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Jeanne King

California State University, San Bernardino

Patrick McInturff

California State University, San Bernardino

C.E. Taipe Rohm

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e-Commerce: How the times have changed

Jeanne King
Patrick McInturff
C. E. Tapie Rohm
California State University

ABSTRACT

The advent of E-Commerce and the information age are catalyzing fundamental decision making processes as well as their management. In this article the authors develop a functional definition of information which forms the resource base in evolving decision making activities where uncertainty and short time horizons tend to predominate. The article also makes the case that modern managers will need to be entrepreneurial.

INTRODUCTION

"The times they are a-changing," a classic lyric from Bob Dylan's famous song, is now even more on target with the rapid development of e-Commerce. A decade ago, use of the "net" was limited to scientists and a few hobbyists. Today, the Internet provides communication, entertainment, and is now a conduit for business commerce and a variety of commercial transactions. Whether the focus is on e-Banking, e-Auctions, or e-whatever you can imagine, the times have certainly changed. Over the past six years the use of the Internet and the World Wide Web (the "web") has become ubiquitous, popular, and, as an information gatherer, an invaluable resource and major time saver. Most people, even novices, have heard about HTML (hypertext mark-up language), many know how to generate a web page using software that requires minimal programming and virtually all Internet users are masters at moving around the web following links to Uniform Resource Locators (URLs).

Estimates of the number of web pages are nearly three-fourths of a billion sites, with thousands of new sites being uploaded daily. Web pages can be had for free at many host sites. Microsoft and Netscape are at war offering various browsers and search engines; neither has emerged as a clear-cut winner, but most of their competitors have dropped from sight. Educators and entrepreneurs are providing information and access to new products in response to user requests for services. Overnight, ordinary people have been turned into millionaires or billionaires with Initial Public Offerings (IPOs) made by their companies for additional investment capital; many of these ventures are highly speculative and the turnover rate is high.

Understanding e-Commerce requires analysis of a minimum of two attributes: the creation and decimation of information, the integration and interaction of information in a dynamic decision context. The purpose of this brief article is twofold: (1) to provide a foundation for understanding e-Commerce and (2) to identify and discuss some major components of e-Commerce and its continuing evolution.

INFORMATION AND E-COMMERCE: THE FUNDAMENTALS

Information defined. Generally, information is treated as a very nebulous concept—indeed its definition is considered almost as a given. In support of this notion, texts presently used in business curricula often lack an explicit definition of information, leaving the student to infer a definition from the remaining discussion. Explicit definitions that do exist are generally inconsistent with one another. The definition of information proposed here is one that is consistent with most existing usages, and is capable of accommodating meanings and nuances yet to emerge. In other words, we provide a definition that is usable now and should prove useful for the future. Thus, the definition of information as used in this article is "the perceived/relevant/functional data units that are incorporated into the decision process."

"Functional," in this context denotes the process that the sender's manipulated inputs result in intended objective outcomes for the receiver. The purpose is to disassociate information as a resource from static and noise in the process. A "data unit" consists of the lowest level of input that generates an objective output. Specifically, it is an ordinal unit that may eventually be measured, but is initially used in a descriptive sense.

These are indeed brief definitions, yet they provide sufficient substance to be immediately useful. At the same time, the Spartan nature of the definition of information used here is possibly its most important attribute, since it should be widely acceptable across a variety of disciplines that require managerial decision making. Thus, it can provide a consensual reference point for specialists in information science, economics, political science, communications and so forth. At the same time, the definition could prove to be generally acceptable to various schools of thought within broader disciplines (e.g., behaviorism or humanism within psychology). And it provides a way to integrate input from a variety of sources into managerial and information technology decisions.

