The Production of Books

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In most industries which produce for the consumer market, company management is very much involved in the production process. Whether it is pens, automobiles, breakfast cereals, or computers, top management is intimately concerned with production in all its detail. Indeed, in some cases, the production process is all management is concerned with.

In a sense this is true of book publishing as well. The publisher thinks of his product as being the words of the author, amended, and improved by the work of the publisher's editors. Management certainly involves itself in that production process—in selecting the manuscript, refining it, creating the personality of the book, launching it properly. But the production of the physical package in which the author's words are delivered to the reader—the book itself—is an altogether different matter.

It is curious that, with one outstanding exception (Doubleday), book publishing management is proudly ignorant of how type is set or books are printed and bound. With that same exception, none of the technological advances of the last fifty years have been developed, or even suggested, by publishers. The improvements have all come from suppliers to the publishing industry, and have been introduced over the lethargy and sometimes the downright opposition of the publishers themselves. The fact that Doubleday, the one outstanding exception to this generalization, has transformed book manufacturing more than all the industry innovators combined, does not negate the statement that

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publishers in general do not know and do not especially care about the technology of book production. As a gesture, an important publishing executive may be ceremoniously shown through a composing room, pressroom or bindery, express his polite ooh’s and aah’s, remark at the marvelously impressive machinery, express his gratitude for the care taken with his books and the sensitivity to his scheduling needs—and then be taken to the best local restaurant for lunch.

Top management is happy to delegate to the production manager the responsibility for getting the books made and for knowing whatever is necessary about the various steps involved in going from manuscript to finished book. And, though he spends more of the company’s money than anyone else in the firm, and may even be rewarded with a vice-presidency to supplement inadequate compensation, the production manager is a junior executive. His function is a service function, and it figures as a service function in the strategy of publishing management.

In the eyes of publishing management, the principal functions of the production manager are keeping track of an immense amount of detail, locating and cultivating suppliers whose prices are at the low end of the range, and managing to get books delivered on targeted dates, usually after the publisher’s editorial and art departments have fallen hopelessly behind schedule. All this is, of course, an overstatement—principally in being much too encompassing a generalization. There are production managers who are much more than canny shoppers and super housekeepers. There are a few who have pushed their way into the management circle on a basis approaching executive equality with other major functions.

In most publishing houses the production manager is expected to “produce” the book as it is handed to him, with all the editorial decisions and scheduling requirements already made by others. Frequently even the design decisions—choice of typeface, number of pages—are outside the production manager’s jurisdiction. It is not surprising that the production manager’s function, as seen by himself and by his management, is to get that book produced in the best and most economical way. And that usually reduces, in large part, to the selection of suppliers for the various operations who have the right balance of quality, price and scheduling flexibility for that book within the publisher’s overall strategy of maintaining good relations with several suppliers for each operation.

The principal concern of the publisher’s production manager is to determine who will set the type, who will print, and who will bind. He makes those decisions on the basis of a judgment of the cost and the
quality each supplier represents. The evaluation and selection among available alternatives certainly seems a straightforward and sensible policy. Unfortunately, in the present state of book production, it misses the point. It matters much less who does the typesetting, the printing, the binding; it matters much more how it is done. Because how it is done by imaginative use of the new technology, can produce dramatic savings many times greater than any advantage gained by using this or that supplier.

And yet, the available technology is being ignored to a remarkable degree by book publishers. Why? After all many other producers of printed material have taken much fuller advantage of new devices and new methods. The reason lies precisely in that lack of interest by publishing management in the production process (though not in the financial results!) and the division of responsibility which flows from that: we will give the production manager the book with all the decisions made and he will produce it.

Putting the new technology to work can only be done properly by changing what happens to the book project before it reaches the production manager. The steps the editors and designer have taken and the decisions they have made effectively lock the production manager out of anything except minor adaptations of routine production techniques. To be sure, today's routine techniques are miles ahead—faster, surer, less expensive—than the methods used in the manufacture of books a few years ago. They have improved book manufacture tremendously—but only a fraction of the improvement possible if they were more systematically applied.

