ELECTRONIC AND PRINT JOURNALS: A VALUE CHAIN ANALYSIS

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Even as the society marches into a digital age, libraries and information centres have assumed greater responsibilities for meeting the diverse needs of its user community. The new technologies have largely aided in designing value-added library services. The emerging digital libraries are redefining the way by which user demands are being fulfilled. Among other resources, electronic journals occupy a prominent place in digital libraries, by providing access to 'online full-text information'. While historically, print journals have played an important role in information dissemination, the spiraling costs of the same have forced both 'information providing' and 'information seeking' community to look for cost-effective and reliable means of information dissemination.

The present paper, while studying the importance of print and electronic journals in information dissemination, applies the concept of 'value chain analysis' for obtaining a longitudinal understanding in terms of 'costs of production' and 'cost drivers' associated with it. Accordingly, a value chain distinguishing the structure of production for print and electronic medium is drawn for identifying the different costs associated in different stages. Further, the paper proceeds to illustrate the competitive position of e-journal industry in terms of different structural cost drivers and put forward a 'differentiation with a cost strategy' for e-journals industry for achieving optimum benefits for different stakeholders involved in the process, viz., information providers, information managers and information seekers.

INTRODUCTION

Human development has been greatly influenced by the quantum of information available, access to the available information, means and medium of access and the degree of its utilization. Libraries have been primarily responsible for 'information management' (which involves the complex process of acquisition, classification, storage, preservation and dissemination) and provide the priceless 'processed information' to the society.

The supply and demand characteristics of information in recent times is resulting in the transformation of traditional libraries into 'digital libraries', continuously attuning themselves to the latest developments of information technology for satisfying user demands by designing valuable means of 'information acquisition' and disseminating mechanisms'. Digital libraries have been defined as an organized collection of online full-text digital information focused on one or more specific subject areas [1]. Electronic journals (e-journals) form principal components of digital libraries, which provide access to valuable 'online full-text digital information'. E-journals are steadily gaining the required momentum in replacing traditional print journals, which form a predominant source of information.

One of the widely discussed issues in recent times has been the question of how the balance between electronic journals and print journals would evolve over the next few years. While, the spiraling costs associated with print journals has forced the information seeking community to look for easier and cheaper means of obtaining the required information, modern mechanisms have also brought in its wake, various challenges, which needs to be carefully addressed for obtaining maximum use from these mechanisms. Against this backdrop, the present paper attempts a comparative cost analysis between print and electronic journals by drawing individual production value chain, distinguish 'costs' for different value activities and examines the important cost drivers that drive the journal industry. In the light of these analyses, the paper advances to formulate a
'sustainable competitive strategy' for strategically positioning the e-journal industry aimed at achieving a competitive advantage for all the stakeholders associated with journals viz., information producers, information managers and information users.

PRINT AND ELECTRONIC JOURNALS

Print Journals

Print journals have always played an important role in information management. Ever since the first journal ‘Journal des Scavans’ was published as a new medium of communication during 1665 [2], for more than three centuries now, print journals have occupied a central role in information creation and dissemination. Besides being a formal channel of scholarly communication, print journals hold crucial significance in scholarly practice. While, studies observe that journals are sought for various reasons including research, current awareness and continuing education, teaching and external communication [3], ‘journal articles’ have been regarded as a principal source of information with respect to a scholar’s research activity. The practice of referring to journal articles among scientists is a very well known practice [4]. In recent times, the evolving demand of the information society for easier, cost-effective and reliable mechanisms of information management complemented by the advances in information technology, has resulted in the development of modern means of information management. E-journals form one such sophisticated form of information management employing information technology.

Electronic Journals

Advances in the science of information technology had a major impact on the field of information science. Innovative, reliable and faster mechanisms of information management were devised. E-journals form one such application of information technology. Further, the advent of Internet provided the thrust in developing e-journals as an effective medium of information management. However, information produced in large proportions over the Internet, absence of standard norms of publishing, non-availability of stringent vigil standards and more importantly, the participation of professionals from different fields viz., ‘library and information science’, ‘computer science’, ‘science and technology’ etc., has resulted in a confused state in drawing a definition of ‘e-journals’.

