International Journal on Semantic Web and Information Systems
Volume 14 • Issue 3 • July-September 2018

Web-Based Collaborative Systems and Harvesting the Collective Intelligence in Business Organizations

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ABSTRACT

The major purpose of this article is to empirically explore the role of web-based collaborative systems in harvesting the dimensions of collective intelligence and the expected outcomes. A questionnaire survey was developed to collect data from 29 firms across all industries with a sample of 239 respondents. Structural Equation Modeling, using Smart PLS was conducted to analyze the data. The results indicated that web-based collaborative systems play a significant role in harvesting the dimensions of collective intelligence, including collective cognition, shared memory, collective problem solving, knowledge sharing, and collective learning. The results also revealed the significant impact of web-based collective intelligence on the sense and response capability and on the quality and morality of organizations' decisions. In addition, the article reveals the significant impacts of BI tools and relationship quality on the role of web-based CI in achieving the expected outcomes.

KEYWORDS

BI Tools, Collective Intelligence, Expected Outcomes, Relationship Quality, Web-Based Collaborative Systems

INTRODUCTION

The environment of business organizations is continuously changing at an ever-increasing pace with a wide range of highly complex and multi-faceted challenges. Business organizations have to innovate in new areas, make complex decisions, develop creative solutions, adapt and behave as human beings to ensure their survival, prosperity, and superiority. In this context, a business organization must be viewed as a complex adaptive system (Ng & Liang, 2010; Schut, 2010; Fink et al., 2017). More specifically, it can be viewed as a human system with the basic objective of pooling different human abilities and expertise to create certain synergetic effects in finding emergent and sustainable solutions to complex problems and challenges (Dumas, 2010; Nga & Liang, 2010). This perspective establishes a new approach of re-examining organizations as intelligent entities that are evolving in the same manner as biological entities that compete for survival and growth in an ecological system using their intelligence (Nga & Liang, 2010). The previous research (e.g., Zara, 2004; Staškevičiūtė et al., 2006) confirms that, an organization is intelligent only if it can nurture a high level of Collective Intelligence (CI).

DOI: 10.4018/IJSWIS.2018070102

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The new Information and Communication Technologies (ICTs) are making it possible to organize groups and empower people to collaborate in very new, innovative ways (Suárez Valencia et al., 2015). Web-based Collaborative Systems (W-CSs) represent the most recently discovered path for opening up the possibilities of improving CI and forming the paradigm of web-based CI that was simply inconceivable even a few years ago (Lévy, 2010; Lykourentzou et al., 2011). These systems leverage the combined efforts of very large groups of people to solve complex problems and are often referred to as CI systems (Lykourentzou et al., 2011).

Many important issues of CI have yet to be explored and are open for research. According to Hansen and Vaagen (2016), CI is still in a state where its theoretical foundation lacks clarity and internal consistency. Kapetanios (2010) clarified that the transition from personalized data, knowledge, and contents towards collectively intelligent forms of synergies in an amalgamation of humans and technology is at its infancy and raises many questions, which vary from the notion of CI to the methodologies and principles for computations and engineering of CI systems. Despite the IT revolution and the continuous growth in its role in harvesting CI, little attention has been paid to the ways in which W-CSs can contribute to harvesting CI to form the paradigm of web-based CI. Moreover, the role of BI tools and the impact of relationship quality on the role of web-based CI in achieving the expected outcomes have been largely ignored. Therefore, the present study aims to develop and empirically validate a framework for exploring the role of W-CSs in shaping the dimensions of CI and the expected outcomes. Furthermore, this study aims to investigate the impacts of BI tools and relationship quality on the role of web-based CI in achieving the expected outcomes.

AN OVERVIEW OF WEB-BASED CI

Intelligence can be defined as a very general mental capability that, among other things, involves the ability to reason, use memory, plan, solve problems, think abstractly, comprehend complex ideas, learn from experience, and measure intelligence by examining performance across several tasks (Barlow & Dennis, 2016). According to Yick (2004), intelligence is spread over a spectrum, with proto-intelligence at one end and CI at the other. Many definitions of CI have been built around the idea of intelligence. For example, Gan and Zhu (2007) described CI as the ability of a group or an organization to learn, solve problems, and plan for the future to understand and adapt to the environmental conditions. Suárez Valencia et al. (2015) suggest that CI can be understood as the capacity of a group of people to collaborate to achieve goals in a complex context. In an operational context, CI frequently refers to a software-supported collaborative design process that allows a group of individuals with a vested interest in understanding complex issues to reach a consensus about system interdependencies among sets of ideas such as problems, barriers, obstacles, goals and strategic objectives (Pór, 2014).

According to Lykourentzou et al. (2011), CI is an emerging field that seeks to merge human and technological intelligences with the aim of achieving results that are unattainable by either one of these entities alone. The widespread adoption of the Internet has effectively changed the way intelligence is collectively developed, thereby providing the foundation for web-enabled CI (Suárez Valencia et al., 2015). The advances in collaborative Internet applications have given impetus to the emergence, dissemination, and application of CI, which has resulted in the formation of the paradigm of web-based CI. The Semantic web constitutes a promising platform for the development of computer support for CI (Janik et al., 2011; Flores et al., 2015). Goble (2005) stated that the Semantic web is an initiative to enable and operate a semantic infrastructure for gathering and exploiting the web's CI, primarily from artificial intelligence and data management computing. However, a wide range of web-based collaborative applications has emerged over past several years. Web-based enterprise applications, such as enterprise resource planning systems (ERPS), supply chain management systems (SCMS), customer relationship management systems (CRMS), and knowledge management systems (KMS) are described as powerful collaborative platforms (Lai and Yang, 2009, Iqbal et al., 2013). These

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