



Efficient Business Process Reengineering with Crowdsourcing

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ABSTRACT

The business world is improving dramatically, and Global competitiveness and the need to have competitive advantage drive companies to adopt new technologies and apply it into company's processes. The development of information technology stimulates organizations to re-design its business processes to better support organization's mission and reduce costs.

This paper presents Crowdsourcing approach as leverage for Business Process Reengineering (BPR). Crowdsourcing is a new on-line distributed problem solving approach that enables organizations to have their processes or tasks be done by large, distributed crowd of people through internet. This paper outlines how crowdsourcing is going to enhance Business Process Reengineering effectiveness by providing organizations with large groups of qualified workforce and efficient cross-functional team who could evaluate organizations operations and customer satisfaction, analyze market needs and etc. Companies by using crowdsourcing for BPR could have faster and cheaper BPR project.

Keywords

Business Process Reengineering (BPR), Crowdsourcing.

1. INTRODUCTION

The term crowdsourcing first coined by Jeff Howe and Mark Robinson in an article in Wired magazine, their definition of crowdsourcing is:

"Crowdsourcing is the act of taking a job traditionally performed by designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call." [1]

There are other definitions for crowdsourcing and all seems to be compatible with Howe's:

"Crowdsourcing as a concept, as well as a practice refers to the idea that the web can facilitate the aggregation or selection of useful information from a potentially large number of people connected to the internet." [2]

"Crowdsourcing is emerging as the new on-line distributed problem solving and production model in which networked people collaborate to complete a task." [3]

Some tasks need human intelligence to be completed and computers are unable to do such tasks or doing them is often very hard for computers. With crowdsourcing we could use ingenuity of crowd of people for doing tasks that need human intelligence.

In recent years there has been a significant increase of Crowdsourcing and numerous crowdsourcing solutions allowing enterprises to externalize various stages of their product lifecycle, for example TopCoder.com is enabling crowdsourced software development, Threadless crowdsources T-shirt designs from the public, Procter and Gamble crowdsources its' R&D problems, Children's Digital Library crowdsources translation, and etc. Enterprises could crowdsource most of their processes, such as innovation, design, development, marketing, sales and support [3]. Companies like Dell, Nokia use crowdsourcing to get innovation and new ideas from crowd of people especially their customers. A central challenge in crowdsourcing is the workflow design problem: how can we divide a complex job — for instance, editing a paper or writing a computer program — into a sequence of micro tasks that can be solved by a pool of crowd workers on the web? The solution for this problem is crowdsourcing too [4]. We could ask crowd of people to design workflows by dividing complex jobs into simple tasks.

To apply a crowdsourcing approach, organizations should be aware of the crowdsourcing process, and consider how crowdsourcing could improve their efficiency, what they expect of crowdsourcing process, and etc.

Figure 1 illustrates an overview of roles and operations in the crowdsourcing process.

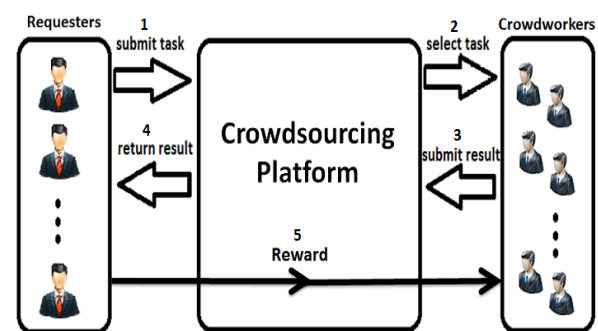


Fig 1. Roles and operations in crowd sourcing process

Crowdsourcing requester (also known as employer) submits a task (or couple of tasks) request in crowdsourcing platform, and provides the task description, the required skills that each participant should have to be able to do tasks, due date for task completion, the time each worker could spend on the task, and useful information for workers to do the tasks with high quality. Crowdworkers (also known as workers or providers) according to their talents and skills and the time they want to spend for each task, choose appropriate task to



work on. The results of tasks are submitted by workers to crowdsourcing platform; if submitted results meet requesters' criteria, workers will be rewarded. Crowdsourcing platform acts like an interface between requesters and workers ensuring the successful completion of tasks and payment process [3]. According to above descriptions, we can bring crowdsourcing process within BPR to re-design organization's business processes—the steps and procedures that govern how resources are used to create products and services that meet the needs of particular customers or markets.

