The Effects of Media on Production of Information

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Recently, there has been a surge of new technologies that are changing the way information content is produced and delivered to consumers. The adoption of these technologies can have a significant impact on the process of information creation and dissemination. The result of this impact has typically been measured unidimensionally, in terms of the quantity of information produced (Lyman and Varian, 2003). While, the quantity of information may help us to quantify the *information overload*, it is not sufficient in understanding the complete impact of new technologies on the process of producing information. The quality of information is another important metric that can lead to a better understanding of the impacts of such technologies, above and beyond information overload. By understanding if the quality of information is compromised due to the increase in quantity, we will be able to identify the conditions under which both the quality and the quantity of information can increase. These results may provide insights for developing incentives, policies and technologies that will lead to the production of higher quality information in equilibrium.

The purpose of this paper is to understand the ways in which a new technology is affecting the quantity and the quality of published information. The quality parameter can be further broken down into the "physical" quality of the information and the quality of the content. The physical quality of a piece of information is determined by the format that it is published in. The quality of the content can be quantified in terms of four essential attributes: accessibility, interpretability, relevance, and integrity (Bovee et al. 2003).[1] We develop a framework to understand the process of information production in broadcast media and other large scale publishing. The framework comprises of three layers, namely the *genre* (which defines the purpose and the form and consequently the quality parameters of information) to which an article (or piece of information) belongs, the *channel* (a profit maximizing firm that produces and disseminates articles) and the *media* (or the technology) that is used by a channel to produce and disseminate the articles. The process of producing an article of information includes four steps: the conceptualization phase during which the idea for an article is created; the production filter phase that determines whether or not an article that has been conceptualized will be published, and is unique to each channel; the production phase, in which the first instance of articles are created; and finally the distribution phase in which the articles are reproduced and distributed to consumers. There are costs associated with each step of the production process and changes in technology and consequently media that are employed by a channel determine these costs. Based on this framework, we develop an economic model of information production which is used to understand how a particular technology changes the quality and the quantity of information, while the revenue, demand and supply of articles are kept constant. A numerical study was conducted via simulation methods to determine the average quality and number of articles that were published by a variety of channels types[2] under different conditions.

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[1] The quality of information can be considered to be both "search" qualities as well as "experience" qualities (Darby and Karni, 1973), however in this paper, we only consider the "search" qualities of the content.
[2] The type of a channel specifies the budget constraints it faces as well as it's aspirations for content quality.

We examine three primary effects of existing channels' adoption of a new technology, namely the reduction in costs, elimination of capacity (i.e., space and time) constraints and the ability to un-bundle the information goods. The adoption and use of digital technology has significantly decreased the costs of producing and reproducing information goods (Shapiro and Varian, 1999). We find that a decrease in production cost does not affect the overall quality of articles produced and distributed; however it does lead to an increase in the quantity of articles produced by channels that produce fewer articles than their capacity due to budget constraints.

Similarly, digital technology offers increased storage at lower costs, thus eliminating constraints on the amount of information that can be published and made available for distribution. The elimination of the capacity constraints will result in an increase in the quantity of articles published by channels that already publish to their maximum capacity. This increase in quantity is directly proportional to the channel's budget constraint and inversely proportional to the target quality level of a channel.

Since the cost of storage is significantly reduced, the cost of distributing one bundle is the same as distributing the individual components of the bundle separately. We find that given the ability to unbundle, the quality of articles will increase for channels with low quality thresholds and high cost thresholds. The economics of information goods research contains a growing body of work on the effects of bundling and unbundling. Bakos and Brynjolfsson (1999) study the bundling of a large number of information goods of decreasing value and find that it is optimal to offer a menu of bundles. On the other hand, McAfee, McMillan et al. (1989) findings show that mixed bundling is more optimal than pure bundling or no bundling and Chuang and Sirbu (1999) show that pure unbundling out performs pure or mixed bundling when selling academic journals online. Bakos and Brynjolfsson's (2000) findings are the most applicable in the case of the music industry and indicate that reductions in marginal costs will favor aggregation, while reductions in transaction and distribution costs will tend to make disaggregation of information goods more profitable. While these studies have investigated the economic impacts of bundling and unbundling, our study is unique in examining the impact of bundling and unbunding on the *quality*, as well as the quantity, of information that is produced.

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