INTRODUCTION: WEB 2.0 TECHNOLOGIES FOR COMPETITIVE ADVANTAGES

Recently, the Web paradigm shifted from the business-centered to user-centered one. This paradigm shift has become known as “Web 2.0”, coined by Tim O’Reilly in 2004 (O’Reilly, 2007). Since then, Web 2.0 has become a Web platform as a method to quickly reach a large pool of consumers. Web 2.0 has changed the nature of a user from a content consumer to a content generator. In contrast, the pre-Web 2.0 era is characterized by read-only websites and proprietary web applications. Web 2.0 brought about a variety of interactive community-based initiatives that leverage data, harness distributed intelligence, and utilize a rich multimedia (O’Reilly, 2005). These community-based initiatives include collaborative advertising (e.g., Google AdSense), P2P file sharing (e.g., BitTorrent), and user-generated content (e.g., Wikipedia), and social bookmarks (e.g., del.icio.us, Digg), to name a few. The contribution of Internet users to the content creation of the websites has been dubbed “user generated content” (UGC). While technological distinctions between Web 1.0 and Web 2.0 are often not clear in some areas, the social and technological environment for positive user participation and interactivity epitomizes Web 2.0.

Many companies saw the potential benefits of Web 2.0 and began to capitalize on it. This extension of Web 2.0 to the industries is dubbed as “enterprise 2.0” (McAfee, 2006b). The user-generated contents are used to understand customers’ preferences and to support instantaneous, custom-tailored customer experiences (e.g., Amazon’s book reviews, Blockbuster’s movie recommendations). The wisdom of crowds is another business area which utilizes the aggregation of information in groups (e.g., the sales forecast at HP through prediction markets and ‘Connect and Develop’ platform at Procter & Gamble). Crowdsourcing is also explored in business such as product developments to leverage the Web-based mass collaboration (e.g., Pepsi’s marketing campaign in early 2007 which allowed consumers to design the look of a Pepsi can).

While no single economic theory can fully explain the sources of value creation of e-business (Amit & Zott, 2001), the potential of value creation in e-business may be derived from four interrelated dimensions: efficiency, complementarities, lock-in, and novelty. In a similar vein, values derived from Web 2.0 may be assessed from these four dimensions. Barney (1991) suggested that advantage-creating resources must have four conditions: value, rareness, inimitability, and non-substitutability. As Web 2.0 technologies are now widely available and easily substitutable, early adopters’ advantage will be rapidly eroded. Small or large, firms that constantly create unique value of Web 2.0 through superior management skills, innovation, and business process reengineering are likely to enjoy sustainable competitive advantage.

The main purposes of this preface are to review literature on Web 2.0, to explore a typology of Web 2.0 technologies and to suggest future research directions. This preface proceeds as follows: Section
2 presents a literature review on Web 2.0. Section 3 develops a typology of Web 2.0 applications in businesses. Finally, Section 4 concludes with managerial implications and future research directions.

LITERATURE REVIEW

Principles of Web 2.0

Web 2.0 refers to the multitude of new ways that the Internet is used as a platform for developing and hosting software applications and developing and exchanging digital contents by the businesses and users. Web 2.0 has already had great impacts on the ways that people interact and businesses operate. Popular Web 2.0 applications include social networking sites, videos and images sharing, wikis, blogs, and social bookmarking. While many researchers have presented often confusing and conflicting opinions on the characteristics of Web 2.0, the following seven principles exemplify Web 2.0 (O’Reilly, 2005, 2006).