When I was finally fortunate enough to enter book publishing right after World War II, type was being set at the rate of about 4000 characters (letters and spaces) an hour on a machine (Linotype) that added its own mistakes to those introduced by the operator. Today's typesetting machines can run at 2.5 million characters per hour, and do not know how to make mistakes.

The metal (an alloy of lead, tin and antimony) lines produced back then were painstakingly divided into pages by hand, and the lines set separately for running heads and folios were added by hand. One could print from the metal type (and frequently did), or, to withstand greater use, mold or electroplate metal duplicates of the type and print from those stereos or electros. The pages of type or the stereos or electros were positioned on the printing press in proper relation to each other so that the sequence of pages would be correct on the folded sheets. The
process—from the corrected linotype galleys to pages properly arranged in "forms" for the press—took many hours, sometimes a few days.

Today the same machine that sets the type (faultlessly correct) at 500 or 600 times the speed of the linotype, can set it directly in page form so that the "makeup" step is not necessary, and will, if you like, automatically place the page images in proper position on the printing plate for the folding operation. What took hours or days before (and the labor of several skilled craftsmen) can be done in almost zero time today with no labor whatsoever.

Printing was usually done in "forms" of 64 pages printed separately on each side of the paper at a speed of about 1000 sheets per hour. There were some presses, reserved for larger quantities, which printed 128 pages at a time (64 on each side) at 1200 sheets per hour. The sheets went from the presses to folding machines which could handle 64 pages at about 1000 sheets per hour.

Today's printing presses can produce 64 pages or 128 pages, printed and folded, at about 25,000 sheets per hour (twenty to twenty-five times the earlier speed), using perhaps 5 percent of the man hours previously used for these processes. The folded sheets used to be put through a series of complicated maneuvers, including sewing, to produce hardbound jacketed books at the rate (in better organized shops) of about 1000 books per hour. Today's binding "lines," immensely simplified, using glue instead of thread, and a fraction of the personnel, produce 3000 hardbound books an hour and some are faster than that.

I cannot resist pointing out that I am referring to the production capabilities at commercial plants generally available to any publisher who wishes to use them. The one exceptional publisher already mentioned has designed and built his own book manufacturing facility. In one smooth operation, starting with unprinted paper and ending, a few minutes later, with fully hardbound books with jackets applied, at a speed of 15,000 books per hour, that facility produces books at less than one-fourth the labor cost and perhaps two-thirds the materials cost of books produced at commercial establishments for other publishers on the most modern equipment commercially available. Except to indicate what might be technologically available in the distant future, if publishers ever "get their act together," this publisher's private facility is not a part of the real publishing world.

Of course the production process is somewhat simpler and somewhat faster for paperbound books which, as a consequence of the mass market paperback phenomenon, have become more popular and, in range of titles, are no longer distinguishable from the hardbound var-
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iety. The difference in manufacturing cost is not as great as the difference in retail price might lead the book-reading public to believe. The cover for the hardbound book, and the extra binding operation required to apply it, may cost thirty-five to fifty cents a copy, perhaps. The very much greater differences in retail price between hard and paperbound books are caused to a slight degree by lower royalty, but principally by accounting aberrations and faulty logic which cannot be a part of this discussion.

The technological advances have been truly staggering. Books can be produced today with perhaps one-tenth the labor required when I first arrived at this industry. A book which routinely took four months (and not infrequently six) can be routinely produced in three weeks—in two weeks if the author has used a word processor.

It can be—but it isn't!

The book that used to be produced in four months, and can now be produced in three weeks, is actually now produced in three months, or perhaps three and one-half. (Consider, for example, that much of what you are reading in this publication was submitted by the author months before this issue came off the press—and for that reason alone some information is out of date by the time it is available to the reader.)

The technological advances of the last thirty years have been marvelous and astounding; the advances have taken place much faster than the ability of book publishing management to understand them and to make the changes in internal publishing procedures that must take place to utilize these new minor miracles. Failure to use the new technology properly results in books costing at least 50 percent more, and more likely 100 percent more, than they should cost. It would be incorrect to say that the improvements in producing books have been confined to (inadequately used) technological changes. There has also been some rationalization in the organization of book production which, like the changes in technology, has been largely on the initiative of the manufacturers rather than the publishers.