While in the initial stages, e-journals were described as ‘virtual journals’ [5] and ‘paperless journals’ [6], in recent times, e-journals are misunderstood for handouts, newsletters, magazines (e-zines), minutes, advertisements, etc., produced in electronic form. E-journals are also regarded as serial publications available in digital format and are distributed via magnetic media viz., CD-ROM, tapes, diskettes etc. Electronic journals are also perceived as the electronic version of a print journal. Piternick made a clear distinction between ‘electronic ‘ and ‘online’ journals by observing that in the case of the former, the contents are produced and stored only in electronic form while in the case of the latter, the publication is published both in paper and electronic formats [7].

Hawkins observes e-journals as ‘publications’ available in electronic form only, having an International Standard Serial Number (ISSN) [8]. The presence of an ISSN lends an air of legitimacy to these publications and helps in weeding out more ephemeral publications such as newsletters and magazine. Joglekar and Sen define e-journals as ‘containing original work, which is subject to a peer review process, and is published only on the web at no cost [9]. The peer review process facilitates e-journals in attaining a high scholarly value. Jacso while studying the coverage of e-journals also lays down a similar viewpoint [10].

In the light of the above mentioned views and perceptions, e-journals can be defined as ‘a serial publication produced and stored in electronic format only, subjected to peer review process, carrying ISSN and adhering to stringent quality standards of electronic technicalities’. Quality-control systems for enhancement and maintenance of high quality standards in e-journal production would not only facilitate in increasing the value of e-journals, but also would aid in maintaining uniformity and more importantly, address various users’ problems in relation to e-journals readability and portability.
Further, by addressing the crucial issues of ‘content management’ and ‘scholarly value’ and putting in place stringent peer-review process, little doubt remains in e-journals playing a vital role in information management.

VALUE CHAIN ANALYSIS: THE RATIONALE

Though print journals occupy a predominant place in information industry, the spiraling subscription costs of print journals has rendered it only next to impossible in accessing this valuable medium. Over the last three decades, the cost of subscribing to a particular journal has almost doubled. Tenopir and King observe an overwhelming increase of 87.93 per cent in the cost of subscription between the years 1975 and 1995 [11]. The authors further note that ‘the traditional scholarly publishing is in serious economic difficulty’. While the general inflation and increase in size (more pages per issue, more issues per volume, more volumes per year etc.) of the journals have accounted for an increase of 52 percent, the remaining 48 per cent is attributed to a dramatic decrease in personnel subscriptions, witnessed in the late 1970s.

A loss / cancellation of subscription entails an increase in subscription price of the remaining subscribers for sustenance of the print journal industry leading to ‘serials pricing crisis’. At this crucial juncture, even as the information seeking community is confronted with serious difficulties in accessing traditional print journals, the advent of electronic journals is perceived as a boon for the user community in meeting their ever-increasing demands. It is against this objective, a ‘value chain analysis’ is taken up for studying the cost-effective aspect of journals, primarily aimed for gaining a better understanding of these invaluable instruments.

VALUE CHAIN ANALYSIS: A COMPETITIVE ADVANTAGE TOOL

Value chain analysis forms a principal tool for diagnosing and enhancing competitive advantage of an industry. At a primary level, while segregating a firm into discrete activities, value chain analysis identifies costs associated with these activities. At a higher level, these costs are examined in terms of different principal cost drivers that drive the industry. Based on the analysis, a suitable sustainable strategy is formulated that aims at achieving competitive advantage for the industry. Value chain analysis can be effectively employed for understanding print and electronic journals. A value-chain analysis of both print and electronic journals, while facilitating in a better understanding of the ‘structure of production’ of individual journals, would provide a longitudinal view of the costs associated with different activities in producing the journals.

VALUE CHAIN OF PRINT JOURNALS

Figure 1 configures a generic value chain of a typical print journal. As distinguished in Figure 1, the principal activities involved in producing print journals are: ‘article/non-article processing’, ‘reproduction’, ‘distribution’ and ‘publishing support’.

‘Article / non-article processing’ forms the initial activity in producing print journals, which results in the production of a ‘master-copy’ or the ‘first-copy’ of the article to be included in the journal. It involves a series of correspondence and technical operations. While the corresponding activities include call-for / acceptance of manuscripts from the authors, determination of its authenticity, identifying reviewers / referees, review processing, manuscript / subject editing in consultation with the author, the technical operations include introduction of special graphics (for introducing tables, graphs, pictures etc.,) and formatting and preparation of master images. While ‘article processing’ involves activities in relation to manuscripts of research articles and papers, ‘non-article processing’ refers to functions carried out for non-article publications (such as letters to editors, book reviews, advertisements, cover pages etc.). The operations carried out in this stage results in bringing out the ‘first-copy’, which shall form the base for bringing out copies in the ‘reproduction stage’.