This paper is divided into four parts. In the first part we're going to represent related works in crowdsourcing area. In the second part we represent crowdsourcing processes in an enterprise. The third part introduces classification of crowdsourcing function. In the fourth part we're going to discuss how crowdsourcing approach affects Business Process Reengineering dimensions. In the last part we'll conclude from our research and we'll define some insights for future works.

2. RELATED WORKS

With crowdsourcing emergence many organizations are inclined to build their business model based on crowdsourcing. Companies need to have competitive advantages to maintain themselves in competitive markets. Cost advantage and differentiation is two leverages for competitive advantages as Michael Porter represented. Crowdsourcing is a growing technology that brings competitive advantages for companies.

Using crowd of people for completing tasks in enterprises is not a new paradigm. In the past companies also used their customers for certain functions, such as advertising campaign design and problem solution challenges. Xerox's Eureka system is an early example of an enterprise crowdsourcing where it harvested knowledge in the context of support system [5].

Recently, many companies crowdsource their R&D processes, since they need continuous innovative ideas to differentiate their products. For example, Procter and Gamble has successfully shifted its R&D strategy to use crowdsourcing for innovation processes [6]. P&G started looking for innovations more actively outside the company instead of investing only in internal R&D work.

Whitla (2009) researched about crowdsourcing application in marketing; He scrutinized various crowdsourcing websites to search for marketing related HITs that had been posted by companies. They found three marketing-related areas in which companies are actively using crowdsourcing, these areas are: product development, advertising & promotion, and marketing research [7].

Lopez et al. (2010) in their paper examined two applications of enterprise crowdsourcing services: 1) IT inventory management 2) End-User support. They represented that companies should take into consideration different aspects for example, methods for expert discovery, team building, task management, and etc. to be able to use crowdsourcing for knowledge-intensive tasks [8].

Many other business processes, such as product design and support, are activities where external community can provide innovative contributions.

As crowdsourcing enable companies to access scalable crowd of people with various talents and skills, many companies try to build their business model based on crowdsourcing. In section 3.1 we'll discuss processes within companies that could be crowdsourced. Literature shows that crowdsourcing

is applicable for various functions and processes within company, in this paper we're going to discuss the applicability of the crowdsourcing for business process reengineering (BPR) and the challenges of BPR crowdsourcing in companies.

When companies conclude that crowdsourcing is the best approach for doing tasks and processes of the company, they should consider methods for designing tasks in such a way to be clear and understandable for workers, methods to ensure the quality of submitted results, methods for aggregation of the results and integrating them into companies existing business processes, and etc. If a company pay attention to all of the above mentioned insights, it could apply crowdsourcing approach for its tasks and processes.

3. CROWDSOURCING PROCESS

Although crowdsourcing process could change according to the type of task and other parameters, but in general we can define a process that its stages could be generalized to all crowdsourcing functions. Researchers have represented crowdsourcing process from different points of view that all seem to be compatible with each other. Vukovic (2009) identified four stages for crowdsourcing process as following: Registration and specification, Initializing crowdsourcing contest, Carrying out crowdsourcing request, and completing crowdsourcing request [3].

In Registration stage, both requesters and providers register in crowdsourcing platform. The requester submits the task to be crowdsourced, defining its requirements including description of the task, start and end date, the reward of successful completion and other parameters.