The rationalization has occurred as a result of two developments. In order to get better control over press schedules, to reduce the space wasted in storing publisher-owned paper stock, and to provide a service which cash-hungry publishers-clients would appreciate, book manufacturers began (in the late 1950s and 1960s) to inventory stocks of paper which could be available, on demand and with virtually no notice, to publishers using their facilities. The obvious advantages of using these papers, gradually (there was no stampede) changed the paper-specifying habits of many publishers for at least a substantial portion of
their titles. Obviously, paper could be stocked only in a limited range of the most popular sizes, colors and textures. As a result, some appreciable portion of the manufacturer's production (representing several publishers) was on identical paper, and it became fairly easy for the manufacturer to schedule such books to follow each other on press, reducing press makeready time as well as paper spoilage.

The second rationalizing development was the introduction of web presses for relatively short runs. Combining the economy of the web press with manufacturer-supplied paper brought makeready costs for web presses below the makeready costs for sheet-fed presses, and also sharply reduced paper spoilage on the web press, which had previously been a serious cost for short-run black and white web offset printing. The result is that it can now be less expensive (subject to the book manufacturer's selling strategy and selling policy) to produce 1000 copies on a web using the manufacturer's paper than to produce the same number by sheet-fed printing on publisher-supplied paper. The technology made this possible thirty-five years ago. It has taken that long for business practices to catch up (if they have, in fact) with reality.

The sad fact is that this leaves publishers' habits only slightly changed from those imposed by the old, almost handicraft methods. The advantages available from the space-age leaps in technique are used only to a tiny degree. We continue to force the new technology to act like the old technology to accommodate deeply ingrained publishers' habits.

The next big rationalizing step would certainly appear to be in more intelligent use of typesetting technology. It is hard to see how the initiative, this time, can come from the supplier; so perhaps the publisher will organize the procedures, all of which are under his control. The payoff is certainly attractive enough—the cost of typesetting can be reduced to one-half or one-third of present costs and at least weeks and possibly months can be cut from the production schedule for new titles. In the process the book would contain fewer errors, and type pages would be better designed and would fit press requirements more precisely.

Perhaps the best way to explain how the procedures should be changed is to review, in general, what the present procedures are:

1. After the manuscript is accepted from the author, it is given to the designer to determine the specifications for the type page. This may be done before any line-editing or copy-editing takes place, or after or during the editing process. In houses that take production cost (or more accurately, the avoidance of production waste) seriously, the designer analyzes the manuscript carefully to plan to have the book
make an even multiple of thirty-two pages. When all the editing steps have been completed, the manuscript goes to the compositor to be set in accordance with the designer's instructions, usually into galleys, sometimes directly into pages.

2. The proofs of the composed type are read for errors, first by the compositor and then by the publisher. The proofs then go to the author, presumably to check for errors (in fact to permit second thoughts) and are sometimes also read by the (more conscientious) editor.

3. The designer usually also sees the proofs, since, if the calculation of length was in error, or if the author's deletions or insertions affect the length, revised paging instructions must be supplied to the compositor.

4. The proofs then go to the compositor to correct, and to make up pages if the first proofs were galleys. Depending on the extent of the corrections, further proofs may be submitted to the publisher for checking.

These procedures evolved when: (a) the typesetter keyboarded the manuscript directly into the typesetting machine so that his accuracy could be checked only by checking the output, and (b) the typesetting machine most widely used (the Linotype) introduced its own mistakes on top of those committed by the keyboarder.

Today's typesetting machines do not make mistakes—or to put it more accurately, the possibility of a machine error is so remote that checking the output to look for one is ludicrous. The typesetting machine produces precisely what the keyboarding tells it to produce.

Modern composition methods have separated keyboarding from the setting of type. Completing all the editing and proofreading steps in the keyboarding stages before a single line of type is set can effect dramatic economies in production time and cost. For manual keyboarding (where error is inevitable), proofreading as a separate step is either unnecessary (because the text exists on word processor disks or equivalent and the proofreading will be a by-product of all the normal editing steps which will precede the typesetting itself), or, if necessary, can be performed before the keyboarder's work is forwarded to the typesetting machine. In fact, keyboarding must be separated from actual setting because while the keyboarder may type 100 words a minute, the machine outputs 7000 words per minute, so keyboarding on the actual composing machine would be ridiculously wasteful.

