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ABSTRACT

Web 2.0 is quickly evolving into one of the most important technologies to drive the business world. In about five years, it made its impact by converting the web into a platform for people to assemble and organize. Today it provides powerful tools for business use. Practitioners propose that they can lead to new product and service offerings, change business processes, and achieve remarkable levels of collaboration within and outside an organization. This research examines over fourteen hundred end-user responses and presents some early results. It empirically verifies the perceptions about the benefits of Web 2.0 and finds four factors that may influence the adoption of Web 2.0. Benefits like collaboration, process innovation, and cost reduction find strong recognition. The four underlying factors that appear to influence Web 2.0 adoption are Business improvement, Workplace collaboration, Innovation, and Personal use.

Keywords

Web 2.0, Web 2.0 benefits, Web 2.0 adoption, drivers, factors.

INTRODUCTION

Web 2.0 is the new revolutionary force poised to change the way businesses operate today. It is comparable to the impact of Web 1.0 in 1990's where it allowed businesses to connect globally, regardless of their size. Web 2.0 allows individuals to participate, collaborate, and contribute globally, regardless of their status (Dearstyne, 2007), as it converts the internet from a one-way medium like a television, to a platform for content creation, sharing, and re-purposing (Cheung and Lee, 2009). The phenomenon was labeled as Web 2.0 by O'reilly (2005) and defined as: websites that harness collective intelligence like Wikipedia, offer desktop-like applications on the web like Zoho, provide a web-based platform like Google, or a cloud computing facility like Amazon (Oreilly, 2005). Researchers and practitioners agree that Web 2.0 is about human connections (Bughin, Shenkan, and Singer, 2009; Panke and Gaiser, 2009) and allowing people to participate and collaborate on a global scale (Dearstyne, 2007; Bonabeau, 2009). The most often discussed features of Web 2.0 are wikis, blogs, online communities, virtual worlds, web-as-a-platform, software-as-a-service, and cloud computing.

According to practitioners, organizations today increasingly prefer Web 2.0 to conduct their business (Booz-Allen, 2007; Economist, 2007). Traditional businesses see many benefits, such as harness collective intelligence from people across the board to refine decision making (Bonabeau, 2009), using enterprise mashups to generate new competencies in real time to deal with emerging market scenarios and challenges (Anonymous, 2008b), and active and dynamic operating-level collaboration with web applications on mobile devices (Cunningham and Wilkins, 2009). Web 2.0 may have the potential to reshape the functional units within an organization. For example it can reshape marketing as it moves towards better collaboration with customers by becoming a part of the web-based customer community that actively exchanges information (Bielski, 2008; Florès, 2008). It is poised to alter manufacturing by fostering higher levels of collaboration within a company as well as with its suppliers (Anonymous, 2008c). It is changing the way legal recourse, arbitrations, and negotiations operate (Hughes, 2007; Katsh, 2007), while even playing a key role in international peace negotiations (Hattotuwa, 2005). It is transforming finance, banking, and insurance industries (Fest, 2008), while introducing radically different modes of borrowing and lending, like Zopa.com, that allow users to lend and borrow directly from each other without the bank as an intermediary, much like ebay. It is even changing the world of medicine (Giustini, 2006).

More importantly, Web 2.0 is driving a power shift in organizations: it puts the independent user in control, where individual users-- rather than large businesses-- decide how the web is used, although the infrastructure may be provided by large

businesses like Facebook (McAfee, 2006; Booz-Allen, 2007; Cuff, Hansen, and Kang, 2008; Stone, 2009). For example, organizations cannot force employees into social networking, wiki entries, or blogging and Web 2.0 remains a predominantly bottom-up movement. With powerful tools available for rich interactions and gathering contributions from thousands of networked minds and from resources across the globe, individual users rather than business executives may drive many aspects of business in the future, from day to day operations to even strategic decisions (Cook, 2008).

