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WEB 2.0 COLLABORATIVE TOOLS FOR SMES: A SURVEY

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ABSTRACT

Organizations today operate in a complex, unpredictable, competitive and global business environment. These demand utilizing Internet-based tools to support more collaborative activities and allow the integration of business processes and the sharing of information. It is often that large organizations have more financial and technical resources compared to Small and Medium Enterprises (SMEs) to leverage the availability of free web 2.0 collaborative tools. Web 2.0 tools provide an efficient and accessible means of encouraging and supporting team members working together on shared objectives. This study investigates twenty available web 2.0 collaborative tools that illustrate different way of collaboration and different set of features. We then organize these features by four major function categories: communication, information sharing, electronic calendar and project management, in order to identify which of the collaborative tools would be suitable for a particular organization. Specifically, this study will increase SMEs to be aware what the current available Web 2.0 collaborative tools have to offer and also help them in selecting the right tools based on their organizational needs.

Keywords: SMEs, Web 2.0 collaborative tools, collaborative tools selections, client server collaborative tools.

1. INTRODUCTION

The term SME stands for Small and Medium Enterprises in which its definition varies from country to county based on the following criteria: in some cases, by industry sector, number of employees, by revenue turnover, or by leadership characteristics. While some combine two or more criteria.

There is no widely accepted SMEs definition universally [1]. Where, different countries use different definitions. For example, Organization for Economic Co-operation and Development [2], consider enterprises that employ less than 500 employees as SMEs, Also previous researchers such as [3-8] agrees that organization should be measure by some criteria such as number of employee, sales turnover, and business category in order to be consider as SMEs, as shown in Table-1.

Table-1. SMEs category and size.

Category	Small	Medium
Manufacturing	Full-time Employees from 5 to less than 70	Full-time employees from 70 to 200
	Sales turnover from USD 100,000 to less than USD 5 million	Sales turnover from USD 100,000 to USD 17 million
Service and Other Sector	Full-time employees from 3 to less than 30	Full-time employees from 30 to 70
	Sales turnover from USD 100,000 to less than USD 1 million	Sales turnover from USD 1 million to USD 7 million

Source: SME [6].

Little effort has been put in research on web 2.0 collaborative tools that focused on SMEs perspective. Furthermore, most studies on collaborative tools examined the implementation, factors affecting collaboration among the SMEs and adaptation of the collaboration tools by SMEs, as conducted by [9-11]. However, due to lack of IT expert personnel a lot of SMEs end-up using tools that doesn't add value to their business.

Specifically, this study seeks to contribute to the existing literature by examine the features of twenty web 2.0 collaborative tools, in which seven ware adopted from previous study by [12], while the researcher surveyed the remaining thirteen collaborative tools in order to cover more variety of tools and to provide more options for SMEs to consider, then we organized these features by four major function categories that is found to be important in studies conducted by [12] such as: communication, information sharing, electronic calendar and project management.

This study uses survey method to investigate some of the available collaborative tools that illustrate different way of collaboration and different set of features for the current available Web 2.0 collaborative tools. Data collected for this study came from previous research, online document and based on our experience with these tools. This aims at helping SMEs to be aware on the offerings and to provide them with an opportunity to easily choose the best fit collaborative tools base on their organizational needs.

2. LITERATURE REVIEW

2.1 Significance of SMEs

Small, medium and enterprises (SMEs) plays major roles when it comes to increasing income levels of many country and creating jobs to many people [13]. SMEs serves as driven force of innovation and economic growth [14]. They also provides playground and opportunities for entrepreneurs and employment [15]. For example, in India, SMEs are said to be constantly outstripping large organizations in terms of parameters such as employment growth as well as production growth that is why SMEs enterprise are responsible for about 35 per cent of the total exports, and also provide 40 percent of the total industrial productions as well as, 80 percent of total employments [16]. While Hong Kong, are said to have the highest employers rate of over 1.4 million employees and Japan SMEs also have around 81 per cent of the employment is in these sector, while 51 per cent of employments in Singapore were been employed by SMEs sector, and particularly SMEs in manufacturing sectors in Singapore accounts for 15 per cent of the total gross domestic products [17]. While Africa has more than 40 per cent employment of the total work force are being employed by small and medium enterprise [18].