Keyboarding away from the typesetting machine makes it possible, by "double keyboarding," to avoid "proofreading" in the usual sense. In that system, originally proposed (by me, I believe) in the early 1960s
and now widely practiced, two different keyboarders, chosen because their errors are typically of different patterns, enter the manuscript. Their keystrokes are compared on a computer which highlights any point at which they differ. The manuscript is examined to determine which of the two is correct.

When using a compositor who supplies the service of double keyboarding, the publisher frequently (in fact, usually) frustrates the accuracy introduced by double keyboarding, since he puts the result through the usual "proofreading" steps in which no errors are found, but some rewriting inevitably takes place—so the expense and waste of time in resetting portions of the type is preserved.

But double keyboarding, originally proposed before the development of word processors, is itself obsolete for most applications. It is far more effective for the publisher, at the earliest possible moment, and certainly before any editing of any kind is started, to enter the manuscript into a word processor—if the author has not already done so. The word processor's computer program can check the manuscript for spelling errors and for simple grammatical errors even before it goes to the editors and author for further work. Thereafter, it is only necessary to enter (and to check) the marks made by proofreaders, editors and the author, including the corrections to the original keyboarding that are discovered each time the word processor "hard copy" is reviewed.

The rationalized procedures would be somewhat as follows:

1. If the manuscript did not come from the author in word-processed form, the publisher would have it keyed into a word processor before any editorial work of any kind was done. All further corrections, emendations, additions, or deletions, whether by author, editor or copy editor would be entered into the manuscript via word processor.

2. After all changes had been made, the manuscript would go to the designer (who would soon be replaced by a set of design rules created by a designer) who, knowing precisely (from the word processor) the length of the manuscript, and the elements requiring typographic decisions, could give precise instructions for typeface, measure, chapter openings, etc.

3. The word processor disks (not the manuscript) would go to the compositor (either physically or via telephone to the compositor's computer) and the first and only product of the composing machine would be final book pages ready for printing. No further proofreading would be necessary. The time required to produce the pages of a normal book by this procedure is about an hour or two, but with scheduling problems one must allow two or three days. Perhaps as
important is the fact that the delivery of final pages can be accurately predicted, so that press and binding time can be reserved with confidence.

A moderately well-managed production department, using these procedures, can assure publishing management of finished books two to three weeks from the time the editor releases the word processor disks. The time (and the cost) may be cut still further by the introduction of technology already developed and tested but not yet widely available. It is now possible to avoid the use of film in offset platemaking by "setting" the type directly on the printing plate via laser. This procedure is not practical with the trial-and-error typesetting methods currently in use, but is a natural step in the rationalized procedures I am suggesting.

There is not much doubt—taking all these factors into consideration—that either by early entry of the manuscript into a word processor or by double keyboarding the final edited non-word-processor manuscript, books can be typeset at substantially less than one-half present costs and in something like one-tenth the time. One would expect such books to have fewer errors and to meet higher typographic standards than books produced by conventional methods. One would hope that sooner or later, publishers will take better advantage of this technology. Doing so seems a simple matter of internal publishing procedures and nothing more.

Unfortunately, such changes can only result from a determined effort by the publisher to break old habits. It is simple human nature that the current preproduction routines and decisions are deeply ingrained and are accepted by everyone. Bringing them into question creates far more disruption and uneasiness than will result from the changes in the production process itself.

The publisher's author believes that he must see and correct galley proofs and that waiting weeks to see them is unavoidable. The typesetter believes the author and editor must correct galleys and inevitably re-write sections of the original copy before he can proceed to make pages. The printer understands that the book must be whatever length it is and will often not fit the equipment properly.

The book printer who still, despite the effect of standard papers and web presses, is asked by 100 or 200 publishers to produce books in 100 different sizes and shapes on papers of 50 different textures, weights and colors, does not dare argue too strongly that a saving would result if this exaggerated variety could be reduced to more reasonable levels. He "knows" it is not possible. Although the number of typesetters and
printing and binding establishments continues to decline, there are enough around to assure unrelenting competition. Suppliers long ago learned that making suggestions for changes in the publisher’s internal procedures, or in the specifications for the finished book, suggestions aimed at reducing cost by making production more efficient, can easily result in the work going to a competitor who unquestioningly takes what he is given and makes the best of it.