As Web 2.0 is an emerging technology, researchers Jiang et al (2009) found most business websites seriously lack any Web 2.0 content. Practitioners at McKinsey suggest that though Web 2.0 adopters see great benefits (Bughin, 2009), and there is a strong business interest in it, Web 2.0 adoption is very low (Bughin and Manyika, 2007; Bughin, 2009). Therefore it is important to explore the motivations that drive users to adopt Web 2.0. Scholarly literature today mainly addresses the Web 2.0 technology and the few that do look at Web 2.0 application are narrowly focused on the social networking phenomenon. Empirical studies on Web 2.0 are few. There is a wide range of practitioner literature on Web 2.0, but its main purpose is to enlighten the industry about this new frontier. There is a need to test the assertions made by practitioners and for development of new theory in Web 2.0 (Clarke, 2008). This research tries to examine the perceptions of benefits of Web 2.0 that influence users to adopt Web 2.0. The paper presents early results on a larger study that explores the end user perspective of Web 2.0. It examines over fourteen hundred responses spanning twenty three separate Web 2.0 applications. The unique proposition that Web 2.0 offers and its benefits for an organization are first discussed in the literature review. Next, the survey research methodology is described, followed by data analysis and a discussion of the subsequent results. In the conclusion section the research is summarized with a discussion of limitations and areas for further research.

LITERATURE REVIEW

The Web 2.0 phenomenon includes many different concepts and applications such as wikis, virtual worlds, software as a service, web-as-a-platform, cloud computing, service oriented architecture, and mashups to name a few. Recent academic research has focused mainly on the Web 2.0 aspect of enabling social networking to understand the structures and behaviors of such networks (Oinas-Kukkonen, Lyytinen, and Yoo, 2010). These social networks may be public such as Facebook, or on organizational intranets, and use technologies such as blogs and wikis. For example the study by Ganley and Lampe (2009) study the online community forum and networking at slashdot.com and examines elements of social networking. Another one by Prasarnphanich and Wagner (2009) survey sixty wikipedians to examine the motivations of contributors and the success of Wikipedia. While Cheung and Lee (2009), explore a virtual community of educators (www.hkedcity.net) to understand the factors that help sustain a virtual community. Although these studies examine the phenomenon of virtual communities, social networking is but one among the many uses of Web 2.0. They neglect other business offering of Web 2.0 such as web-as-a-platform, software as a service, and cloud computing. Few researchers have attempted to empirically examine the Web 2.0 phenomenon as a whole.

Researchers and practitioners suggest many different business benefits of Web 2.0. These are categorized into eleven benefits a business can expect from the use of Web 2.0 in everyday operations.

1. Change or improve a business processes: Web 2.0 provides features like mashups, wikis, online office, online project management, and online CRM that can improve or radically alter business processes. An example includes the use of a global wiki by IBM to identify emerging business opportunities for strategic investment, by inviting employees, suppliers, and customers to contribute (Hemp, 2006; Dearstyne, 2007; Cook, 2008; Bonabeau, 2009).

2. Create new business processes: Web 2.0 can allow one to do the same business but in a completely new way. Practitioners propose that with the new Web 2.0 technology, every aspect of business can change quite radically (McAfee, 2006; Anonymous, 2008b). It leads to the advent of Marketing 2.0, Enterprise 2.0, Training 2.0, and other such 2.0's to suggest a shift driven by Web 2.0. Each shift is a new way to conduct business. Marketing 2.0 (Anonymous, 2008a) talks about connecting with customer communities rather than bombarding them with advertisements; while Enterprise 2.0 (McAfee, 2006) talks about the new ways to manage business.

3. Help create new product or services: New offerings may include simple services like paid video tutorials on product training (Lynda.com), video conferencing with service personnel, and a wiki to provide self-support. Further, mashups allow customizing a solution to a particular need, like Housingmaps.com combines Google maps web service with Craigslist's web service to provide a unique offering. Using Mashup makers, organizations can now offer unique systems solution to their customers depending on the need of the moment.

Such mashups can now be created and deployed on the fly, resulting in value generation within hours instead of months (Anonymous, 2008b; Kavanagh, 2010).