2.2 Advantage of SME

The small size of SMEs moreover is an added advantage, particularly their ability to anticipate and respond to changes and achieve a closer interaction with their customers. For instance: Quicker decision making, related re-orientation and execution of new decisions [19], can result from a streamlined organizational chain. For small enterprises, normally the founder actually owns the company and the owner is the key decision maker effectively pushing and motivating any changes. Deeper customer knowledge is derived from the direct interactions of the SMEs with their customers, whose shift in consumption patterns and needs can be quickly understood because of the proximity/attention enabled by the smaller size.

Increased employee interactions are facilitated by an environment where everyone knows each other in the organization. Opportunities to work with others and to be aware of the business goals of the entire enterprise. Face-to-face contact with "the rest of the company" is an easier occurrence in an SME context.

Participation in planning activities by many employees is also more likely in a small enterprise. Large companies use various strategies to stimulate participatory governance. However, the actual management of a bottom-up strategic planning process in a large company lends itself to prioritization choices that may eliminate minority ideas. In SME contexts, minority ideas can be more easily integrated in planning, that also foster quicker buy-in and motivation [20].

2.3 Disadvantage of SME

The smaller size of SMEs naturally raises a number of issues such as: lack of in house IT personnel, limited IT infrastructure, and limited product or customer outreach globally, in which are all fading away. Many of the traditional size issues and constraints though are slowly being overcome by technological advances that increase the manageability of small enterprises. One key disadvantage that has prevented SMEs from being more competitive is the failure of technology, to market emerging technologies, to SMEs because the return on investment was too low to justify sustained commitment.

Today's reality, however, is that SMEs are finally becoming a viable business proposition due to the collapsing costs of technology. New software licensing models, while some software ware free under general public license (GPL), available through software-as-a-service (SaaS). These are some examples of how information technology provision can be customized to the needs of smaller players. Other traditional "size" disadvantages that are fading away include:

- Lack of IT personnel is being replaced by new IT out sourcing models whereby IT personnel can be "rented" together with equipment.
- Limited IT infrastructure is irrelevant as ownership of physical hardware and network infrastructure are no longer needed to run a business.
- Limited customer and product outreach globally is superseded by the flattening of the economy [21], with impacts that span technology, marketing, and branding.

3. WEB 2.0

3.1 Web 2.0 capabilities

Web 2.0 is being recognized as the second generations of web developments, it also eases communication and collaboration as well as safeguarding the sharing of data and information's by collaborating through World Wide Web. The idea of Web 2.0 happen to be at the far front when it comes to web applications development, like social network, wiki, video sharing and blog [22].

Web 2.0 is said to be a set of technology that deeply pull down the cost of collaboration over the World Wide Web, that easily make the development of system more available through internet. Also Web 2.0 have lower the cost of communications that lead to chances to have

more comprehensive, communicative and collaboration with online contributions. That is why more organizations decide to take the advantage by embarking on the online collaboration [23].

Because of the way this technology change our society, even the online tools used to support collaboration are redesign, that lead changing the way organizations conduct their businesses, how they motivate their employee, how they engage their customers, and also how relationship between their stakeholders are maintained, collaboration is more of high value in any organization [24].

3.2 The benefit of Web 2.0

This technology is said to be a significant enticement to organizations, because the collaboration between employees is on high increase daily and in low cost due to the emerge of Web 2.0 technology [25]. When it being used efficiently, they can also boost user's moral in a projects and idea sharing, it also bring enhanced scope and scale to organizations. The following are some of their major benefit:

- Supporting of communication and collaboration across time and space.
- They are of low cost (sometimes even free).
- They do not have need of much IT support.
- Ease of accessibility and use.
- It already gains popularity and many people are comfortable using it.
- They have very little "downtime."

