

Software Crowdsourcing in Brazil IT Industry

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1. INTRODUCTION

In the last decades with the growth of software ecosystems, software development activities have become much less isolated, more dependent and interconnected with functionalities provided by other developers [Carmel, 1999]. These changes create enormous pressure on software engineers that must now coordinate their development activities with an increasing number of people from different countries, cultures, expertise, background and even different companies while dealing with the increasing technical complexity of the current systems [Kaganer, 2013]. Recently more complex models began to emerge such as open participation in software development scenario as an alternative business model that offers cost reduction, talent management and faster time-to-market. This new model is known as Software Crowdsourcing [La Toza, 2013], [Wenjun, 2013] [Stol, 2014].

In order to effectively support crowdsourcing, there are computational platforms that handle the technical aspects of the crowdsourcing tasks including the broadcasting of tasks to be performed, the selection of tasks, reception of results of the tasks, and so on [Brabham, 2008] [Kaganer et al. 2013]. Examples of these platforms include TopCoder, Amazon Mechanical Turk and others, such as Crowdtest developed in Brazil.

Crowdsourcing has challenges that must be overcome. First, the model of collective intelligence is appropriate when tasks are well defined and "self-contained", i.e. do not require coordination with others something relatively rare in software development. Therefore, for complex tasks, the model of collective intelligence will only succeed through new collaborative tools [Brahman 2008], [Malone et al. 2010], [Begel et al, 2012]. The second challenge is that when using collective intelligence techniques for tasks of a given domain, it will be necessary to have specific knowledge and experience. It might lead to challenges in the area of knowledge management and its applications (software maintenance, evolution, etc.)

For the large market of Brazil is important support for research related to crowdsourcing models. The use of crowdsourcing in software development activities is directly related to finding solutions for increased capacity of Brazilian companies acting in the global software development market. In addition, the focus of this study and its social-technical approach with the results arising from the study aimed at improving the process quality of the Brazilian's products and software services. Brazilian companies can through crowdsourcing better able to compete in the global market.

This paper presents the initial findings from an empirical study about crowdsourcing in order to investigate the Brazilian software labor and industry markets and the effects of this new phenomenon of crowdsourcing. The goals of this study are broad: to understand how the three CS elements are emerging in Brazil – the buyers, the platforms and the crowd.

1.1. Software Crowdsourcing Elements

In software development, CS means to engage a global pool of online workers that can be tapped on-demand to provide software solutions or services [Machado et al. 2014]. Crowdsourcing portends—not only the disruption of outsourcing-- but the disruption of the entire global labor market. Small, atomized, tasks that can be completed and paid for in small

increments are unprecedented in the history of work. Thus there are three key components to crowdsourcing (Figure 1). The platform is the middleman, i.e., it intermediates the communication between the two other parties. Second, is the crowd—the workers who will effectively perform the tasks—most in their home. The crowd is a global dispersed and undefined crowd. Third, on the left, are the buyers or requesters. These are the firms that place the requests for work (the tasks).



Figure 1. Basic model Crowdsourcing

2. RESEARCH DESIGN (Desing Goals)

We executed an empirical approach by conducting a semi structured interviews, which is a popular technique of qualitative research in software engineering [Corbin and Strauss, 2008]. The main purpose of these interviews was to provide background understanding how crowdsourcing is being and should be practiced in terms of software development in IT Brazil industries. An initial ad hoc literature review was conducted with the purpose of sharing the basic CS concepts with the research team and identifying the challenges to be addressed. Semi-structured interviews were conducted iteratively. Interviews lasted between 30-60 minutes each and a flexible interview protocol with open-ended questions focused the discussions on the industry - organizational motivations for leveraging the crowd, the specific tasks to be completed and perceived impacts on the organization. A total of 15 interviewees were conducted. These participants mainly came from Brazil with various backgrounds, profiles and skills like managers from TI, media and internet corporations, Brazil's CS platform CEO, and IT professionals and had different experiences in using crowdsourcing for micro and complex tasks.