1) The Web as Platform

The Web serves as a platform which is loosely tied together by a set of protocols, open standards, and agreements for cooperation. Web 2.0 connects services to each other and harnesses the power of the users. Web as a platform can *leverage a massive variety of customer-self services and unique data via users’ interaction and participation, expanding from the center to the edges of Web space and from the head to the long tail of the population.*

2) Harnessing Collective Intelligence

As users contribute new contents to the Web, the web of connections and associations among users grows stronger as a result of their collective activities. Collective intelligence is formed out of massive user participation and collaboration via the Web. Innovative Web business models such as social bookmarking and online encyclopedias take advantage of the *network effects:* the more people participate in generating and refining contents, the more useful they become to the users. Collective Intelligence *contributes to the market success* of Web 2.0 adopters.

3) Data as the Next "Intel Inside"

The competitive advantage of Web 2.0 that adopters inherit comes from superior data management. Successful e-commerce business models utilize some type of specialized data. Those data might be about products, events, customers, location, or maps. As evidenced by innovative e-commerce companies such as Google, eBay, and MapQuest, the control over exclusive databases can lead to market dominance and sustainable competitive advantage.
4) End of the Software Release Cycle

Software in the Web 2.0 era must be understood as a service, not as a product, which has to be operated daily with users as co-developers. Google’s or Yahoo!’s expertise in daily operations is as important as expertise in their new product development. These companies will cease to exist if they cannot operate daily. The daily operations run on Web-based software, which is constantly being developed and upgraded. In the spirit of the open source development practices, users must be treated as co-developers. The perpetual beta is a Web 2.0 software release strategy in which the product is developed in the open, with new features slipstreamed in on a monthly, weekly, or even daily basis.

5) Lightweight Programming Models (LPMs)

A simple pragmatism in application development is touted. Google Mashup and RSS have become one of the most widely deployed web services because of its simplicity, while most other complex web services have yet to achieve wide adoption. The lightweight programming models (LPMs) intentionally maintain low barriers to create a network of loosely coupled systems. Other features of LPMs include syndication of data and design for “hackability” and remixability.

6) Software above the Level of a Single Device

Web 2.0 is no longer limited to the PC platform. Software can be accessed by PCs, servers, handhelds, and other mobile devices via various Web platforms. iTunes is an example of the software developed above the level of a single device. This application seamlessly reaches from the mobile device to a massive back-end server, with the PC acting as a local cache and control station (O’Reilly, 2005). TiVo is another good example of a multi-device application. It can seamlessly transfer shows from a server to PC, and then to mobile device.

7) Rich User Experiences

Success of the Web applications depends on a satisfied user experience. Rich user experiences of Web applications will come from PC-equivalent interfaces and interactivity. Google’s AJAX is a technology which brings rich user experience by delivering full scale applications.

Web 2.0 Technologies

A recent McKinsey (2008) survey indicates that “a growing number of companies remain committed to capturing the collaborative benefits of Web 2.0.” According to Forrester Research (2009), the investments in Social Media are expected to grow by more than 15 percent annually over the next five years despite the current recession. The following discusses major Web 2.0 technologies including social networking sites, blogs, folksonomies, and wikis.
1) Social Networking Sites

Social networking sites (SNS) use the Web-based technologies to allow individuals to form or maintain online social connections and share their skills, talents, knowledge, and/or preferences with other members. Boyd and Ellison define social networks as “web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system” (2007 p. 211). While every social networking site requires its members to create a profile, each site has different purposes and targets certain user population. For example, Facebook focuses on students’ friend networks, while LinkedIn focuses business networks, and MySpace focuses on special interest topics such as movies and hobbies. Recently, these SNS are expanding their business models and are competing with each other.

Firms began to use SNS in a variety of ways. Many firms leverage their own internal SNS to increase efficiency in the workplace (Middleton, 2008). SNS also facilitate recruiting and connecting potential contributors for distributed innovation processes (Cash et al., 2008). As hiring tools, SNS enable recruiters to view the manner in which candidates behave in an online setting and the type of people they socialize with (Henricks, 2009). Firms can also use social networks to engage in direct market research (Henricks, 2009) and to maintain a positive relationship with customers (Parise et al., 2008). LinkedIn’s new service, Company Groups, allows all of a company’s employees to subscribe to a single private Web forum where they can talk to one another, share ideas, and ask company-related questions.