3.3 Trend of Web 2.0

Following the aspiration of cutting down the online collaboration costs would be continue to reshaping the web technology in years to come, timely innovation and low priced online collaboration would continue to present a future of technology full of new astonishments innovation. The following are some of the trends at various levels that would continue to contribute toward reshaping the technology.

- New Platform would continue to be develop.
- The functionalities in platform will continue to converge.
- We should all expect to witness greater integrations between handheld devices and Web 2.0 tools.

On the other hand, the use of Web 2.0 in entertainment, socializing, virtual world, businesses, as well as education continues growing [26]. Currently users are more familiarizing to join physical and virtual life, however, businesses are also finding a ways to embrace this technology for their business in other to make their business process more applicable and important.

3.4 Trend of Web 2.0 tools on SME

The empirical evidence of Web 2.0 implementation by SMEs is paramount, a study conducted by [27] on a specific group of Portuguese SMEs. This group was composed of a sample of 438 companies which were selected from a total population of 1481 "excellence" companies. The "SME excellence" is an annual award which prizes the best SMEs in Portugal. The sample was obtained via a simple stratified sampling method to guarantee the representativeness of the selected SMEs.

The data, from the 438 SMEs, purported that Web 2.0 tools such as blogs, wikis and podcasts have reasonable levels of initial adoption. The survey was completed by 99 participants aged 31 to 54 years old. The participants reported that, their use of Web 2.0 tools such as wikis and podcasts are in their initial stages of adoption, while blogs and instant messaging are assuming a growing part in the private sphere of the respondent's lives.

Furthermore, around 29% of survey participants confirmed that Web 2.0 tools implementation in their companies is integrated with their business strategy and takes advantage of the efforts of employees and top management. Web 2.0 tools shows a high level of dissemination in organizations' departments. Also, 29% of respondents said their company had spread Web 2.0 practices while 79% of the survey participants confirmed that their organizations have recently been focusing on these technologies. More than 92% were sure that the impact of Web 2.0 in their companies is positive.

Finally, the data showed that 83% of study participants were satisfied or very satisfied with Web 2.0 collaborative tools been used in their organizations and also admit that investing in Web 2.0 tools for business activities could be potentially rewarding for SME's. The payoff can be more efficient and less costly marketing, because SME's are also utilizing the Web 2.0 tools as marketing tools, it depend on how SME's utilize the tools to extract value from it.

4. COLLABORATION

Collaboration is said to be the principle of exchange, coordinating, communicating and interacting [28]. Collaboration is also consider as management of movement of data and information between the project members as well as stakeholders in which an organizations existent depend on it.

Collaboration is also said to have an important role in an organizational success through its project success, to meet project objective. Collaboration has the capability to decrease the probability of happening of conflict. Collaboration is said to be a mechanism for sharing knowledge and abilities among organizational members to meet the objectives of an organization [29]. The rapid development of the Web 2.0 technology enhances the collaboration among the project participant.

Collaboration does not depend on just exchange of information during a project. Information exchange as used in this research as a process of transferring information from one person to others. While Information sharing is enabling the participants to access the same information based on their role in an organization, the

collaboration is based on evolving ICT services like Internet, which is why it's called online collaboration [30].

A study shows that collaboration in organization more especially during a project is topping the list of project challenges, Norwegian Oil Company Statoil Hydro conduct a research about the most regularly occurred problem within their project they review around 1647 reports, lack of collaboration is on the top list then followed by procurement, Scope, and integration [31].

Also a researcher such as [32] highlighted the significance of collaboration, stating: "collaboration among project members and stakeholders need to be given more consideration, and also need to be supported sufficiently just like any other task such as economical, technical, and environmental since from the planning phase." [32] as well make an important point that sufficient collaboration in a projects has a huge significant in determining the project outcome, because collaboration can also be regard as a tool which has strong influences in project. This suggestion receive a highly support from [33-38]. Collaboration as an influential serious issue face by many organization during execution of a project, is been stated by [39].

Fundamental of collaboration procedures are sharing of data and information, organizing activities, develop an understanding, socializing and influencing. The most significant way of achieving a project success in any organization, is converting those procedures to online collaboration [40]. The highest threat in many projects is a failure to collaborate [41].

