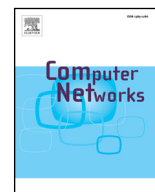




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Wisdom of the Crowd within enterprises: Practices and challenges

Mahmood Hosseini*, Jack Moore, Malik Almaliki, Alimohammad Shahri, Keith Phalp, Raian Ali

Bournemouth University, UK

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ABSTRACT

The Wisdom of the Crowd advocates that decisions collectively made by a diverse crowd could be better than those made by an elite group of experts. The Wisdom of the Crowd puts preconditions on this to work correctly. This concerns the diversity of the crowd, their independence from each other, their decentralisation, and the methods of aggregating their distributed knowledge and forming collective decisions. Although the concept is inspiring, its interpretation and conduct differ significantly amongst enterprises, especially with regard to the culture and style of management. In addition, we still lack reflections on how the Wisdom of the Crowd worked in the practice of modern enterprises. To address this lack of knowledge, this paper conducts an empirical study following a mixed method approach involving 35 senior managers coming from 33 different industries in the UK. In the first phase we interview eight managers and, in the second, we confirm and enhance the results by a survey consisting of open-ended questions and involving 27 other managers. The results shed light on the current practice of the Wisdom of the Crowd in several UK enterprises, which can inform the analysis and design of future software tools meant to aid this emerging decision-making mechanism.

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1. Introduction

The Wisdom of the Crowd (WoC) advocates that, for certain kinds of problems, the collective decisions of a large group of individuals are often better than those taken by an elite group of experts [16]. The reliance on the crowd to solve problems and take decisions has a long history in social and political science, including the foundations of modern democratic systems and its composite and emerging forms like the urban governance [15]. The concept, coined as the WoC, has gained attraction with the advent of the technology age, which made it more feasible not only for large scale

enterprises, e.g. parliaments and other governmental institutes, but also for small and medium scale enterprises and smaller scale problems. For example, it is possible now to see a small design company consulting staff and clients about the new logo or the new website style and features.

In order for the WoC to yield good results, there are a number of aspects that need to be set up [16,17]. The first is about the *diversity* in the crowd, where diversity is generally needed to generate valid and holistic solutions. The second is about *independence* amongst the members of the crowd, where dependence means suppression of individual perspectives, sometimes subconsciously, e.g. when influential people drive the crowd. The third is about *decentralisation* in the sense of specialisation where members or groups work on parts of the problem and provide local knowledge, i.e. divide and conquer. The fourth is about the suitable *aggregation* of that local knowledge to form a holistic solution. These four

* Corresponding author. Tel.: +44 7749792697.

E-mail addresses: mhosseini@bournemouth.ac.uk, mahmood.hosseini@yahoo.com (M. Hosseini), rali@bournemouth.ac.uk (R. Ali).

pillars were often studied as general principles without concretising and delving into the details. Thus, customisation to the problem domain typically requires further research.

In academia, the WoC has been researched as a mechanism to solve a wide range of problems. This includes the harnessing of the power of the crowd to contribute enterprise knowledge [10], in supporting marketing [27], in content generation [2], in prediction and forecasting [31], in election forecasting in politics [5], and in e-commerce and collaborative shopping [26]. Certain studies paid effort on subtle aspects of the WoC such as the effect of coordination strategies and also social influence amongst the crowd on the quality of outcome [3,14]. The underlying reasons for this growth of research relate to the facilities Web 2.0 provides and the proliferation of social networks, which made online communication both effective and widely used. Surprisingly, the majority of research focused on the final stages of the WoC, mainly on deducing collective decisions from de facto social networks or artificial agents. Little attention has been paid to the forward engineering of platforms and social networks expressly tailored to the WoC and to meet its principles of diversity, independence, decentralisation and aggregation.

Knowledge acquisition is a bottleneck problem in enterprises [8]. The collection of knowledge is a preliminary step to quality enterprise modelling and decision making. This is typically a collaboration amongst clients, staff, management and systems analysts [12]. Broadening the volume and expertise of the set of stakeholders involved in the knowledge acquisition would help better quality knowledge [22]. For modern enterprises to cater for the velocity and diversity of changes in their social and economic context, the WoC seems to be a practical and realistic alternative to the centralised knowledge acquisition and decision making approaches especially with the presence of the new technology of social networks and mass communication.

In spite of the promising nature of the WoC for modern enterprises, we still lack the knowledge on how the concept is perceived and applied in practice. Also, being mainly a social concept, the WoC would highly be subject to multiple interpretations in different enterprise cultures. In this paper, we investigate how the WoC is perceived and practised in several United Kingdom enterprises. In doing so, we also aim at reinforcing the meaning of the main pillars of the WoC and identifying questions to ask when designing automated tools to support the WoC. The study consists of an exploratory qualitative interview-based phase and a quantitative survey-based phase, and it involves 35 managers from 33 different UK enterprises.

The paper is structured as follows. In Section 2, we present our research method and the design of our study. In Section 3, we report our findings on the current practice of the WoC and its challenges. In Section 4, we elaborate on our findings and discuss the threats to validity of our study. In Section 5, we present conclusions and future work.

2. Methodology

To investigate how the WoC is applied in enterprise decision-making and problem solving, we conducted an empirical study using a sequential exploratory mixed method.

The first phase of the study was qualitative, where we interviewed eight managers from eight UK enterprises in various domains. The insights we obtained were then confirmed and enhanced in the next phase, which was quantitative and where we surveyed a larger sample of 27 senior managers working in different enterprises and domains. The questions in the interview and, consequently, those in the survey were centred on the four principles of the WoC as defined in [16]: diversity, independence, decentralisation and aggregation. The interview and survey questions can be found at <http://goo.gl/xQz7DH>.

2.1. Qualitative phase

The qualitative phase took two months to complete, during which the following took place. The interview questions were designed based on the concept of WoC and its four pillars and the interview participants were selected. This was mainly done in March 2014 (cf. Section 2.1.1). Then, all the interviews were performed and their results were collected during March and April 2014 (cf. Sections 2.1.2 and 2.1.3). Finally, the content analysis of the interviews and the design of the questionnaire for the online expert survey were performed during April 2014 (cf. Section 2.1.4).

2.1.1. Interview participants

In order to gather insights and information on how the WoC is being currently practised in enterprises, we first interviewed a select set of eight managers. We followed the purposeful sampling method, proposed by Creswell [18], in which participants were selected through the understanding that they usually apply the concept of the WoC in their enterprise. The maximum variation sampling technique [23] was also used to ensure participants diversity. We interviewed seven senior managers with a minimum of 10 years of experience and one junior manager with two years of experience. We chose the participants from eight different industries in the UK, namely photography, web development, higher education, environmental and sustainability projects management, pharmaceutical research, network and infrastructure, publishing, and charity organisation.

2.1.2. Conduct of the interviews

The qualitative interviews were carried out in two separate formats. Six of the eight participants were interviewed face to face, whilst the other two participants were interviewed online. Each participant was invited via e-mail. At the beginning of each interview, each participant was given a consent form to sign agreeing with the terms and conditions of the interview. Then an introduction script and examples were given to ensure we got a shared understanding of the concept of the WoC, especially that managers apply the concept sometimes under different names. This was to ensure that the interviewees were introduced to the concept of WoC and its four pillars before the interview started. Finally, the core questions of the semi-structured interviews took place. During every interview, we sometimes changed the order of the questions with respect to the answers we obtained from the managers to keep the natural flow of the information. Therefore, instead of going sequentially with the interview

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