4. Allow small firms to compete with larger ones: Researchers conclude that larger firms were the bigger beneficiaries of Web 1.0 rather than the small ones(Poon and Swatman, 1999; Hart, Doherty, and Ellis-Chadwick, 2000; Jeffcoate, Chappell, and Feindt, 2002). With Web 2.0, practitioners suggest smaller companies might finally compete with larger ones, especially with technologies such as Software-as-a-service, Cloud computing, free Web 2.0 tools, and web service mashups (Anonymous, 2008b; Kennedy and Mighell, 2009).

5. Help generate new customers: Web 2.0 can generate new customers by exploiting online communities and resources such as online CRM (SugarCRM and Salesforce.com), online lead generation, communities on twitter, blogs, youtube, and other social media. Practitioners assert that as a new media, web 2.0 offers a new arena with a whole host of new customers online (Edery, 2006; Hemp, 2006).

6. Allow customers and suppliers to contribute to your operations: Customers and suppliers are important business partners for an organization. Web 2.0 can help them actively contribute to an organization's operations by using the collaborative features of Web 2.0 (Dearstyne, 2007; Cook, 2008).

7. Make the organization a part of customers, suppliers, and/or employee communities: Web 2.0 allows for 'prosumers' i.e. consumers who are also part producers as they take an active role in shaping a firm's offerings (Clarke, 2008; Cook, 2008; Bonabeau, 2009). Such prosumers, while providing help free of cost as well as proving a global word-of-mouth campaign, are also more demanding, keep high expectations, and require quick organizational responses. Web 2.0 allow communities to come up very easily and these communities wield enough power to influence an organization

8. Provide virtual team collaboration for faster/ better decisions. Using tools like Google Docs and Zoho write, and wikis, people can collaborate virtually, in real-time even on a single page of document leading to faster and better decision-making (Baron, 2008; Bonabeau, 2009; Cunningham and Wilkins, 2009).

9. Gather intelligence from co-workers globally: This can allow an organization to take advantage of intra-organizational opportunities. With tools such as blogs, wikis, and whiteboards, one can now network minds inside their work unit or across their organization to solve a problem or share opportunities (McAfee, 2006; Dearstyne, 2007; Baron, 2008; Clarke, 2008).

10. Reduce costs: Reducing costs is one of the most attractive propositions. There is no direct cost of software, as most of it is web-based, or available for pay-per-use at a nominal rate compared to what an organization pays for professional software, with the added benefit of enabling collaboration (Cong and Du, 2007; Orr, 2008; Cunningham and Wilkins, 2009; O'Sullivan, 2009). With cloud computing, storage and computing power can be scaled to meet the needs of the moment (Anonymous, 2008b; Cunningham and Wilkins, 2009). It takes very little to train people on these tools, or to maintain the software (Cunningham and Wilkins, 2009). Many users, especially those entering the workforce are already comfortable operating in web 2.0, involving tags, wikis, and such.

11. Immersive-- Engage employees, keep energy levels high: Some researchers argue that pleasure and immersion leads to higher adoption (De Wulf, Schillewaert, Muylle, and Rangarajan, 2006). Some of the Web 2.0 technologies tend to be highly immersive and engaging, eliciting quicker adoption as well as higher levels of productivity from employees (Dearstyne, 2007).

This research examines if these proposed benefits by practitioners are also perceived as benefits by the end-users of Web 2.0, and to what degree. Further, the research attempts to find the factors that may drive the adoption of Web 2.0 among users.

RESEARCH METHODOLOGY

The first stage of the research was to select the best possible representatives for Web 2.0 applications for any business oriented task. Applications were selected from a range of sources that evaluate and recommend Web 2.0 applications. The sources include SEOmoz Awards and Webby Awards for Web 2.0, and websites such as CNet's Webware 100 and PCMag's Top 100 web apps. A selection of twenty three web 2.0 applications was made primarily on the basis of their direct application to business. These applications are listed in Table 1.