4.1 Selecting the appropriate Web 2.0 collaborative Tools

Collaborative tools are tremendously increasing nowadays with the help of Web 2.0 technologies, in which many organizations are taking advantage of the growing technologies as an opportunities for business, innovation and project management collaboration. A wide ranges of different features of tools were illustrated that include chat, discussion board, email, announcement, instant messaging, calendar, file sharing, wiki, task, time sheet, Video conference and Gantt chart [42-44]. However, must of the tools use client server architecture in which all the data related to collaboration were stored in a server. Even though few of the tools are hybrid architecture where by collaborative data were stored in participant storage while servers ware used only for directory services.

To gain understanding about those tools we tested twenty Web 2.0 collaborative tools, the idea partially come from a previous study by [12] in which seven of the tools ware adopted, while we reviewed the remaining tools such as: eXo Platform, Basecamp, Zoho project, Wrike, Asana, Huddle, Mavenlink, Trello, ProWorkflow, Skype, Google Hangout, Zimbra, Groupware, WebEx, PHProject, Bluetie, Microsoft SharePoint, Kune, and Microsoft Office Groove, based on our experience. The researcher try to cover more wider ranges of tools that has more different features, ranging from freeware to paid, client server to hybrid architecture, from charting, to project management and to document management.

4.2 Web 2.0 tools overview

All these tools tested by us are client server based architecture except Microsoft Office Groove which uses the combination of peer-to-peer and client server. Whereby client server architecture allow all the related collaborative data to be saved on the server, the client normally login using their browser to access the server. The advantage of client-server architecture is that, the data is considered more secure because it is stored in a well maintained server. While in peer-to-peer collaboration, collaborative data are stored in the collaborators computer. Therefore multiple copies of the same document may exist in these collaborating computers. Synchronization is needed to make all the computers have the most up-to-date copy. Because peer-to-peer collaborative tools allow users to update the data offline, the latest version of data may not be able to circulate to other computers immediately. The problem is usually solved by creating a new copy of the file and notifying the user. While caching service were used by Microsoft Office Groove, to update the cached that is in the server temporarily then transferred it to a collaborative system that make the request whenever they login. When multiple users are online at the same time, the synchronization is carried out directly among the users.

Even though, some of the collaborative tools require users to install their own server. Collaborative tools like PHProjekt run on web server that supports PHP with database connection. Skype, and Zimbra's server can be installed on Windows, Mac and Linux. As for the rest of the tools, the tools vendors host the server. The clients are usually web browsers except for Microsoft Office Groove and Skype that use vendor's application as illustrated in Table-2.

Table-2. Collaboration tools overview.

Tools	Architecture	Server	Client
eXo Platform	Client Server	Hosted	Web browser
Basecamp	Client Server	Hosted	Web browser
Zoho Project	Client Server	Hosted	Web browser
Wrike	Client Server	Hosted	Web browser
Asana	Client Server	Hosted	Web browser
Huddle	Client Server	Hosted	Web browser
Mavenlink	Client Server	Hosted	Web browser
Trello	Client Server	Hosted	Web browser
ProWorkflow	Client Server	Hosted	Web browser
Skype	Client Server	Hosted	Skype
Google Hangout	Client Server	Hosted	Web browser
Zimbra	Client Server	Win/Mac/Linux	Web browser
Groupware	Client Server	Hosted	Web browser
Webex	Client Server	Hosted	Web browser
PHProjekt	Client Server	PHP & MySQL Web Server	Web browser
Bluetie	Client Server	Hosted	Web browser
Microsoft Office Groove	Hybrid	Hosted	Microsoft Office Groove
Kune	Client Server	Hosted	Web browser
Microsoft Share Point Server	Client Server	Hosted	Web browser
Xaitporter	Client Server	Hosted	Web browser