2) Blogs

Blogs are online journals that are characterized by short entries and regular updates. Blogs are inherently flexible and can be used for a variety of purposes, ranging from personal opinions of the author to knowledge management initiatives and customer relation tools (Ives & Watlington, 2005). Personal or public websites are used to host blogs and the posted messages can be distributed to other sites or readers via RSS. One of the most useful features of blogs is the functionality that allows readers to comment on each entry (Kolbitsch & Maurer, 2006; Rosenbloom, 2004). This feature enables readers to engage in an open discussion for every post (Zerfass & Boelter, 2005). The collective comments and links on blogs form a clustered network termed the blogosphere (Schmidt, 2007). A variety of public blogging services are available to individuals and firms. For example, Twitter is the most popular social networking and microblogging service which thrives on constant change and updates. Tweets are text-based posts of up to 140 characters displayed on the author’s profile page and delivered to the author’s subscribers who are known as followers. Authors can restrict delivery to those in their circle of friends or allow open access.

Firms can use public or private blog sites to establish a communication channel between themselves and customers. The publication of a blog enables the firm to interact directly with consumers. Leading firms like Boeing, IBM, and GE are all early adopters of corporate blogs. While the blog can be used for public relations, it can also be used to promote new products and receive consumer feedback to products and services. For example, GE makes public announcements on their blog sites, asks their employees to contribute articles/opinions on various topics, and invites other employees and customers (http://ge.geglobalresearch.com/blog). Senior management also utilizes internal and external blogs to make announcements and seek inputs from various stakeholders.
Internal corporate blog sites offer a communication channel for individual employees to express themselves and share information with each other. Internal bog sites can be used as a knowledge repository to store expert knowledge and experiences and a connection point among employees.

3) Collectively Arranged Metadata: Folksonomies and Tags

Collectively arranged metadata is the result of user participation in classification of digital objects. Collectively arranged metadata become more useful as more users participate in the creation. The process of individually assigning metadata about objects such as URLs, images, videos, and texts is called folksonomy or tagging. The process of assigning tags or labels to websites is also often referred to as social bookmarking. The primary benefit is that users will find information more easily and accurately. Folksonomies have become part of social software applications such as bookmarking and photograph annotation, and have become an important alternative to search engines or other instruments for navigating the Web. An empirical analysis of the complex dynamics of tagging systems has shown that consensus around stable distributions and shared vocabularies emerges, even in the absence of a centrally controlled vocabulary (Halpin et al., 2007). Some of popular tagging sites include del.icio.us - a social bookmarking system and Flickr - a photo publishing / sharing site.

4) Wikis

Wikis are easy-to-use, browser-operated platforms that enable collaborative publication on the Internet (Ebersbach & Glaser, 2005). Wikis also embody a specific mindset towards the accumulation of knowledge. They allow many individual participants to contribute to an online document or discussion, usually via centrally managed content management systems. In contrast to blogs, the content of wikis tends to be more unbiased, as the author allows the readers to co-edit the original document. Through multiple revisions of a document by a group of co-authors, the content becomes more credible (Kolbitsch & Maurer, 2006). One of the most successful applications of wikis is Wikipedia, a popular online encyclopedia for which any user can contribute and edit contents. However, the open collaborative nature of public wikis raises concern about the validity of information contributed by the public (Priedhorksy et al., 2007). Therefore, a number of validity checks have been implemented to the contributions made to a given topic. Wikis are designed to make it easy to correct mistakes and track changes.