INFORMATION: A CONTEXTUAL RESOURCE

In decision processes involving the allocation of resources, a fundamental premise is that resources are limited. If this were not the case, decisions regarding the allocation of resources would not be required. A list of the most important scarce resources would include for example, oil and gas, which have received particular attention in the environmental literature. But it is really the scarcity of oil that is of concern or is it what oil represents—that is, energy? Obviously, there was a time in history when oil was not scarce, and it was just a sticky substance that stuck to hands and feet when man first foraged along beaches and inland waterways. It was only when information was used to define the sticky substance and then applied, converting oil to energy, that oil acquired the status of a necessary and valued resource. It should be evident that it was not oil *per se* that constituted the valuable resource; it was the combination of oil, plus the information necessary to extract its valued properties. In this instance, as in many others, information can be viewed as a basic resource—as important as the tangible resource to which it is applied.

The search for information has always been pervasive. Gamblers read racing brochures, researchers develop theory, new knowledge and inventions, insurance companies calculate risks, and manufacturers forecast demands. With other tangible resources, information should be included in this classification. Information is perhaps the most essential resource on which society relies and grows.

For information technology managers, one important implication of this point is that information can be a scarce resource in decision-making processes. Again returning to the example of oil, it is not oil *per se* that is valued, but oil in conjunction with relevant information, such as the processes needed to convert it to energy, rights of alienation, laws of ownership and so forth. Thus, understanding the process of decision-making requires the ability to generate, manipulate, and synthesize a resource that is the key to decision-making—information.

Another critical facet is the collection and storage of information particularly with respect to the reduction of uncertainty in decision models. Economic and administrative methods for reducing or controlling uncertainty are a prominent feature of our social/economic system. Contract law, fiscal and monetary policies, and economic forecasting are several examples of methods of predicting or controlling future events. Information is the critical element in such decision processes. In fact, it is a scarce resource impacting our most important decision-making processes and the institutions responsible for them. In order to understand clearly the crucial nature of information as the resource of decision making, our discussion now focuses on the role of information in the context of several decision frameworks.

INFORMATION AND E-COMMERCE

Since 1957, generally acknowledged to be the advent of the Information Age, computer use and personal computer ownership has continued to accelerate. Internet access is now relatively cheap and consequently has greatly changed the role of information and decision-making processing. Pre-Information Age decision-making focused on the search for information that generally was not readily available and therefore incomplete. Currently the opposite is the case; a search of the web on a given topic may generate thousands of "hits" for web sites. For example, searching the academic literature is far different as compared to a "generation" ago. At that time, a researcher spent a great deal of time combing library card files and going through "the stacks" of books and journals. These searches often yielded other important sources and often one had to travel to distant libraries and, if luck was on one's side, find sought after references. Often now the process begins by computer, starting with one of the numerous search engines and typing in a descriptive keyword or phrase and then hitting the "search" button on the browser. A different problem now exists: the computer searches yield what is often too many citations that cannot be differentiated in terms of relevance, timeliness, or accuracy. This process creates a dilemma that is the opposite of the information scarcity problem.; specifically, how does a decision-maker identify and differentiate the relevant functional data units from the sometimes thousands that are available on the web?

The change to an electronic information society requires a similar conceptual transition in relation to the "push-pull" of the marketplace. The proliferation of e-Commerce sites permit relatively low business start-up costs; spare bedrooms and garages are replacing separate locations with rents and regulations. That is, no longer are costly locations essential to success. Business can be conducted by people working in cheaper, remote locations. The obvious conclusion is that e-Commerce has changed many traditional notations of the "hows and whys" of doing business, which can be rapidly altered by the "Nintendo-generation" taking over the marketplace. Even enterprises that should be difficult to put online are finding their niches on the net. For example, more than one net-based company will do grocery shopping with direct delivery to the consumer's door.

E-COMMERCE: THE COMING EVOLUTION

The evidence suggests that e-Commerce is clearly going to require a reformulation of business/managerial applications. At the outset these will consist of (1) new managerial models, (2) reformulation of marketing principles, (3) increased emphasis on multidisciplinary skills, and (4) a focus on multiple learning.