4.3 Web 2.0 tools features

As stated earlier we have illustrated variety of Web 2.0 collaborative tools features such as chat, calendar, email, document sharing etc. However, some of the tools implement many features which are loosely independent and integrated from each other. While Zambra can be said as an email centered tool which was integrated with search and calendar function. To clearly understand these tools features, we then organize all its features based on their functional categories. These tools were then categorized into four categories according to their functions such as: project management, information sharing, communication, and group calendaring [12]. The categories were explained as follows:

a) **Communication:** this feature allow participant to communicate within them self through sending and receiving messages. Common communication features include: email, video call, instant messaging and announcement. Those tools that have features such as email they as well offer features like address book or contact list to allow user to save their contact. A part from that announcement is also a feature that allow user to post a discussion or any information that need the attention of other users. However, some of the tools also offer more cutting-edge feature such as sharing of applications. Although out of all the collaborative tools we tested, the must advance email feature tool is Zimbra, it send email messages for address book, calendar, phone numbers, maps, time and name.

b) **Information sharing:** this feature allows the users to collaborate within them self through sending of different information to each other. The most popular feature for sharing of information are; discussion board, wiki, file sharing and much more, whereby users exchange their ideas by discussion, sharing of file sometime also called document sharing, is the features that allow users to share their document by just marking them as synchronized needed documents when using peer-to-peer tool or just uploading it to the server when using client server tools. Change are automatically detected and synchronized to other system in peer-to-peer document sharing. While using client server document have to check in or out in other to update the change to the document.

c) **Project management:** from all the tools we tested project management tools among them only provide part of the project management requirement such as: time sheet, tasks, milestones and Gantt chart. Time sheet allow recording of time spend by participant

while working on a particular project. While some tools offer Gantt chart in order to illustrate the activities in a particular project. While task is some time called to-do, every task has a properties such as; status, progress, start date, participants, and end date. Therefore milestone feature is use to mark the significant events in a project.

d) **Calendaring:** is also known as group calendar, it features include storing an event that are upcoming as well as the event participants. Some of the tools have a remainder function that can remain the participants whenever there is upcoming event or they scheduled a new appointment. For those using tools that are integration to desktop their remainder would be in a form of popup message. While the most popular technique to remain someone is by email for those using web based collaborative tool. This feature of calendar sharing also permits participant to view other participant schedules in other to engage them in discussion or to scheduling the group decisions.

The collaboration tools that we study were mapped with the features of those four categories, and criteria that was adopt from [12], using Multi Criteria Mapping (MCM), MCM offers a systematic part of quantitative and qualitative approach to clarify why various Web 2.0 collaborative tools are mapped to certain category of features. MCM is one of many multiple criteria decision analysis (MCDA) methods. The common purpose of these methods is to evaluate and choose among different decision alternatives based on multiple criteria using systematic, structured and transparent analysis decisions [45]. A number of different MCDA methods exist following various optimization algorithms and varying in both the types of value information needed and in the extent to which they are dependent on computer applications. Some techniques rank options whereas others identify a single optimal alternative, criteria's were either measured or based on expert judgments [46].

MCM has previously been used to evaluate policy options in regard to stakeholder preferences in regulating nanotechnology, genetically modified crops and obesity [46-48], but this study presents the first MCM of Web 2.0 collaborative tools evaluation.

We identify the features of the tools based on our experience with the tools; we then illustrate which tools belong to which category. The criteria were listed based on their category on the top rows, while the collaboration tools were listed on the columns of Table-3 respectively. In the condition of one specific collaboration tool from a column that could have match with one particular criterion from a row. Example Trello tool from column have email feature in this case Trello and email criteria from a row are match with the intersection of that column and row which marked by "X" sign that shows their compatibility, otherwise it is left blank.

Table-3. Mapping of Web 2.0 collaboration tools with categorized features.

