDF format. The prices for the individual chapters were set at 50%, 75%, 100%, and 125% relative to the prorated list price of the Print book. For example, if the book had 10 chapters at a price of \$40.00, the list price of each chapter would be \$4.00. All other experimental conditions were similar to those in the previous experiment. As before, the respondents were given the option to participate in the survey and answer questions that focused on their perceptions of PDF vis-à-vis Print, usage situations, and demographics. The details of the experiment and the findings are in Appendixes 2, 4, and 5.

As in the previous experiment, data from the three phases of the experiment were merged to perform the analysis. A total of 18,775 interactions (individual respondents) were recorded and 17% of them took part in the subsequent online survey.

### ***c. Survey of Offline Customers***

Based on a secondary analysis of the customer base and an exploratory study of the previous surveys with customers, a total of 2,379 people who had previously purchased NAP printed books were selected to receive the offline survey. NAP's customers were divided into two categories, based on their frequency of purchase: (1) heavy buyers, who had purchased three or more books over the past three years; and (2) light buyers, who were defined as buying fewer than three books in the same time period. The respondents were selected by use of stratified sampling based on their geographic location and method of purchase (by fax, by mail, or other non-Web methods). Customers who ordered only via the Web were excluded from this group because this survey was only for customers who purchased *offline* (operationalized on the basis of whether their orders were placed on the non-Web channels). The surveys were mailed during the last week of June 2001. A coupon for 50% off one NAP book was offered as an incentive for completing the questionnaire. A reminder was sent in late July for those who did not respond to the survey.

The survey instrument (Appendix 6) for the offline customers consisted of questions covering four major areas: Section 1 focused on general purchasing issues, including information gathering and search behavior, book purchasing behavior, the types

of books purchased, and online buying behavior for different product categories. Section 2 dealt with all the above issues but with respect to NAP specifically. It incorporated inquiries into customers' purchasing experiences with NAP in general and with NAP's Web site in particular. This section explored customers' awareness of different functionalities of the Web site, such as free browsing and ease of searching. Questions relating to experiences in downloading content and purchasing printed books on the site were asked in this section as well. Section 3 served to measure customers' beliefs and attitudes about printed books versus e-format books. In particular, questions were posed about customers' willingness to purchase e-format books as substitutes for printed books or in addition to printed books, and their enthusiasm for buying unbundled content. Section 4 collected data on demographics.

#### **4. Summary Research Findings and Implications**

##### ***a. Comparison of Offline Versus Online NAP Customers***

*Customer Profiles.* The profiles of the offline and online customers in terms of their age and education were very similar — a majority of them were more than 40 years old and had a graduate or a postgraduate degree. The offline survey showed a definite tilt toward customers in the education field (40%) with less representation of the other fields. The online survey also had a majority from education (23%), but the science, engineering, and medical areas were much better represented. Health and medicine was second highest in terms of representation in both the online and offline surveys.

*Perceptions of PDF Versus Print on Different Attributes.* On the various attributes examined — image quality, layout, browsing, convenience of use, archival quality, and cost — offline customers were much more likely to rate PDF as being worse than Print on all of the dimensions. Even on the dimension of cost, only 54% of the offline customers rated PDF as better (lower cost) than Print, whereas 75% of the online customers rated it better (lower cost) than Print. This indicates that selling the PDF format to the offline customer group will be a more difficult task than to the online group. More experience with good-quality online content will probably be necessary to begin to change the perceptions of those people who are not yet purchasing online.

*Similarity of PDF and Print.* Offline customers had an overall mean similarity value of 4.36 on a 9-point scale (1 = Extremely Dissimilar to 9 = Extremely Similar) as compared to online customers' mean value of 6.25. This implies, not surprisingly, that online customers could be more likely than the offline customers to substitute the PDF for the Print format.

*Usage Situations.* Offline and online customers use books that they purchase from NAP in a similar way.

*Who Pays for Books.* The surveys indicate that online customers are more likely to pay for their own books as compared to offline customers. Around 40% of the offline customers pay from their own pockets, whereas around 60% of the online customers pay out their own funds. This significant difference suggests that offline customers

may be less price-sensitive and thus less likely to substitute PDF for Print because any potential savings do not go into their own pockets. Given their perceptions of PDF as lower quality, it is not shocking that they are more likely to buy what they view as the higher quality printed product with their employers' funds.