To initialize crowdsourcing process, the platform displays submitted tasks and all prerequisites that are necessary for doing the tasks. Most of the platforms have interface for searching for tasks according to the amount of reward, required completion time, the type of tasks, the required skills, and etc. in crowdsourcing platforms, the worker is the one who choose to work on a task according to his/her interests.

To accomplish crowdsourcing task, *Crowdsourcing* platform provides the environment and tools to support requesters to submit tasks and also to support crowdworkers to choose the appropriate task to work on regarding their knowledge, interests, and skills. The more user-friendly the platform is, the easier the process happen.

Finally, once the participant completes the request, submits it to the platform, requester validates it against the completion criteria. Once the requester confirms successful completion of request, platform executes award payment.

Geiger (2011) identified four dimensions that describe how crowdsourcing processes differ [10]:

Preselection of workers, Accessibility of peer results, Aggregation of results, and remuneration of results are the processes in crowdsourcing.

Preselection of workers, is concerned with selecting qualified workers among crowd of people who asked to do tasks. Most of the requesters assign qualification tests before workers start to work on the main tasks. Accessibility of peer results determine show workers can access each other's results and specifies workers' authority to modify, access, and view the results.

Aggregation of results, describes how the requester aggregate the crowdworkers' results and how they use the results. Aggregation could be selective or integrative based on the type of task. Remuneration for results, determines how the requesters reward the workers [10].

3.1. Classification of crowd sourcing function within an enterprise

As we mentioned before crowdsourcing could be applied to a wide range of jobs and tasks. Vukovic(2009) represented that in organizations Crowdsourced function may take one of the following forms: design and innovation, development and testing, marketing and sales and support [3].

By crowdsourcing innovation and design processes, enterprises can employ members of crowd to help for innovation and design processes. Example in this category is Threadless.com, a popular community-oriented T-shirt company, where crowdworkers submit their T-shirt designs. The submitted designs are shown to the public to vote .a design that gathers the highest vote will be produced. As most of the voters are company's customers, the company will be sure of the existence of appropriate market and significant sales of the products. As customers see that Threadless gives great value to their opinions and produces designs with high votes, their loyalty toward the company will increase. On the other hand, using crowdsourcing for innovation and design process will incur the company less cost.

As crowdworkers are not limited to few amounts of people, and are scalable amounts of people, they could innovate continuously. With this continuous innovation, companies could produce innovative products and will have differentiation in the competitive markets. On the other hand as companies pay crowdworkers much lower than professional employees, by crowdsourcing, their overall costs will be lower, as a result they offer products with lower prices; so crowdsourcing will bring cost leadership for companies in competitive markets.

Companies can benefit from crowds ability to support product development and testing. Andhaving large groups of people could facilitate and accelerate these processes.uTest.com and TopCoder.com are success stories and example systems in this group.

Numerous platforms are used for crowdsourcing of marketing and sales functions. By employing crowdsourcing for marketing and sales functions, enterprises can benefit from crowd potentials. For example Threadless asks from crowd of people for slogans and inspiring sentences to print on T-shirts, or to use for marketing. And because these slogans are various and innovative and originate from different thoughts and points of view, so their effect will be more on people and the company's sales will increase.

Support services provide a mechanism for submitting, managing and resolving user submitted issues in a centralized problem resolution knowledge base. Crowdsourcing could be used for support process of organizations, and could facilitate it. Amazon Mechanical Turk and FixYa.com are platforms for crowd sourcing supporting functions.

4. CROWDSOURCING EFFECT ON BPR DIMENSIONS

As we represented in the previous section, we can use crowdsourcing approach in doing enterprise processes, and crowdsourcing is effective in design, development, marketing, sales and support functions of an enterprise. Enterprises need to focus more on motivating people to participate in crowdsourcing process, and qualifying people who want to do tasks. There should be qualification test for tasks based on their types, for example in marketing, enterprises need to crowdsource tasks to people with good relationships with customers and people who're aware of marketing techniques. Complex jobs should be divided into simple tasks to be easier to accomplish and motivate more people. For each task companies should add necessary information that a worker or provider will need to do it efficiently.