Collaboration tools	Communication			Information sharing				Project management			Calendar	
	Email	Chart	Video Call	File Sharing	Discussion	Wiki	Polls	Task	Time Sheet	Gantt Chart	Shared Calendar	Automatic Notification
Asana	×			×	×			×	×	×	×	×
Basecamp	×	×		×	×			×	×	×	×	×
Bluetie	×	×		×	×			×			×	×
eXo Platform		×	×	×	×	×		×	×		×	×
Google Hangout	×	×	×	×	×							
Groupware	×			×		×		×	×	×	×	×
Huddle	×			×	×			×			×	
Kune				×	×	×	×	×		×	×	×
Mavenlink	×			×	×			×	×	×	×	×
MS Office Groove		×		×	×						×	
MS Share Point Server	×			×	×	×	×	×		×	×	×
PHProjekt	×	×		×	×		×	×	×	×	×	×
ProWorkflow	×			×	×			×	×	×	×	
Skype		×	×	×	×							
Trello	×	×		×	×		×	×	×	×	×	×
WebEx	×			×	×		×	×			×	×
Wrike	×			×	×			×	×	×	×	×
Xaitpoter		×		×	×			×	×		×	
Zimbra	×			×							×	×
Zoho Project	×	×		×	×	×		×	×	×	×	×

5. DISCUSSIONS

In other for organization to select the most appropriate tool we have tested twenty Web 2.0 collaborative tools features as illustrated in Table 3. However, when it comes to collaboration on the same documents then Microsoft Office Groove (MOG) is the most convenient tool, compare to web based document sharing in which document need to be checked in and out. While, MOG provide automatic document synchronization. It also arrange folder by folder synchronization which give it the opportunity for any newly created document to be shared automatically in a particular folder, as well as offering a simple interface for instant messaging so that the participant can communicate through. Even though its calendar function doesn't automatically notify anybody, and also MOG doesn't have features for project management.

Zimbra is a collaborative tool that focus on email and it also have a very powerful features for calendaring, with a web based email client that recognizes some keywords like location, email address, date, phone number, etc. that conveniently allow participant to launch a different activities by using them. However it has reasonably simple document sharing. But it also doesn't offer features such as project management.

However, eXo platform, Skype and Google Hangout are more powerful on charting, video call, file sharing and discussion even though Skype and Google Hangout has no project management feature but eXo platform has very convenient project management features such as task, time sheet and also integrated with calendar with automatic notification.

While Basecamp, ZOHO, Trello, PHProjekt, Microsoft Share Point and Groupware has one of the best project management, Information sharing communication and calendaring features they also offer one of the most inclusive collaboration tools, as they always offer more function and ways to collaborate than the previous tested tools. Although, Wrike, Ansana, WebEx, Huddle, Mavenlink, ProWorkflow, Kune also has a strong project management, information sharing and calendaring features but, they are weak in communication feature. While BlueTie has good features for communication but also doesn't have features of project management.

6. CONCLUSIONS

Today, many SMEs are adopting collaborations tools in an effort to enhance their innovation capabilities, improve communications and collaborative activities. However, in order to select the best collaboration tool to

meet their organization's need, we have examine some Web 2.0 collaborative tools by their features and functions we then categorize them into four category based on their features to illustrate the capability and weakness of each of the collaboration tool. The strength of our finding here is related to the Web 2.0 collaboration tools for SMEs and we have generate new insight knowledge within online collaboration area, we believe this study have provided exposure to the current available collaborative tools to SMEs and also guide them toward selecting the best tool needed by their organization that will end up performing their activity in a more collaborative, effectiveness, efficiency, and competitive way.

This study has several opportunities for future study. Firstly, future researcher can focus on collaboration tools complexity and compatibility, because some organizations may need to use the combination of two or more tools in order to achieve their efficiency and effectiveness that they need for their business, so they need to be ensure the compatibility between the different tools. While if a collaboration tool perceived to be too complex users will not participate, neither will they engage meaningfully nor contribute to the business process that required their collaboration.

Secondly, more collaborative tools could be examined by future researchers in order to complement the limited number of (twenty) collaborative tools studied in this paper.

Thirdly, this study focus only on collaboration tools for SMEs. It would be interesting to also focus on collaboration tools for public sectors in the future.

Lastly, as more devices become connected to the web, such as smartphones, cars, and other household appliances, in which these devices were been able to exchange data between each other and even generate new information, so as new technologies that describes how computers will be generating raw data on their own continue to emerge. It would be more interesting for future study to focus on tools that are develop with these new technology.