For businesses, wikis serve as an excellent technological platform for knowledge management and can facilitate innovations (Tapscott & Williams, 2007). Corporate wikis can also be used as a collective intelligence tool to tap the expertise of a large group rather than an individual. Firms have the opportunity to derive value from the mass collaboration of the public that participates in wikis. By allowing consumers to contribute ideas revolving around the firm’s products, the firm can not only develop the core consumer base, but also create values for any consumer that can benefit from the collaborative works. Internal wikis can be applied to a number of possibilities such as collaborative knowledge management (Wagner, 2004). Wikis are also an excellent project management tool due to their ease of use and update capability. Wikis can be created at any time of the project and updated throughout the project life. Wikis are increasingly used internally by firms such as Adobe Systems, Amazon.com, Intel, and Microsoft.
Web 2.0 Business Applications

Web 2.0 brought about a wide range of changes with respect to their influence on e-business (Fleck et al., 2010). Businesses can take advantage of a variety of Web 2.0 technologies in order to dynamically cooperate with customers and partners to generate new design innovations (Brown, 2008). Web 2.0 has contributed to an unprecedented growth of information volume, new forms of networking, many new shopping alternatives and customer empowerment (Constantinides & Fountain, 2008). A recent survey by Stelzner (2009) on the status of Social Media marketing reports that 81% indicated that it has generated exposure for their business, 61% that it has increased their traffic/subscribers and opt-in lists, 56% that it has resulted in new business partnerships, and 45% that it reduced their overall marketing expenses. Another recent survey published by the Aberdeen Group (2009) found that for 70% of the participating companies (what they call Best-in-Class and Industry Average performers) the use of Social Media as marketing strategy increased the return on marketing investment, improved the likelihood of customers recommending their products, and improved the customer acquisition rate (Constantinides, 2010).

Both practitioners and researchers are converging on the usefulness of Web 2.0 for organizations. Firms such as Procter & Gamble, Amazon, and others have gained a significant experience and benefits from the applications of Web 2.0 technologies. (Bughin & Manyika, 2007; Koplowitz & Young, 2007; McAfee, 2006a). The way for firms to capture benefits from Web 2.0 technologies differs substantially from the way they obtained benefits from other information technology (IT) projects (Bughin & Manyika, 2007; Koplowitz & Young, 2007; McAfee, 2006a; De Hertogh & Viaene, 2010). To stay competitive in the Web 2.0 environment, firms must understand how to navigate and capitalize on the changing Internet terrain (Dinger & Grover, 2010). Regarding the adoption of Web 2.0 technologies, evidence suggests that pioneers in this field are the large corporations rather than the SMEs (Constantinides, 2010). A review of the literature indicates that previous research focused mainly on the importance of online communities for corporations (Du and Wagner, 2006) and the effects of these new technologies on business (Karger and Quan, 2005; Deshpande and Jadad, 2006; Boll, 2007).

A TYPOLOGY OF WEB 2.0 BUSINESS APPLICATIONS

So far, the previous studies on Web 2.0 have mostly focused on the roles of Web 2.0 and the application of the technologies. However, as web technologies advance, the need for developing a framework of Web 2.0 applications that reflect the unique characteristics and capabilities has increased. In order to meet our specific research purposes, our study adopts a typology approach to the framework development. Typologies are specific rather than general classifications, otherwise known as taxonomies (Bailey, 1994). Typologies are mostly generated through qualitative classification rather than quantitative or statistical analysis.

In exploring the typology, three Web 2.0 support types are identified: social networking, information sharing, and collaboration. These three types are chosen based on the selection criteria of research purposes, significance of dimensions, and parsimony of the typology. Social networking Web 2.0 facilitates and expands the networks of businesses and customers on the Internet. Information sharing Web 2.0 facilitates creating, storing, refining and sharing information between users. Collaboration Web 2.0 supports and enhances the collaborative works on the Internet. Web 2.0 users’ interaction space is classified