Some organizations are unhappy with the performance of their processes without actually knowing what those processes are. They maybe dissatisfied with performance of some departments but they don't know where the inefficiency originates from. So organizations have to discover what the issues are and where changes can be made.

Each business process reengineering project should start with analyzing the current "As-Is" situation, determining precisely what problems exists, which processes don't have efficiency and then bringing about changes that is necessary to improve situations. Figure 2 illustrates general process improvement in BPR.

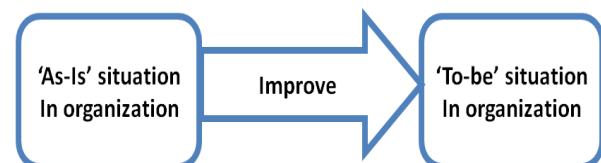


Fig 2. Process improvement in BPR

Traditional methods like interviews, workshops, walk-throughs, and etc. for analyzing and determining processes are often inaccurate, difficult, and time consuming. Organizations need to apply other techniques for analyzing "As-Is" situation and employees' performance to have successful BPR project. Starting BPR project without actually knowing the current situation of organization, its problems, the performance of its employees, and etc. is not possible. So it's crucial to apply approaches for determination of "As-Is" situation.

The time taken to analyze and determine the processes with traditional methods like interviews, workshops are often inaccurate, difficult, and time consuming. So organizations could use scalable large crowd of people for analyzing their processes to determine the "As-Is" system and existing processes and model. After identifying existing model of organization and its processes, then it's time to rewrite, reengineer and make changes to processes within organization.

Figure 3 illustrates schematic view of using crowdsourcing for process analysis.

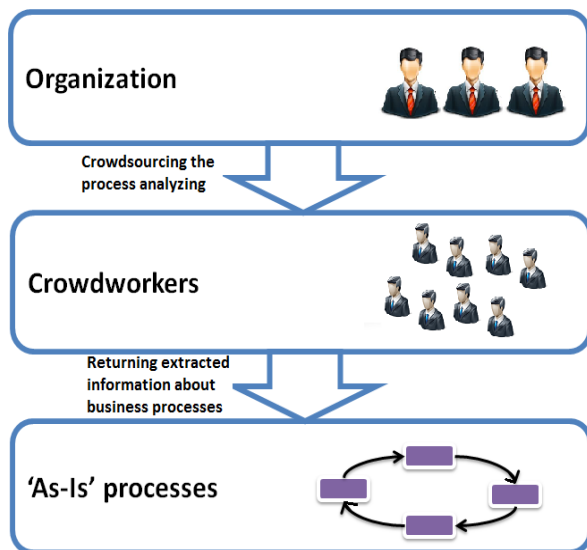


Fig 3.Crowdsourcing process analysis

In the following we're going to present BPR's dimensions and how crowdsourcing affect those dimensions. Wang Li-ping (2009) divided Process Reengineering into four dimensions, namely: organization structure reform, management system reform, personnel management reform, and information technology application [11]. We're going to discuss applicability of crowdsourcing for each of these dimensions.

Organization Structure Reform

A cross-functional team is a group of people with different functional expertise working together toward a common goal. Members of cross-functional team are from different units with the same aim to complete a workflow.

To have the processes be done with lower costs, in a shorter time and effectively, enterprises could choose cross-functional team by crowdsourcing platform, they could announce what kinds of skills they need, what tasks they need to be done, and precisely explain the tasks, and take a qualification test to qualify the workers who want to do tasks, then enterprises would have a large group of qualified workers with different talents and skills to do the tasks, So they could make effective cross functional team with crowdsourcing. Here crowdsourcing has a direct effect in having efficient BPR.