REFERENCES

[1] Mutula, S.M. and P. Van Brakel. 2006. An evaluation of e-readiness assessment tools with respect to information access: Towards an integrated information rich tool. International Journal of Information Management. 26(3): p. 212-223.

[2] Lerner, J. 2010. Innovation, Entrepreneurship and Financial Market Cycles: OECD Publishing.

[3] EC. 2003. Small and medium-sized enterprises (SMEs). Sept, 2011]; Available from: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm.

[4] Kotey, B. and C. Folker. 2007. Employee training in SMEs: Effect of size and firm type-Family and nonfamily. Journal of Small Business Management. 45(2): p. 214-238.

[5] SBA. 2011. FAQ's: advocacy small business statistics and research.

[6] SME, C. 2013. Guideline for new SME Definition. Malaysia Secretetiat to the National SME Development Council.

[7] Moyi, E.D. 2003. Networks, information and small enterprises: New technologies and the ambiguity of empowerment. Information Technology for Development. 10(4): p. 221-232.

[8] Passerini, K., A. El Tarabishy, and K. Patten. 2012. Information Technology for Small Business: Managing the Digital Enterprise: Springer Science and Business Media.

[9] Zhu, K., K.L. Kraemer, and S. Xu. 2006. The process of innovation assimilation by firms in different countries: a technology diffusion perspective on e-business. Management science. 52(10): 1557-1576.

[10] Chan, F.T., A.Y.-L. Chong and L. Zhou. 2012. An empirical investigation of factors affecting e-collaboration diffusion in SMEs. International Journal of Production Economics. 138(2): p. 329-344.

[11] Yee-Loong Chong, A., *et al.*, Influence of interorganizational relationships on SMEs'e-business adoption. Internet Research, 2009. 19(3): p. 313-331.

[12] Xu, J. Zhang, J. Harvey, T. Young. 2008. A survey of asynchronous collaboration tools. Information Technology Journal. 7(8): p. 1182-1187.

[13] Mira, K. 2006. Case studies of e-commerce adoption in Indonesian SMEs. The evaluation of strategic use. Australasian Journal of Information Systems. 14(1): p. 69-80.

[14] Temtime, Z. and J. Pansiri. 2006. Proactive marketing and financial management for Small and Medium Enterprises.

[15] Thurik, R. and S. Wennekers. 2004. Entrepreneurship, small business and economic growth. Journal of small business and enterprise development. 11(1): p. 140-149.

[16] Sharma, M.K. and R. Bhagwat. 2006. Practice of information systems: Evidence from select Indian

SMEs. Journal of manufacturing technology management. 17(2): p. 199-223.

[17] Lukács, E. 2005. The economic role of SMEs in world economy, especially in Europe. European Integration Studies. 1 (4): 3-12.

[18] Muuka, G.N. 2002. Africa's informal sector matters: A challenge to scholars to close the knowledge gap. in Proceedings of Expanding the Horizons of African Business and Development: The International Academy of African Business and Development International Conference, Port Elizabeth, April. 2002.

[19] Raymond, L., F. Bergeron, and S. Rivard. 1998. Determinants of business process reengineering success in small and large enterprises: an empirical study in the Canadian context. Journal of Small Business Management. 36(1): 72.

[20] Chesney, T. 2013. Competitive information in small businesses: Springer Science & Business Media.

[21] Friedman, T.L. 2005. The world is flat: A brief history of the twenty-first century. New York: Farrar, Straus and Giroux.

[22] Web_2.0. 2009 [cited 2009 May 9]; Available from: http://en.wikipedia.org/wiki/Web_2.0.

[23] O'Reilly, T. 2005a. What is Web 2.0. Retrieved October 30, 2014; Available from: http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html.

[24] Evans, P. and B. 2005. Wolf, Collaboration rules, Harvard Business Review: Harvard. p. 162-162.