The ‘first-copies’ obtained in the ‘article / non-article processing’ stage are utilized in developing print journals in the ‘reproduction’ stage. This stage involves the functions of printing, collating and
binding. 'Print journals' so produced are forwarded to the 'distribution' department for distribution of the same to the subscribers of the journal. These involve the activities of wrapping, labeling, mailing and maintenance of updated list of subscribers, their addresses and payment status etc. The 'publishing support' is primarily concerned with activities pertinent to marketing and promotion, administration, managing rights and copyright protection, finance costs etc.

VALUE CHAIN OF ELECTRONIC JOURNALS

A generic value chain involved in the production of electronic journals can be structured as shown in Figure 2.

As regard the activities performed in the production of electronic journals, the initial task involves a 'preliminary survey', which is taken up to identify the existing print and electronic journals, their subject coverage and the degree of satisfaction it commands in the respective field. Besides providing valuable insights about the present system, the preliminary survey would facilitate in identifying the lacuna in the existing system and avoids replication of the existing system. Since electronic journals are a new venture, this activity assumes larger significance. The results obtained in this state would serve as input to the next stages of e-journal production.

In accordance with the insights obtained in the preliminary survey, the activity of 'editorial context' or 'article processing' is initiated. The article processing function in producing an electronic journal involves obtaining manuscripts from authors, determination of its authenticity, identifying reviewers/ referees, review processing and manuscript/ subject editing in consultation with the author. Once the editorial concept and the articles for the publications are ready, the technical realization of the journal is initiated. 'Technical realization' assumes crucial significance as the effectiveness of e-journals utilization depends upon the efficiency of technical realization of the journal. The activities, which are involved in technical realization, include website development, website design, website programming and website launching. Further, decision regarding the development of journal layout and format of the journal forms key tasks in this stage.

Once the journal is technically realized and launched successfully, the production/maintenance stage is responsible for continuous production, controlling and supporting editorial flow, copy editing and alerting the users of newly published issues. The

Figure 1 — Value Chain of Print Journals (Source: King and Tenopir [14])

<table>
<thead>
<tr>
<th>Cost</th>
<th>24.85 %</th>
</tr>
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<tbody>
<tr>
<td>Firm Infrastructure</td>
<td></td>
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<tr>
<td>Human Resource Management</td>
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<td>Technology Development</td>
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<td>Procurement</td>
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<table>
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<tr>
<th>Publishing Support Activities</th>
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<tbody>
<tr>
<td>Article / Non Article Processing</td>
</tr>
<tr>
<td>- Receipt Processing</td>
</tr>
<tr>
<td>- Initial Disposition / decision making</td>
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<tr>
<td>- Identifying Reviewers</td>
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<tr>
<td>- Review Processing</td>
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<tr>
<td></td>
</tr>
<tr>
<td>- Printing</td>
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<tr>
<td>- Collating</td>
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<tr>
<td>- Binding</td>
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<tr>
<td></td>
</tr>
<tr>
<td>- Wrapping; labeling</td>
</tr>
<tr>
<td>- Sorting, Mailing</td>
</tr>
<tr>
<td>- Subscribers List, Payment status etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th>41.65 %</th>
<th>20.80 %</th>
<th>12.70 %</th>
</tr>
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</table>

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function of alerting is generally taken up through journal's list server and other selected list servers and Usenet newsgroups. This stage is also responsible for continuously monitoring the usage and obtains feedback related to the journals and makes necessary corrections for increasing usage of electronic journals. The ‘publishing support’ for electronic journals takes care of activities related to marketing and promotion, administration, managing rights and copyright protection, finance costs etc.

**PRINT AND ELECTRONIC JOURNALS: COMPARATIVE COST ANALYSIS**

The value chain while dividing a production system into discrete activities facilitates in a meaningful cost analysis of the system by observing the corresponding costs involved in carrying out individual activities in the value chain. Costs associated with different activities in the production of print and electronic journals can be observed in Figures 1 and 2 respectively and the same is tabulated for a comparative analysis as shown in Table 1.