It seems far wiser to produce to uneconomical specifications, even taking a ridiculously low profit in so doing, than to risk implying lack of wisdom in the editor, or lack of expertise in the production manager. Besides, in the nature of things, with hundreds of customers and thousands of production situations, the book manufacturer is equipped, in his equipment as well as his psychology, to accept confusing variation and inefficient customers as facts of life. Actually, so intent is the book manufacturer on being a faithful servant, that as the publisher changes his own practices to make use of the new technological opportunities, it may be necessary to reorganize the manufacturer as well. Nevertheless, because the shift from sheet-fed presses to web presses has made it harder for the publisher to insist on inefficiencies, printing and binding of books are performed somewhat closer to their technological potential than is composition.

Back in the 1950s, in a letterpress room containing sheet-fed presses of only two different sizes, Country Life Press produced books in approximately 250 different trimmed sizes. Hard to imagine! But each book was designed quite independently of any other book, and as long as the sheet to be printed was at the limit or below the limit of size the press could handle, there was no obvious reason (technological or financial) why it could not be printed. And occasionally the trimmed size of a book was chosen precisely because it was different from other books. If the next book to be produced was a different trimmed size (as it almost always was) from the previous book, or on a paper different in color, weight or texture, various machines had to be adjusted at a substantial cost in time and in the material run through the machine to test and stabilize the adjustment. Partly for this reason, the equipment at Country Life Press (like the equipment at all commercial book manufacturers) was of the slow, easily adjustable kind.

Even with that slow printing and binding equipment, reducing the number of trimmed sizes would have resulted in producing twice as many books without adding a single man hour to the labor cost. Put another way, the labor cost component (at least half the total) of the total production cost would have been reduced to half. And, no small advan-
tage, the reduction in adjustment of machines would have improved the
overall quality of the books produced. But the assurance of that volume
of work on less varied specifications would have made it sensible to
introduce faster, less easily adjustable, machinery which would have
produced at six or eight times the overall rate of the existing equipment,
reducing the labor cost to something like 5 or 10 percent of the labor cost
of what was acknowledged to be a completely (at the time) "modern" plant.

The web presses currently used tend to enforce some discipline on
trimmed sizes. The choice of web press tends to dictate one dimension of
the book, because if the circumference of the press cylinder is something
other than an exact multiple of the width or height of the book, the
waste of paper is too obvious to miss. On the other hand, the width of the
paper roll can be varied within wide limits with no waste of paper—and
it is.

Even more important, however, the web press changes the publish-
er's thinking about trimmed size. The variation in size on a sheet-fed
press is costly in efficiency but need not involve any paper waste. On the
web press any variation in size from a size dictated by cylinder circumfer-
ence results in a clear waste of paper trimmed from the signature and
thrown away. The cost is much clearer to the publisher. He is less
insistent on unlimited freedom, more inclined toward making a book
the size most efficiently delivered by that particular press. In web plants,
therefore, and among publishers using web presses, the variation in
trimmed size (expressed in number of sizes coming off the same
machine) has probably been reduced by a factor of ten.

Commendable, not because books should all be the same trimmed
size, or because there should be a restriction on number of sizes, but
because the trimmed size chosen for a book should have a reason,
functional or aesthetic, and not be the result of a whim which may
actually defeat the intent. Making two books in the same trimmed size
makes sense because it can in itself provide substantial economies and
manufacturing advantages. It also makes possible an organized flow of
production which results in additional savings. If books were printed
and bound in groups of books of the same size on paper of the same
specifications, the savings would be somewhat as follows:

1. The economies of web press printing and the high speed binding line
   would be available on runs as low as 2000 to 3000 copies instead of on
   those above 10,000 copies as at present.
2. Paper usage would be decreased by 2 to 20 percent, depending upon
   number of copies produced. In addition, there might be some saving
in cost per pound because of buying paper in larger quantity. Experience also suggests that money invested by the publisher in paper inventory would be sharply reduced, perhaps as much as 50 percent.