[25] O'Reilly, T. 2005b. What is Web 2.0. October 2014 [cited 2005 September 30,]; O'Reilly website]. Available from: http://www.oreillynet.com/pub/a/oreilly/ tim/news/2005/09/30/what-is-web-20.html.

[26] NMC. 2007. Horizon Report. [cited 2009 June 9,]; Available from: http://www.nmc.org/horizonproject/2007/virtual-worlds.

[27] Isaias, P. and D. Antunes. 2014. Small and Medium Enterprises 2.0: Are We There Yet? in HCI in Business. Springer. pp. 175-182.

[28] Becerik, B. 2006. Implementation and Value of Online Collaboration and Project Management System in Design and Construction, ProQuest and Learning Company.

[29] Hobbs, R. 2007. Leadership through collaboration. AIArchitect Information & Management. 3(11): p. 523-544.

[30] Dawood, N., A. Akinsola, and B. Hobbs. 2002. Development of automated communication of system for managing site information using internet technology. Automation in Construction. 11(5): 557-572.

[31] Sanberg, F. 2007. Interndokument StatoilHydro, in StatoilHydro, R.t.l.v.p.o.u.i. prosjekter, Editor.

[32] Flyvbjerg, B. 2007. Megaproject policy and planning: Problems, causes, cures. Summary of Dissertation for Higher Doctorate in Science,(Dr. Scient.), Aalborg: Aalborg University.

[33] Altshuler, A.A. and D. Luberoff. 2003. Mega-projects: The changing politics of urban public investment: Brookings Institution Press.

[34] Fox, J.R. and D.B. Miller. 2006. Challenges in managing large projects. VA.

[35] Loch, C.H., A. DeMeyer, and M.T. Pich. 2006. Managing the unknown, John Wiley & Sons: New York.

[36] Miller, R. Lessard, D, R. Michaud, P. Floricel, S. 2001. The strategic management of large engineering projects: Shaping institutions, risks, and governance: MIT press.

[37] Schwass, R.D. and B. Fowler. 1993. Public Involvement throughout the Big Chute Hydroelectric Redevelopment Project. Impact Assessment. 11(4): 417-434.

[38] Steelman, T.A. and W. Ascher 1997. Public involvement methods in natural resource policy making: Advantages, disadvantages and trade-offs. Policy Sciences. 30(2): 71-90.

[39] Johnson, S.B. 2005. Systems integration and the social solution of technical problems in complex systems, in The business of systems integration, In A. D. In A. Prencipe and M. Hobday, Editors. Oxford University Press: Oxford. pp. 35-55.

[40] Poole, M.S. 2005. Communication, organizational behavior in The Blackwell encyclopedia of management N. Nicholson, P. G. Audia, and M.M. Pillutta, Editors: Wiley. p. 47-50.

[41] Kathy, S. 2007. Information Technology Project Management six, Editor: Cengage learning.

[42] Damian, D.E. and D. Zowghi. 2002. The impact of stakeholders' geographical distribution on managing requirements in a multi-site organization. in Requirements Engineering. Proceedings. IEEE Joint International Conference on. 2002. IEEE.

[43] Gralla, P. and M. Reimer. 1996. How intranets work.

[44] Herlea, D. and S. Greenberg. 1998. Using a groupware space for distributed requirements engineering. in Enabling Technologies: Infrastructure for Collaborative Enterprises. (WET ICE'98) Proceedings. Seventh IEEE International Workshops on. 1998. IEEE.

[45] Linkov, I., *et al*. 2006. Multicriteria decision analysis: a comprehensive decision approach for management of contaminated sediments. Risk analysis. 26(1): 61-78.

[46] Hansen, S.F. 2010. Multicriteria mapping of stakeholder preferences in regulating nanotechnology. Journal of Nanoparticle Research. 12(6): 1959-1970.

[47] Mayer, S. and A. Stirling. 2004. GM crops: good or bad? EMBO reports. 5(11): p. 1021-1024.

[48] Millstone, E. and T. Lobstein. 2007. The PorGrow project: overall cross-national results, comparisons and implications. Obesity Reviews. 8(s2): 29-36.