Among the respondents, we observed three categories of tasks in those companies that have already tested the crowdsourcing in pilot projects within their business: small tasks (companies use crowdsourcing for small tasks such as image recognition using the Amazon Mechanical Turkey platform); creative tasks (companies use crowdsourcing for creative tasks using design's platform like 99design and the Brazilian platform WeDoLogo¹); macro tasks (companies use crowdsourcing for bigger tasks, such as testing an entire software system using uTest and the Brazilian platform Crowdtest²).

Our initial empirical data showed that the Brazilian IT industry has no knowledge of the CS concept and is outdated in terms of crowdsourcing software. Software professionals are not sure about CS reliability. In addition, Brazil is a country that usually receives a lot of outsourcing demands but is not used to outsource (Brazil most of time is suppliers not consumers). Few companies are already benefiting from CS and were open to crowdsourcing. At the same time that we found few studies about the practice of crowdsourcing in IT companies, there is a great opportunity to better understand this topic, including the effects of implementing CS and analyzing its effects in the organizational, national or individual cultures.

¹ <http://www.wedologos.com.br/>

² <http://crowdtest.me/>

We can observe that Brazil still have a few active members, both at national and international crowdsourcing platforms. The preliminary findings of interviews conducted from the three perspectives (the buyers, the platforms, and the crowd) can be summarized in table 1.

	Enable	Blockers
Crowd	Extra money	Poorly feedback
	Share knowledge	Few collaboration
	Curiosity	Knowledge of the Technologies
Buyers	Scalability	Specific business knowledge
	Save money and time	Low quality of the services
	Creativity	Maturity of the suppliers
	New ways to do the same	Identify a specific process
Platform	Fast delivery	Data confidentiality
	Reduced cost	Very specific business rules
	Diverse types of testing	Laws and taxes involved

Table 1: Summary of findings about the three crowdsourcing perspectives

As enablers, there is the maturity of the software engineering industry in sharing knowledge, diversity of skills and experiences. Alliances and partnerships are also important enablers to promote the software crowdsourcing initiatives. As blockers the bureaucracy, legal issues (taxation), and the maturity and adoption of crowdsourcing in Brazil were pointed. In spite of the difficulties we identified above, we posit that crowdsourcing will disrupt labor markets. Markets that are disrupted, like the Brazilian software market, see change in the types of tasks that are conducted. Software development, with programming at its heart, is composed of many tasks: design, planning, prototyping, coding, testing, integration, etc. Thus, the preliminary study conducted with Brazilians companies, platform and developers is part of a multi-year program of research and contributes to answer our first research question:

RQ(1) What efforts are needed for companies in the Brazilian market to facilitate the use of the software crowdsourcing process?

3. DISCUSSION

Crowdsourcing is an emerging topic and the benefits have were discussed in Section I. The literature suggests that crowdsourcing will disrupt labor markets like the software market. However, harnessing the positive effects of crowdsourcing faces several challenges, such as the precision and efficient of a software crowdsourcing task, technical and social aspects [Huberman, 2009] and the barriers in the organizational, national or individual cultures in crowdsourcing context.

In literature, few authors explore the cultural aspects of CS and this is an opportunity to be investigated. We know that Europe and the U.S. are well-populated with crowdsourcing participants, but that still doesn't say much about potential differences in acceptance of crowdsourcing across the globe. Brazilian people are highly creative in their own way, but is still underdeveloped in term of software crowdsourcing. Cross-cultural differences in the

adoption of crowdsourcing and open approaches to business are still under-explored, and little is known about possible differences in participation across cultures too.

Crowdsourcing is therefore a business concept that is premised on the use of intelligence collective and volunteer's knowledge to solve problems, improve or develop new products, technologies and services [Malone, 2010]. But it is still not clearly understood by many companies that would be in a position to actually benefit (cost and results) for implementing a crowdsourcing process in general or software crowdsourcing initiative.

We believe that crowdsourcing scenario in Brazil could be a source of competitive advantage on the global marketplace and strategically invest in software crowdsourcing. For the next years with regard to crowdsourcing will present an increase in the number of buyers, platforms and further growth in respect to workers.

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