Management system reform

Companies need to evaluate customer's satisfaction of products to determine product deficiencies and they should try to improve quality of products and change the processes that affect production of goods. This could result in company's marketing performance. Each organization has two kinds of evaluation, internal evaluation and external evaluation; for external evaluation, organizations could crowdsource evaluation to their customers to specify customer satisfaction and most important things in the market. Or even the company could crowdsource evaluation to the public who could communicate with more customers and evaluate their satisfaction. The result of such several evaluation methods can be seen in company's market performance.

The reform of personnel management

Another variation of crowdsourcing is enterprise crowdsourcing. In this kind of crowdsourcing, works are not

done by anonymous crowd of people, but by crowd of company employees [12].

As workforce is of great importance for companies and is considered one of the assets of companies, companies have to focus on improving their employees' performance. Before taking action to enhance employees' performance, companies need to evaluate the performance of employees, their contribution, their team work, the time they spend over each task, their relationship with other employees, and etc.

For large companies with many employees, evaluating employees' performance with traditional methods is very difficult or sometimes impossible; Crowdsourcing is a very effective solution for this problem.

For evaluating employees, we could use the potential of crowdsourcing, but the original crowdsourcing is not applicable when companies don't provide employees' work information to crowdworkers (because of privacy issues); and because crowd of anonymous people don't know the companies employees, they could not evaluate employees well. The solution is enterprise crowdsourcing, so the company could ask its employees or employees of sub-conductors to evaluate other employees' performance. The result will show the precise performance of employees.

If there was no privacy limitation regarding to issuing employees' work information to public crowd, Crowdsourcing employee evaluation task to anonymous crowd of people is also applicable and will produce efficient results. Since each employee's achievements and their general information have been stored in company databases, by providing this information to crowdworkers, they could analyze the information and evaluate employees' performance effectively.

While company gets useful information regarding to their employees' performance, they could rethink about them and change responsibilities of employees regarding to their skills. In some cases if an employee's performance doesn't meet company's criteria s/he will be fired.

The application of information technology

Web2 and the evolving vision of Web3 have a great effect on facilitation of information sharing, information aggregation, interoperability, user-centered design, collaboration on the World Wide Web, and crowd-centered services. New concept of Web is the intuition that drives crowdsourcing, crowd servicing, and crowd computing. Crowdsourcing is an application of IT in BPR which enhances enterprises' efficiency, performance, and it decreases costs and the completion time of tasks because there are large groups of people who do tasks with lower awards.

Figure 4 illustrates crowdsourcing and BPR dimensions in a schematic view.

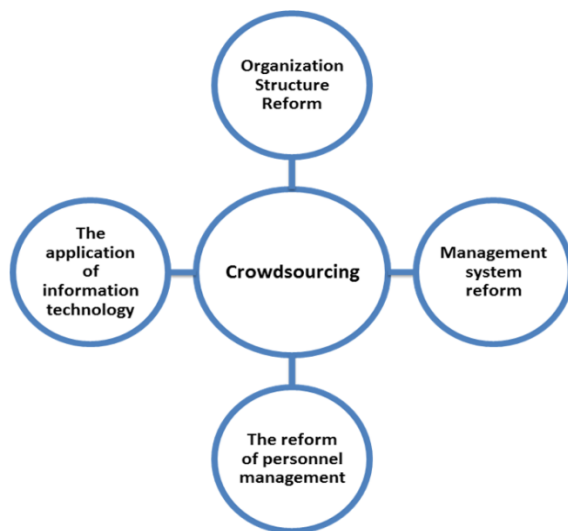


Fig 4. Crowd sourcing and BPR dimensions

5. CONCLUSION AND FUTURE WORKS

Crowd sourcing has the potential to effectively harness the machine's enormous raw power and the crowds' genius. It can also spawn new business models and startups. Enterprises could apply it for business process reengineering to do it effectively and with lower costs.