One characteristic of the business environment that has emerged during the Information Age is rapidity of change in chaotic environments. Entrepreneurial approaches have become more dominant in the theoretical realm as well as in the real world. The heart of entrepreneurship is the generation of a vision and the birth of an organization to implement that vision. Current, effective models of this approach arise from the many new information-oriented businesses that have been developed over the last decade. On the other hand, rapid change has brought with it substantial uncertainties. Thus, risk-taking has become a way of doing business. In fact, "business as usual" may be a requiem for disaster and possible enterprise failure. Decision-making in the world of e-Commerce is going to require new managerial models that focus on risk taking, entrepreneurship, and probably credible team behavior.

A second component of the transition into the e-Commerce era will involve refocusing principles of marketing and minimizing the digital divide. The question for marketers and advertisers is going to be "how to get the word across." The preponderance of individuals who have started web-based businesses have had to confront the problem of introducing and advertising their companies and attracting prospective clients or consumers. Although the formation of web-based businesses is generally quite simple and much less costly, getting the word out can be exceptionally difficult. Banners, tag-ons, and other forms of net advertisements have their own prices, which are not consistent or well established. Search engines and priority sequencing also come at a price. Moving away from traditional marketing media can result in an increased difficulty in reaching target audiences. Added to these barriers are the costs and obstacles of privacy and security. Consumers are asked to provide personal information that can be misused by hackers and other Internet "thieves." The future of e-Commerce is going to be critically affected by the creation and application of an information-based and secure digital marketing process.

A third facet is going to be the development and expansion of interdisciplinary approaches by those involved in the evolution of e-Commerce. Contemporary business decisions demand greater amounts of information as well as increasingly diverse kinds of information. Decisions that appear to be purely economic, for instance, often require inputs from environmental, legal, and political specialists, among others. Neglect of these inputs may lead to undesirable or even disastrous results (e.g., the legal costs to firms accused of having dumped toxic wastes, and the clean-up costs to firms found guilty). Effective use of these diverse forms of information must be integrated within the decision-making process.

Before integration of information can occur, a number of difficulties must be resolved. Foremost is reconciling the multiple (and often conflicting) meanings of "information" in various disciplines. Whether the difficulty arises due to limitations based on language, psychological or behavioral constraints, it will be necessary for current and future information managers to have both the conceptual and experiential breadth to overcome the cognitive limitations arising due to rapid information and technological change and increasing systemic complexities of goods and services.

A final facet that figures into the evolution of e-Commerce is the increasing use of multimedia approaches. The real importance of this observation is that historically our educational system has matriculated those individuals on the basis of strong verbal and quantitative skills. A modern trend in a few elementary schools is not occurring where the focus is on what has been labeled multiple learning based on the concept of multiple intelligences; specifically, that there are several areas within the learning spectrum, such as musical, visual, hand-eye coordination, practical intelligence, and so forth. The evolution of e-Commerce, with its focus on multimedia, is going to require more individuals with diverse learning skills. In fact, the trend may be toward individuals who are not only multidisciplinary but who also have talents in multiple areas of intelligence.

CONCLUSION

In this article, the overriding argument being presented is that e-Commerce is, at once, a product of and catalyst for change in a variety of domains and for business and individuals alike. The change that will be required is basic and fundamental to traditional notions of the business and learning process. The requirement will be for individuals with theoretical and experiential expertise who function with multiple skills to solve problems in a changing, chaotic, and uncertain world.

As we have attempted to reason, an understanding of the evolution of e-Commerce requires that a fundamental definition of information first be developed. It was posited that information is an integral and at times limited resource and, for definitional purposes, is defined as composed of individual data units. As the information age evolves, these data units will become the primary resource base. Thus, as business progresses into the realm of e-Commerce, the information foundation is an essential defining construct for understanding the rise and changes accruing to a new

method of commercial activity. Specifically, future managers and decision-makers will have to refocus their skills to become multi-talented and multidisciplinary. Further, managerial entry into e-Commerce will require individuals with entrepreneurial attitudes and approaches who can operate in risky, chaotic environments. The times are not only "a-changing," they have changed, and managers and individuals will be expected to function and succeed in an electronic rather than traditional marketplace.