3. Less binding material (for hardbound books) would be wasted, and the cost of fabricating covers would be reduced 10 or 15 percent.

4. Printing and binding cost, hardcover or paperback, would be reduced 10 to 25 percent depending upon number of copies produced.

5. The time required to print and bind books, new or reprint, would be reduced by about three weeks in well-run production departments and more than that in poorly run ones. Permitting later decisions on printing quantities would enable management to order quantities more accurately related to actual need. It is not farfetched at all to suggest that, with proper scheduling, copies of new titles could be ready, routinely, three weeks from the publisher’s release for typesetting and reprints of already published titles within ten days of the publisher’s order.

In the course of responding to cost pressures by sacrificing quality, publishers (in addition to degrading the paper and the binding materials) have, bit by bit, accepted adhesive binding (laughingly named “perfect binding”) in place of sewing to hold the book together. Adhesive binding, as it is currently practiced, frequently produces a book which does not stand up to use as well as a sewed book.

But that does not have to be the case. An adhesive-bound book can actually be stronger than a sewed book by using a technique—Hellerbonding—in which neither publishers nor bookbinders have shown much interest. Why the lack of interest? Because preliminary estimates indicated that Hellerbinding would add about a penny a copy to the binding cost. It certainly seems worth the added cost—though it is my opinion that the increased binding line speed possible with Hellerbonding would more than compensate for the penny, actually making it less expensive in practice.

One dream among the more farsighted people involved in the production of books has been to reduce the multiple operations of printing, folding, gathering, binding and jacketing to one smooth continuous operation. The advantages in speed, control, labor cost and material spoilage are obvious.

The ingenious belt press for printing the entire book in one pass was, unfortunately, technologically out-of-date before it was finally perfected. Despite its technological obsolescence, the belt press is widely used because the failure to use web offset presses properly makes the belt press seem advantageous.
What is needed, of course, is an offset adaptation of the direction taken by Doubleday: a press (or rather a book machine) that prints, binds and jackets a book, of whatever number of pages, in one continuous operation. Books coming from such a printing press could be produced—printed, bound and jacketed—at speeds approximating 15,000 copies per hour, delivering a bound, jacketed book approximately three minutes after the press started to run. That is five times the speed of the fastest current lines which use two to three times the personnel that would be required for the high speed line. The dramatic reduction in cost and increase in speed of manufacture of books made possible by better use of existing technology and by application of advances clearly available, has implications far beyond the production process itself.

Getting books closer to the decision to publish means fewer publishing opportunities missed and fewer publishing errors made. Reduced fixed costs in reprinting and faster delivery of reprints will reduce investment in inventory and overstocks, reducing the temptation of publishers to foul their own markets with remainders. The simplification of all procedures inherent in these changes will lower the publisher’s internal staff costs in editorial and production departments.

I am certainly the last one to argue that book publishing’s shortcomings exist exclusively in the production area. The inefficiencies and waste in the distribution of books contribute much more to higher-than-necessary prices and harder-to-obtain titles than the poor use of available book production resources. But failure to produce economically—particularly when that failure is in the publisher’s office itself and not the fault of suppliers—is a disservice both to the author and (when the bumbling distribution system allows him to get his hands on the book) the reader.

While it is true that production of the books is not and should not be the central focus of the publisher’s attention, it is hard to understand why it takes publishers so long to use their available opportunities to produce books of higher quality, on considerably faster schedules, at very much lower cost.

The possibilities are exciting to consider. All are solidly based on existing technology and do not need to wait for new inventions or the development of new techniques. If realized, they would reduce the costs, except for materials, to something of the order of one-third present costs, and reduce the time required from months to days.

Is it likely to happen in the 1980s? or even the 1990s? Certainly not the printing and binding “book machine.” Although the technology
for the printing and binding line may exist, there is no sign of a driving force or a source of financing within the industry for creating such a line.

On the other hand, the changes in typesetting involve no costs and no adaptations of technology. The changes in typesetting involve no costs and no adaptations of technology. They require only some adjustments in the usual procedures in the publishing house itself—adaptations which would reduce staff, reduce tensions and make life generally more agreeable for publisher and author.