**Business-to-Employee-to-Employee Space**

Business-to-employee-to-employee space refers to a space created exclusively for a business organization and its employees. Business-to-employee-to-employee space enables businesses to complement existing e-commerce applications by integrating multiple Web 2.0 platforms. This space is intranet-based secure space. Unlike typical business-to-employee e-commerce, which is mostly for one-way communications, this space encourages employee-to-employee networking, information sharing, and collaboration. It is expected that employee-to-employee information sharing and collaboration contributes to the increase of the productivity. Businesses play a central role in this space by consciously designing Web 2.0 tools, creating and managing contents, supporting the active employee-to-employee interaction and involvement, and analyzing employee generated contents. Businesses should establish a Web 2.0 portal as a gateway to all corporate Web 2.0 tools, and set the strategic direction for future Web 2.0 investments. Internal blogs are used to announce corporate news and events and corporate wikis are used to conduct group works. Innovative use of Web 2.0 for consumers and business partners may be pilot-studied in this space. Knowledge management, training, ERP, SCM, CRM, research and development, and human resources are areas where potential value can be derived from this internal Web 2.0.

**Business-to-Employee-to-Consumer Space**

Business-to-employee-to-consumer space is formed for a business organization, its employees and consumers. This space is an extension of business-to-consumer e-commerce and can be designed as public and/or private. Business-to-employee-to-consumer space enables businesses to interact dynamically with their consumers via multiple Web 2.0 platforms. Firms initiate this space, and employees are engaged in dialogues with consumers in this space. Three major interactions occur in this space: business to consumer, and employee to customer, and business-to-employee-to-consumer. Firms have to invest in the content creation and in the design/implementation of tools to encourage the active customer interaction and involvement. Firms can keep their consumers informed of their products or services via tools such as RSS, Twitter, and blogs. In this space, employees are asked to write blog articles on certain subjects and consumers are invited to comments on them. Public and/or corporate social networking sites are used to create connections with consumers. An increasing number of companies use videos and pictures to enhance public relations. In this space, consumers’ product reviews are solicited, analyzed regularly, and integrated into improvement programs. In addition, consumers may participate in the co-creation of products and services as a crowdsources. Marketing, sales, product development, and logistics are some of the areas to benefit from this space. This space serves as a business intelligence system with little money invested.

**Business-to-Employee-to-Business Space**

Business-to-employee-to-business space is a space for a business organization, its employees, and business partners such as suppliers and distributors. This space is an extension of business-to-business e-commerce and designed as private. The multiple Web 2.0 information sharing and collaboration plat-
Table 1. Typology of Web 2.0 applications

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<tr>
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<th>Networking</th>
<th>Information Sharing</th>
<th>Collaboration</th>
<th>Value Creation</th>
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<tbody>
<tr>
<td>Business-to-</td>
<td>Human resources management,</td>
<td>Company news, Knowledge dissemination</td>
<td>New product development, Prediction market, Collaborative Knowledge creation, Project development</td>
<td>Empowerment, Employee participation, Employee loyalty, Knowledge management, Increased productivity</td>
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<tr>
<td>Employee-to-Board</td>
<td>Employee relationship management</td>
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<td>Employee Space</td>
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<tr>
<td>Business-to-</td>
<td>Customer relationship</td>
<td>Company news, Product review, Complaints, Market research, Promotion, Public relations</td>
<td>Product innovation, Collaborative filtering</td>
<td>Consumer loyalty, Open innovation, Increased consumer satisfaction Targeted marketing, Capturing customer data</td>
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<tr>
<td>Employee-to-Consumer Space</td>
<td>management, Public</td>
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<td>relations</td>
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<tr>
<td>Business-to-</td>
<td>Partner relationship</td>
<td>Company news, Product review, Complaints, New product announcements</td>
<td>Product innovation, Collaborative product development, Application development, Supply chain management</td>
<td>Relationship building, Business intelligence, Knowledge management, Increased productivity, Community of practices</td>
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<tr>
<td>Employee-to-</td>
<td>management</td>
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<td>Employee-Business Space</td>
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<td>Enabling</td>
<td>Private corporate networking sites, Public social networking sites (e.g., Facebook, MySpace, LinkedIn)</td>
<td>Podcast, RSS, AJAX, Mashup, Widget, Blog, Twitter, Forum, Bulletin, Social networking, Social bookmarking, Photo sharing, Video sharing</td>
<td>Wikis, AJAX, Widget, Open source software, Blog, Twitter, Social networking, Social bookmarking, Application sharing, Collective intelligence, Crowdsourcing</td>
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<td>Technologies</td>
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forms are expected to strengthen the relationship between business partners. Unlike business-to-business e-commerce, employees’ active participation in this space is encouraged. This space is extranet-based secure space. While business-to-employee-to-consumer space emphasizes the social networks, this space emphasizes information sharing and collaboration. On this space, business partners share experiences, problems, and ideas about products and services. By engaging employees in this space, rapid and proactive measures are taken to problems and opportunities arising from the business partner side. Purchasing, manufacturing, inventory, product development, and warehousing are some of the areas to benefit from this space.