*Using PDF Format in Addition to Print.* Given the lower value of offline customers' perceptions of the similarity between PDF and Print, we explored whether they might be persuaded to view PDF and Print as complementary items. In the offline survey, more than half of the offline respondents indicated that they would use a PDF in addition to Print. However, when asked how likely they would be to actually buy the bundle, the mean likelihood was quite low. In the experiments with online customers, the actual bundle purchase rate was rather low as well. In neither situation were special discounts for buying both formats.

### ***b. Impact of Free Online Browsing, Sampling, and Downloading***

*Online Versus Offline Browsing.* Surprisingly, only half of the offline survey respondents were aware that they could browse the content of NAP titles online for free. In contrast, over 80% of the online visitors actually used this feature to sample the contents of the titles. Free browsing removes uncertainty regarding the content. For segments who tend to be risk adverse and price conscious, free browsing can increase the probability of purchasing the content—a phenomenon that might help to counteract the revenue cannibalizing effect that the free browse feature also exhibits.

*Pricing Effect on Browsing.* Customers tend to use the free browsing feature more often with books whose prices range from \$20 to \$40 than for those books priced lower than \$20. This is understandable given the uncertainty reduction utility of this feature. It is also interesting to note that free browsing resulted in a higher likelihood of purchase of the PDF format compared to the Print format.

*Free Page-by-Page Downloading.* About one-fifth of the online customers download the free page-by-page PDF content (at least one page). Although it is clear that free downloads cannibalize potential sales, under certain conditions (when the fit of the book's content to the customers' needs is generally high), the market expansion aspects of this feature can mitigate this loss.

*Downloading and Purchase Rates.* If respondents downloaded the free page-by-page content, they were more likely to purchase than when they did not download any content. In addition, if customers downloaded free content, then they were also more likely to buy the PDF format than the Print format.

*PDF Sampling and Purchase Rates.* The feature for sampling PDF format had a similar impact to free downloading on the purchase of the PDF format. Those who sampled the PDF were much more likely than those who did not sample that format to buy any content, and especially the PDF format.

*Implications of Free Content.* It is clear that, in addition to increasing the penetration and circulation of NAP's content to customers with lower purchasing power, free content has a positive impact of increasing the likelihood of purchasing any content. The key lesson from this part of the analysis is that an organization keen on selling digital content should provide features that help customers interact with the medium. Free browsing, free sampling features, and/or page-by-page downloading help reduce risk and can also assist customers in becoming familiar and comfortable with digital books. Lower-quality free content will lead not only to higher sales of e-content but also to higher sales of the printed format.

### *c. Design and Pricing of Full PDF*

The following table summarizes the purchase rates of the full PDF format in the various segments at the different PDF price levels relative to the printed book price.

PDF Price as % of Print	% of PDF Purchase		
	Seg. A	Seg. B	Seg. C
0	41.90	16.41	39.06
25	27.82	3.85	8.41
50	28.90	2.42	4.96
75	18.16	1.73	2.99
100	16.06	0.74	2.86
110	24.39	1.71	0.00

*Switching Rates/Market Expansion.* Segment A customers had initially elected to buy a printed book upon entering the Web site. Some of them switched over to PDF. Therefore, their PDF purchase rate (as shown in the above table) can be viewed as the switching rate from a printed book to PDF. Segment B and C purchase rates contribute to the potential market expansion.

*Strength of Demand for PDF and Print.* One of the most interesting findings of this study relates to the strength of demand for the printed book. Even at 0% price (free), 58% of Segment A customers stuck with the printed book—deciding that paying, say, \$40 for a hard copy of the book was more attractive than downloading a PDF at no cost. Conversely, there is also a group of customers within Segment A that has a strong affinity for the PDF. At 110% of the printed price of the book, 24% switched to the PDF showing that they are willing to pay a premium for digital content.

*Absolute Prices:* The data indicate that, for many customers, there is a ceiling on the price that they are willing to pay for PDF format books. Across all segments at absolute prices below \$10, about 12% purchase the PDF. This plummets to about a 3% purchase rate at prices above \$20.