#	Web 2.0 application	Area of business application
1	Google Docs	Online documentation, presentation, and collaboration
2	Thinkfree	Online documentation, presentation, and collaboration
3	Zoho	Online documentation, office, project management.
4	Backpackit	Online office, project management.
5	Clarizen	Online project management
6	Attask	Online project management
7	Webex	Web conferencing and meeting
8	Dimdim	Web conferencing and meeting
9	Skype	Web conferencing
10	Ghost	Cloud computing
11	DesktopTwo	Cloud computing
12	Stoneware	Cloud computing
13	Salesforce	Online CRM
14	Wufoo	Collecting information on the web with forms
15	Quimble	Online polling
16	Google Sketchup	Online collaboration on product and concept designing/ drawing
17	Diigo	Web highlighter, sticky notes, online bookmarking for research
18	Mindomo	Collaborative, web-based tool for creating mind maps to visually connect ideas and information and drive creativity
19	Mindjet	Collaborative, web-based tool for creating mind maps
20	Dabbleboard	Collaborative, web-based tool for creating mind maps
21	LinkedIn	Business networking
22	Pbwiki	Online wiki for collaboration of activities between team members
23	SecondLife	Virtual, three dimensional, commercial world

Table 1. Web 2.0 applications relevant to business

Mashup editors were not included in the list as Microsoft Popfly and Google mashups closed within a few years of initiation. IBM discarded its QED Wiki to come up with a new solution in November 2009. Yahoo pipes provides a mashup editor whose capabilities were limited to RSS feeds.

In the next stage of the research, a self-administered questionnaire was developed as a part of a larger study on end user attitudes and perceptions about Web 2.0 applications in business. Literature suggests that although there is a strong business

interest in Web 2.0, the rate of adoption is very low (Bughin and Manyika, 2007; Bughin, 2009), possibly because Web 2.0 technologies such as wikis, blogs, and collaboration cannot be mandated by organizations. Such enforcement finds little support among end-users (Brzozowski, Sandholm, and Hogg, 2009). Organizations have to depend on its end-users to be motivated to adopt Web 2.0 in their daily routine, making it an end-user driven, bottom up phenomenon (Dearstyne, 2007; Cook, 2008). Increasingly they have to depend on the new generation entering the workforce that is already comfortable operating in web 2.0 (Cunningham and Wilkins, 2009). The online questionnaire for this study was made available to junior and senior level students in the business school as they represent the new generation of workforce and the early adopters of web 2.0 in an organization. The survey was pilot tested for clarity and applicability. Exercises were devised to acquaint them with each Web 2.0 application: online tutorials and the usage of it key features. They also contributed to a wiki analyzing each Web 2.0 application on SWOT: strength, weakness, opportunity, threat.

A total of 1483 responses were collected, out of which 29 were discarded due to insufficient data leading to 1454 usable responses.

DATA ANALYSIS

The first task is to empirically verify the claims of practitioners about the benefits of Web 2.0 against end-user perceptions. The second task is to empirically find the factors that motivate end-user adoption of Web 2.0. An exploratory factor analysis was conducted. Table 2 summarizes the means of the perceived benefits in a descending order of importance. The eleven benefits were collected on a five-point Likert scale, where 1 equals 'strongly agree' about a benefit. The closer the score to 2.5, the lesser is that benefit perceived by the user.

#	Perceived benefits of Web 2.0	Mean	Pr > |t|
1	Provide virtual team collaboration for faster/ better decisions	1.813	<.001
2	Gather intelligence from co-workers globally	1.911	<.001
3	Reduce costs	1.978	<.001
4	Create new business processes	1.997	<.001
5	Change or Improve the business process	2.023	<.001
6	Allow small firms to compete with large ones	2.214	<.001
7	Immersive: engage employees, keep energy levels high	2.218	<.001
8	Help customers and suppliers contribute in operations	2.242	<.001
9	Make you a part of customer/ supplier/ employee communities	2.270	<.001
10	Help create new products or services	2.336	<.001
11	Help generate new customers	2.429	<.001

Table 2. End user's perception of Web 2.0 benefits

The second task is to empirically find the factors that affect end-user adoption of Web 2.0. The eigenvalues in Table 3 and the scree-plot in Figure 1 indicate the presence of four factors.