Table 1 shows the typology of the Web 2.0 applications. By combining the Web 2.0 user space and Web 2.0 support types, Web 2.0 applications can be divided into nine categories with the three user spaces on a vertical axis and the three Web 2.0 support types on the horizontal axis. Each interaction cell represents the specific user space and support type for specific business processes/activities. Some business processes/activities may belong to more than one cell, and the same Web 2.0 tools may be utilized for more than one business process/activity. The bottom row shows the Web applications that support each Web 2.0 support type. The last column shows the benefits/values derived from the specific user spaces.
CONCLUSION

Web 2.0 represents a paradigm shift in the Web applications. With its promise of a more rich, participatory and interactive user experience, Web 2.0 has quickly emerged as a powerful method for both user participations and interactions. Web 2.0 technologies become less complicated and less costly due to its wide diffusion and technological advances. As consumers are rapidly adopting Web 2.0 applications such as social networks sites, blogs, wikis, and social bookmarks, Web 2.0 has opened new opportunities for customer relationship management, communication, and collaboration for businesses. Many firms have opened up social networking sites and built blogs to post new product news and innovations along with solicitations for comments. To stay competitive, firms need to quickly adopt Web 2.0 and develop related business models and marketing tools.

The choice of technology and management practices is a managerial decision on the part of the company, as there is a tradeoff between technology and cost. Given the current technological advances and the pace of environmental change, firms must proactively embrace Web 2.0 technologies and redesign their core business processes in order to maximize their values. Web 2.0 technologies are advancing quickly. The number of Web 2.0 tools is ever increasing. To help practitioners to better apply the dynamically changing Web 2.0 technologies to their businesses, we presented a typology of Web 2.0 business applications. We classified Web 2.0 into three application types: networking, information sharing, and collaboration. We also classified user space into three categories: business-to-employee-to-employee space, business-to-employee-to-consumer space, and business-to-employee-to-business space.

Web 2.0 has driven a paradigm shift in the business operations. As such, there are numerous research opportunities in Web 2.0. In light of the significant impact on marketing and sales, research is needed to develop a unified framework to understand how consumer perceptions, privacy, risk, trust, and attitudes affect the adoption of Web 2.0. Investigating the relationships between the organizational characteristics and the choices of Web 2.0 will be of significant practical value. An in-depth understanding of what data/information they ask for/contribute and how they use them can be another interesting avenue of research. Many other interesting questions remain to be answered: How firms can influence the customer decision-making process by means of Web 2.0 tools, generate values, and engage consumers in the value generation process?; How large is actual performance and ROI of those social technologies? (Bugnin, 2010); To what extent do user generated reviews replace other means of information gathering about products and services that have traditionally been used for decision making by buyers? (van Iwaarden et al., 2010); Who own user generated contents, how trustworthy are user generated contents and who are allowed to benefit from it? (Fleck et al., 2010).

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REFERENCES