*Free PDF.* Because many people view a PDF book as a direct substitute for a printed book, giving away content that is easily downloadable (one whole PDF of the full text) most likely is not a financially viable strategy because it would erode the revenue base

significantly. With 42% of Segment A customers switching from paying for a printed book to paying nothing for a PDF, this means major revenue losses. Note that the above switching rates are without advertisement of any kind. If customers in Segment A were expecting these kinds of savings before making an initial Print purchasing decision, their switching rates might be substantially higher.

*File Sharing.* In our analyses, we have not considered the possible negative impact on revenue of PDF file sharing among customers. To the extent that the sharing of e-content is a concern, technical barriers to sharing content should be considered.

#### ***d. Impact of Unbundling***

The first table below summarizes the purchase rates of PDF chapters in the three customer segments at the different PDF chapter price levels relative to the proportional price of the printed book (e.g., a \$40 book with 10 chapters at 50% off would cost \$2.00 per chapter).

The second table provides the average proportion of the full book purchased by each segment at four price levels. For example, on average, at 50% of the proportional list price of the book, Segment A customers purchased 76% of the whole book. In our earlier example, that would be between 7 and 8 of the 10 chapters.

PDF Price as % of Print	% of PDF Chapter Purchase		
	Seg. A	Seg. B	Seg. C
50	11.93	4.85	8.47
75	14.71	3.94	7.51
100	10.19	4.10	5.94
125	6.81	4.04	8.09
PDF Price as % of Print	Average % of Full PDF		
	Seg. A	Seg. B	Seg. C
50	76	47	39
75	60	48	53
100	57	55	55
125	62	44	60

*Switching Rates.* The purchase rates in Segment A when offered books chapter-by-chapter lead to lower levels of substitution (or switching) than in the case of the full PDF study. For example, at the 50% price level, the purchase rate in the full PDF case was 29% whereas it was 12% in the unbundled case. This result is even more surprising when you consider that the customers had the option to buy the full content by selecting all of the chapters. This might indicate that customers do not want to go through the extra effort of selecting each chapter.

*Percentage of the Full Book.* The average content bought by customers in Segment A varies from 76% to 57%, which implies that additional revenue is lost as compared to

the case of full PDF, because not all customers bought all of the content. Overall, however, the cannibalization effect of offering PDF chapters over the printed book is lower than that of the full PDF over the printed book.

*Market Expansion.* In Segments B and C, the purchase rates are much higher than in the full PDF case. Although the average percentage of the full content bought is lower than that of Segment A, the higher purchase rates as compared to the full PDF case indicate potential for greater market expansion than in the case of the full PDF offer.

*Price Sensitivity.* From the data, we can conclude that customers are much less price-sensitive to the PDF chapters than to the full PDFs. This is most likely because the absolute prices of PDF chapters are in the range of \$1 to \$5 rather than in the higher, double-digit range. In any case, this finding suggests that selling PDFs in chapter-by-chapter format could be a more financially attractive strategy than selling PDFs in full format. Additional analysis is needed for confirmation of this suggestion.

*Optimal Case.* With additional analysis, we might be able to show that selling books chapter-by-chapter only will produce more revenue than selling full PDFs. However, we must take into account the fact that customers will most likely, over time, come to prefer PDF more and more as its quality and utility begin to fit their needs. For those who wish to have the entire digital book, it is imperative to make downloading as convenient as possible.

**e. Findings from the Online Survey**

*Perceptions of PDF Versus Print.* Those who purchased the PDF format (full books or individual chapters) had a more positive perception of the quality of PDF than those who purchased Print only on the dimensions of image quality, layout, browsing, archival utility, and convenience of use. On the dimension of cost, most customers tended to agree that the PDF format should be cheaper. This indicates that customers will have a strong reference point for prices of PDF and will expect the price of the PDF version to be lower than that of the Print version.

*Attributes of Electronic Content.* As would be expected, in general, those buying the PDF format valued features such as electronic search capabilities, immediate access through computer networks, and availability of high-quality printing much more than those buying the Print format. They also viewed the PDF format as more similar to Print, and thus more substitutable for Print.