As implicit from Table 1, distinguishable difference is observed in the costs involved with the article / non-article processing activity of print and electronic journal. While 41.65% of the total costs are incurred in the case of print journals, only 5.43% of the total costs are required for carrying out this activity in the case of electronic journals. It is to be noted that in the case of print journals, while the costs involved in 'correspondence activities' between the publisher and the author (in connection with the manuscript) is minimal, the costs involved in the materialistic realization of the journal, is largely a function of the following:

- number of articles and their length;
- the average number of pages per article;
- number of special graphic pages produced;
- number of issues published in an year.

Irrespective of the number of journals produced or the total number of subscribers, the costs for the materialistic realization of the journal are inevitable. The capability of electronic journals, in producing the articles in electronic medium largely minimizes the costs arising from these factors.

Considering the production activity, while 20.80 per cent of the total cost is spent for reproduction in the case of print journals, 41.54 per cent of the total cost is spent on technical realization of electronic journals. It is noteworthy that while the
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Table 1— Costs involved in different activities in producing print and electronic journals

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Activity</th>
<th>Print Journals (%)</th>
<th>E-Journals (%)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Preliminary survey</td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>2</td>
<td>Article / Non-article processing</td>
<td>41.65</td>
<td>5.43</td>
</tr>
<tr>
<td>3</td>
<td>Reproduction / Technical Realization</td>
<td>20.80</td>
<td>41.54</td>
</tr>
<tr>
<td>4</td>
<td>Distribution</td>
<td>12.70</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Maintenance</td>
<td></td>
<td>16.46</td>
</tr>
<tr>
<td>6</td>
<td>Publishing support</td>
<td>24.02</td>
<td>34.47</td>
</tr>
</tbody>
</table>

costs of reproduction of print journals is a recurring cost, the costs incurred on the technical realization of an electronic journal is a one-time expenditure. The same platform can be effectively utilized in publishing the journals in the consecutive years with a minimum cost being spent on the maintenance of the platform.

With respect to the ‘distribution’ activity, it is observed that while a recurring cost of 20.80 per cent is spent annually in the case of print journals, the cost in the case of electronic journals is almost zero. The developments in the field of information technology, particularly the Internet technology has facilitated in achieving a minimum cost for the distribution activity in the case of electronic journal. With reference to the ‘publishing support’ activity, while 24.02 per cent of the total cost is incurred in the case of print journals, 34.47 per cent is spent in the case of electronic journals.

Comparison of costs associated with different activities in the value chain clearly establish that majority of the costs pertain to article processing, production and distribution. Migrating to e-journals can effectively minimize these costs. However, various studies have observed similarity in the cost structure of paper and electronic publishing activities with a relatively small percentage of savings achieved with e-journals. These studies note that savings obtained with e-journals are partially offset by costs associated with electronic storage, software and typically high labour costs. In the wake of such an argument, the ensuing section considers various cost-drivers that drive an industry's competitive position to highlight the cost position of e-journals.

COST DRIVERS

The various structural cost drivers that shape the competitive position of an industry, as identified by Riley are scale, scope, experience, technology and complexity [12]. The cost position of the journal industry in terms of these structural cost drivers can be explained as follows:

Scale: Though the average cost of production of print journals is expected to fall in the subsequent years of production, a steady decrease in the number of subscribers has only led to an increase in the journal prices. Since subscription is the main or the only source of earning revenue, publishers tend to increase subscription prices for recovering their profit share. The reality with respect to e-journals that the digital data can be sold and retained with no difference between the original and the duplicate and more importantly, the marginal costs of further production tending towards zero can be best exploited. Therefore e-journals are projected to achieve larger 'economies of scale' in terms of production. Further, with respect to print journals, another issue to be noticed is the difficulty in achieving larger economies of scale in relation to 'delivery of print journals'. This is due to the fact that the costs of delivery to a given buyer remain fixed regardless of the buyer’s order size. However, in the case of electronic journal, with effective utilization of technology, it is possible to achieve...
large economies of scale in distribution of electronic journals. Electronic journals, with its ability to achieve large economies of scale in ‘production’ and ‘distribution’ is expected to amortize the cost of intangibles such as advertising, promotional activities, R & D etc. involved in publishing support activity over a period of time.

Scope: Studies, while observing increase in the number of articles per journal and the length of individual articles, note a significant increase in the pages published per scientist. This characteristic can largely facilitate e-journals in achieving larger economies of scope. Further, related e-journal features and products can complement in achieving larger economies of scope.