Factors	Eigenvalue	Difference	Proportion	Cumulative
1	19.8325109	12.5200209	0.6411	0.6411
2	7.3124900	4.8873153	0.2364	0.8775
3	2.4251747	0.0519455	0.0784	0.9559
4	2.3732292	1.5242976	0.0767	1.0326
5	0.8489316	0.1942708	0.0274	1.0600

Table 3. Factor analysis: Eigenvalues
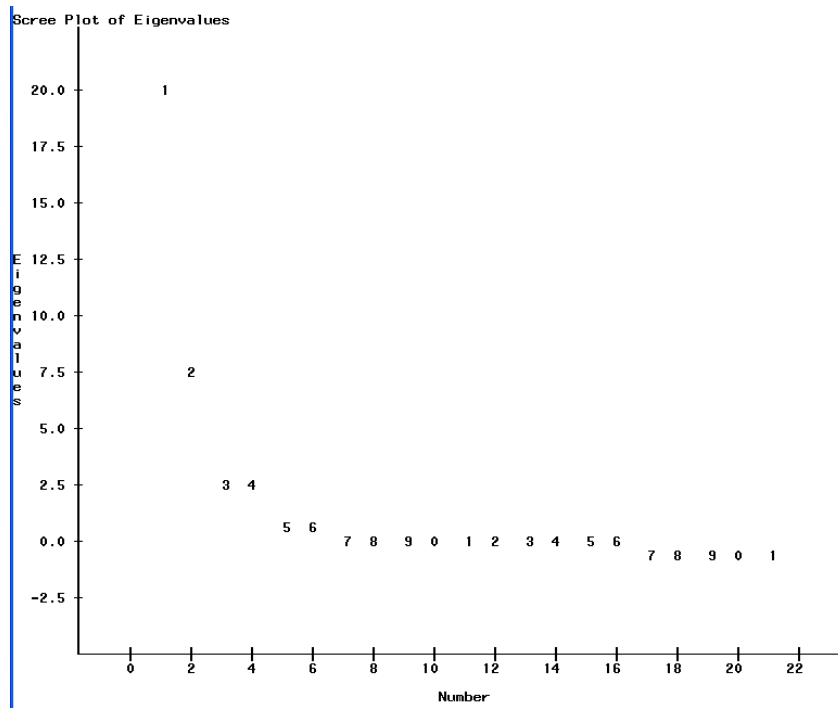
Figure 1: Factor analysis: Scree plot

#	Benefits of Web 2.0	Factor1	Factor2	Factor3	Factor4
1	Make you a part of customer/ supplier/ employee	**74**			

#	Item	Business Improvement	Workplace Collaboration	Innovation	Personal use
	communities				
2	Help customers and suppliers contribute in operations	**73**			
3	Gather intelligence from co-workers globally	**68**			
4	Provide virtual team collaboration for faster/ better decisions	**62**			
5	Allow small firms to compete with large ones	**58**			
6	Immersive: engage employees, keep energy levels high	**53**			
7	Help create new products or services	**52**			
8	Change or Improve the business process	**59**		**41**	
9	Create new business processes	**57**		**46**	
10	To work on group projects		**86**		
11	In other class related work		**85**		
12	To share/ edit documents		**83**		
13	To work with student groups		**67**		
14	To meet virtually		**50**		**53**
15	For personal life				**66**
16	To interact with friends				**82**
17	Offers something innovative			**63**	
18	Has many new and useful features			**70**	
19	Is 'cool'			**70**	
20	Will recommend to friends			**69**	
	Cronbach's Alpha :	0.948	0.950	0.949	0.950
	Eigenvalue :	8.88	14.76	7.87	6.11
	Variance explained :	23.30%	8.15%	3.47%	2.70%
	Interpretation of factors :	Business Improvement	Workplace Collaboration	Innovation	Personal use

Table 4. Factor analysis

The benefits of 'reduce costs' and 'help generate new customers' did not load on any of the four factors. Internal consistency is determined by assessing item-total correlations. All item-total correlations were greater than 0.5, except for two items in the 'Personal use' factor that were at 0.40 and 0.41. This provides evidence of internal consistency.