In this paper we represent crowdsourcing as leverage for BPR and applied it within BPR to crowdsource some of the BPR dimensions. In our proposed model BPR and crowdsourcing applied in parallel. An enterprise could crowdsource some stages of BPR to large groups of people who could work on tasks through internet with lower rewards in comparison with enterprise's employees or other traditional methods. For future works we could take into consideration crowdsourcing of BPR as a whole, to crowdsource the whole BPR from the first stage to the last; so an enterprise could ask crowd of people to do BPR for the enterprise, then the crowdworkers collaboratively evaluate the enterprise, discover business models and processes, recognize the problems of "As-IS" business model, and finally find solutions for enhancing the enterprise' operations. Crowdsourcing is beyond other technologies that help enterprises to have efficient BPR, because no machine or computer has the ingenuity that human beings have and computers are unable to do some tasks that need human recognition. In future works we'll compare process mining and crowdsourcing results for mining and analyzing an organization's processes and rate the accuracy and efficiency of both methods.

In summary, Crowdsourcing is going to be the future of all businesses.

6. REFERENCES

- [1] Howe, J. The Rise of Crowdsourcing. Wired magazine. June 2006. Issue 14.06.
- [2] Davis, J. 2011 From Crowdsourcing to Crowdservicing. IEEE Internet Computing.
- [3] Vukovic, M. "Crowdsourcing for Enterprises", in Proceeding of the 2009 Congress on Services – I. IEEE Computer Society, Washington, DC, USA, 686-692, 2009.
- [4] Kulkarni, A. Can, M. Hartmann, B. (2012). Collaboratively Crowdsourcing Workflows with Turkomatic; Proceeding of CSCW 2012, ACM (2012); Seattle, Washington USA.
- [5] Bobrow, D. G. Whalen, J. 2002 Community Knowledge Sharing in Practice: The Eureka Story. Journal of the Society of Organizational Learning and MIT Press, Volume 4 Issue 2.
- [6] Huston, L. and N. Sakkab 2006 Connect and Develop Inside Procter & Gamble's new model for innovation. *Harvard Business Review*.
- [7] Whitla, P. 2009 Crowdsourcing and Its Application in Marketing Activities. *Contemporary Management Research* Pages 15-28, Vol. 5, No. 1.
- [8] Lopez, M. Vukovic, M. Laredo, J. 2010. People Cloud Service for Enterprise Crowdsourcing. 2010 IEEE International Conference on Services Computing.
- [9] Surowiecki, J. 2005 The Wisdom of Crowds. Anchor.
- [10] Geiger, D. Seedorf, S. Schulze, T. Nickerson, R. Managing the Crowds: Towards a Taxonomy of Crowdsourcing Processes, In *Processing of the seventeenth Americas Conference on Information Systems*, 2011.
- [11] Li-ping, W. Business Process Reengineering in E-commerce Environment; ICISE 2009, IEEE.
- [12] Hirth, M. Hoßfeld, T. Tran-Gia, Ph. Analyzing costs and accuracy of validation mechanisms for crowdsourcing platforms, *Journal of Mathematical and computer modeling*, ELSEVIER, 2012, in press.
- [13] Pan, Y, Blevins, E. A Survey of Crowdsourcing as means of Collaboration and Implications of Crowdsourcing for Interaction Design, IEEE, 2011.
- [14] Quinn, A. Bederson, B. Human Computation: A Survey and Taxonomy of Growing Field, In *Processing of CHI*, 2011.
- [15] Shaw, A. Horton, J. Chen, D. Designing Incentives for Inexpert Human Raters, CSCW 2011, March 19-23, 2011, Hangzhou, China.
- [16] Yi-wu, X. Xiao-wan, L. Yan, CH. The Research on the Usage of Business Process Mining in Implementation of BPR; 2007 IFIP International Conference on Network and Parallel Computing, IEEE.
- [17] <http://www.threadless.com/>
- [18] <http://www.pg.com>
- [19] <http://en.childrenslibrary.org>