Experience: Valuable insights gained from print journals industry can be banked upon in realizing e-journals as a successful source of information. Broadly, the following form the principal reasons for which journals are sought:

- important source of information;
- expected to deliver a high scholarly value;
- publishing medium for disseminating research findings;
- prestigious matter to publish in reputed journals.

However, the escalating costs of print journals, delay in publishing activity due to editing and peer review process, steady decrease in the number of subscriptions etc. have forced the user community to look for substitute means of obtaining information. E-journals can achieve a competitive edge by successfully sorting out the problems faced by print journals, which can be achieved by meticulously considering the important reasons for which the print journals are primarily sought and the various barriers confronted in accessing the same. Incalculable experience gained by print journal industry would certainly go a long way in defining and structuring e-journal industry for satisfying our current needs.

Technology: Technology forms another important feature that facilitates an industry in achieving sustainable competitive advantage. Since technology form the fundamental premise of e-journals, larger economies of technology can be effectively achieved.

SUSTAINABLE COMPETITIVE STRATEGY AND PROFIT MARGIN

Porter substantiates that an industry can develop a sustainable competitive advantage based on a strategy involving ‘cost’ or ‘differentiation’ or both [13]. While offering the product at a lower cost as compared to its competitor’s prices, but not compromising on the quality could formulate a low cost strategy. A differentiation strategy can be designed by laying primary focus on differentiating the product in the competing environment. This strategy’s premise is on creating additional value in the product that would be perceived as something unique by its customers. By taking into account both ‘cost’ and ‘differentiation’ issues, a company can formulate a ‘differentiation with cost advantage’ strategy.

A ‘differentiation with cost advantage’ strategy can be successfully formulated in the case of e-journals. While realization of lower costs in activities such as article / non-article processing, reproduction, distribution, maintenance and publishing support could facilitate in formulating a low cost strategy, the distinct features of e-journals such as hyperlinks, interlinks to databases, multimedia effects, faster communication etc., combined with capabilities of search engines would facilitate in differentiating the product.

The profit margin in a value chain is defined as the difference between the total value or return and costs of carrying out the value activities in the entire value chain. Albeit considerable profit margin being achieved in the case of e-journals with respect to cost factor, it is extremely important to look at the wider profit margin achieved in terms of the ‘value’ for all the stakeholders involved in the process viz., information producers, information managers and information users. In the current scenario of information explosion coupled with difficulties in accessing the same, the strategy of all the
stakeholder should be to focus on "getting the right information, at the right time, at a minimum cost with a minimum effort" aimed at gaining a competitive advantage. Substantiating the argument, Tenopir and King observe two aspects of information value in journals viz., 'purchase value' and 'use value' [14]. While 'purchase value' is what users are willing to pay for the information, the 'use value' reflects the benefits gained from the use of information, both of which needs to be present in journals. The profit margins obtained in the case of e-journals clearly establish sound 'purchase value' and 'use value', thereby creating a competitive advantage for all the members concerned with the industry. The scenario is portrayed in Figure 3.

CONCLUSION AND OBSERVATIONS

To sum up, the value chain analysis of print and electronic journals, clearly advocates electronic journals as viable and cost-effective medium for information creation and dissemination. Besides highlighting the fact that the initial cost in establishing an electronic journal is comparatively lower than that of a print journal, it observes that the structural annual costs of publishing electronic journals
reduces drastically over consecutive years of its establishment. Further, the cost drivers associated with e-journals drive towards achieving a competitive position. A 'differentiation with cost advantage' strategy can be effectively formulated for sustainable competitive advantage for all the stakeholders in the industry viz., information producers, information managers and information users. It is observed that by addressing the crucial issues of authenticity and validity of articles and thereby publishing valuable peer-reviewed scholarly articles, electronic journals can play a major role in meeting our increasing demands effectively.

Further, e-journals can also play a prominent role in effectively bridging the 'digital divide' between rural and urban users. While access to e-journals is limited, the cost analysis put forward in the paper augments the notion of utilizing e-journals for filling the widening gap between rural and urban user community. In view of enormous cost savings to be achieved in the case of e-journals, appropriate strategies and action viewing e-journals as a valuable source of information could be initiated by the Central and State Governments for providing information for larger sections of user community. Thanks to the initiatives in forming 'consortium arrangements', access to e-journals is being increasingly facilitated. With rapid development of technology and sharp decrease in the costs associated with it, e-journals can be prophesized to occupy a prominent position in information management process in the near future.

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