*Paying for the Content.* Those who were paying for the books out of their own pockets were more likely to buy the PDF format than the Print format, whereas those who received money from their employer for the purchase tended to buy the Print format more often than the PDF format.

*Bandwidth.* The impact of Internet speed on the purchase of the PDF format was different depending on whether the PDF format was full (completely bundled) or was

in chapters (unbundled). In the case of the full PDF, those with higher Internet speeds (DSL/Cable Modem, T1/T3) were more likely to buy the PDF format as compared to customers with 56K or lower speeds. However, in the case of the PDF chapters (where customers on an average bought 40-50% of the content as chapters), Internet speeds did not have a significant impact on the PDF format purchase. This could imply that customer bandwidth is not necessarily a significant constraint on selling electronic content, especially in unbundled formats.

## 5. Limitations

Because we have used both descriptive and causal (experimental) research, the study we have described in this report is quite comprehensive with respect to measuring the behavior and attitudes of NAP's online customers toward printed books and PDF format e-content. The survey of offline customers covers many dimensions of their attitudes and purchase intentions. However, because we have not studied the purchase behavior of offline customers directly, the findings have the reliability and validity of self-reported measures of purchase intentions rather than those of actual purchase behavior.

The response rates from all three of the surveys were quite low at 14% for the full PDF experiment, 17% for the PDF chapter experiment, and 13% for the offline survey. However, the response rates for those who actually purchased a book (either Print or PDF) are acceptable at over 50%. For the offline survey, we tested for non-response bias and found none. Because of the lack of non-response bias and because of the higher response rates when we consider only "involved" online customers, we believe that useful insights can be derived from the survey results.

To accurately measure the substitution rates in the experiment, we could not tell customers upfront that we were offering PDF versions of NAP's books. Therefore, our experiment could not measure the effects of advertising, word-of-mouth, and other activities to promote the PDF versions.

Finally, our study has not examined the potential longer-term impacts of the possible cannibalization of sales because of extensive unauthorized copying and circulation of e-content. In the case of NAP, this impact might be mitigated by the fact that it already provides free content by allowing downloading page-by-page. Therefore, NAP might already be accounting for some of the demand for free content.

## 6. Conclusions and Recommendations

The overall study has revealed useful, interesting, and enlightening results regarding the acceptability of PDF digital content to customers of NAP's scholarly books.

We can conclude that there are a significant number of NAP customers who value content in electronic format with some even willing to pay prices higher than the Print book price to acquire the digital content. By the same token, there are many customers who continue to have very strong preferences for the printed book. Many are not willing

to switch to the PDF format, even if it were to be offered for free. These customers have poor perceptions of PDF quality as compared to Print quality in several attribute dimensions. Additionally, there are some customers who are willing to buy both the PDF and the printed formats. At least in the short run, it seems that NAP and possibly other publishers of scholarly works will be in an intermediary stage of filling demand with both print and digital products. Developing innovative and financially viable strategies for building and running the infrastructure for both product lines will be essential as print runs become shorter over time because of more and more customers switching to the digital format.

We know from our data that customers will begin to migrate toward digital books as they interact more frequently with e-content. To ensure that as much of this market as possible is captured, it might be fruitful to continue with free browsing, free page-by-page download, and free PDF samples.

Our findings indicate that unbundling content can possibly result in higher market expansion than offering only fully bundled content. This market expansion can, in fact, mitigate the cannibalizing effect of unbundled content on revenue from printed books. Customers tend to be quite price inelastic with chapter prices as compared to full PDF prices in the ranges of prices we studied. Given our results, it might be tempting to offer only unbundled content and not full PDF content. However, that strategy would ignore the customer convenience factor.

The study reveals that Internet speed has an impact on the purchase of PDFs except in the case of PDFs by the chapter. As we know from media reports, high-speed access is not keeping up with consumer demand. Because of this phenomenon, publishers might not be as successful now as they might be in the future. However, over time, we project that more and more people will want to purchase NAPs content digitally. This trend might apply to other scholarly content similar to that of the NAP books. Getting into the market early will assure the publisher's customers that the publisher is, indeed, well positioned to fulfill the needs of its audiences.