Discriminant validity is described as the extent to which each item differs with items in other factors. It is determined by the number of times an item has correlation with another factor than with its own factor. Only 8 out of 141 correlations used to evaluate discriminant validity were higher, providing evidence of discriminant validity.

DISCUSSION

The business benefits of Web 2.0 as classified in eleven motivators to adoption are seen in Table 2. As they were evaluated on a 5-point Likert scale with 1 being 'Strongly agree', the lower the score, the higher is the perceived benefits from Web 2.0. As initially expected, virtual collaboration comes up as the strongest benefits perceived by the end users. Reducing costs also figures very high on the list as Web 2.0 provides services free or at a nominal expense. They also see substantial potential in Web 2.0 to redesign processes as technology can alter business processes or create new ones. One the other hand, very few believed Web 2.0 could provide new customers or help create new products or services. As table 1 also suggests, very few Web 2.0 services are geared towards helping organizations create new customer, products, or services. Most of them appear to leverage the collaborative nature of the web instead.

Therefore virtual collaboration at workplace could become a commonplace phenomenon in the new future. This can help break down functional silos and make for better communication and better and faster business decisions. Also workplace situations where virtual collaboration are critical to success, can expect faster adoption of Web 2.0. Especially businesses that provide customized or complex business-to-business products and services, such as a turbine, a conveyor belt, or legal considerations in mergers and acquisitions or arbitrations, need strong collaborative efforts between organizational members as well as those outside. Also big business with many employees, spread across the globe, should adopt Web 2.0 to gather intelligence for their employees to aid better decision making. Especially service and knowledge-driven industries would benefit more than manufacturing industries.

Web 2.0 is also expected to reduce costs of operating a business, starting with cost of collaboration to the cost of software and computing and the users agree. In a difficult economy, Web 2.0 adoption can be expected to increase, especially for those who with substantial budgets devoted to travel, meeting, and collaboration. Web 2.0 can also be expected to substantially change business processes in future. Technology is well known for its ability to radically change business processes (Hammer and Champy, 1993) and Web 2.0 can be expected to be no different. Certain characteristics of Web 2.0 such as immersiveness are not perceived as strong benefits. It could be either that the business-oriented technologies do not focus much on this aspect, and/or, the users today are used to much more immersiveness in other online and offline technologies.

The exploratory factor analysis in Table 3 and Figure 1 suggest the presence of four factors. Looking at the factor loading in Table 4, they are labeled as 'Business improvement': those that provide improvement in business performance; 'Workplace collaboration': those that provide immediate collaborative benefits in present work; 'Innovation': benefits that are new and attractive, especially that provide new features that can lead to process innovations; and finally 'Personal use': Web 2.0 that end-users perceive to be important in their personal lives, especially as the web allows such a possibility. Understandably some of the benefits, like change and improve business processes, load on both 'Business Improvement', as well as 'Innovation'.

CONCLUSION

This research focuses on examining the benefits of Web 2.0 as perceived by the end-users. It also attempts to find the factors that may drive end users to adopt Web 2.0. The survey research empirically confirms the claims made by various practitioner experts and technology consultants about the benefits of Web 2.0. These benefits are perceived by the end users however they differ in the extent to which they perceive each benefit. Some of the benefits are perceived more strongly than others, while others are barely noticed. The study also finds four factors that influence user adoption of Web 2.0: its ability to provide 'Business improvement' and 'Workplace collaboration', the Innovation they offer as well as their ability to be used in personal life.

As this is one of the few empirical investigation of Web 2.0 and its usage in business context, the study provides important evidence and contribution for academicians to build on. Practitioners can refocus their efforts to leverage what the users perceive to be important. The fours factors can also help the academicians and the practitioners better understand the usage of Web 2.0.

This paper presents early results from a study on Web 2.0. Subsequent efforts would lead to a more thorough and detailed analysis to provide greater clarity and understanding of this emerging phenomenon. These efforts are not expected to lead to results different from the ones presented here but provide a stronger support to the conclusions in this paper as well provide a greater understanding of adoption of Web 2.0.

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