Information & Management 48 (2011) 208–219

Contents lists available at ScienceDirect

Information & Management

journal homepage: www.elsevier.com/locate/im

Generating quality open content: A functional group perspective based on the time, interaction, and performance theory

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ARTICLE INFO

Article history:
Received 1 April 2010
Received in revised form 23 December 2010
Accepted 18 April 2011
Available online 30 May 2011

Keywords:
Group research
Input-process-output approach
Time
Interaction
Performance theory
Open content
Virtual communities
Wikipedia

ABSTRACT

We applied the input-process-output approach and time, interaction, and performance theory to examine the input factors (organisational, group-related, and individual) and process factors (group production, group well-being, and member support) that yield group effectiveness, measured as high-quality articles in Wikipedia. The results provided evidence of the positive effects of: group size and shared experience on both group process variables and group effectiveness; group heterogeneity on group production; organisational support and member activeness on group well-being; member activeness on member support; and organisational support and member activeness on group effectiveness.

1. Introduction

Open content (OC) has been defined as "content possible for others to improve and redistribute and/or content that is produced without any consideration of immediate financial reward – often collectively within a virtual community". It depends on an alternate philosophical and sociological view of the creation of information products that posits the superiority of open over closed systems, being an extension of open source software (OSS) principles to all domains that pertain to the development of information-based products.

The principles are equally applicable to any discipline that relies on creative intellectual work. As a result, the open source movement has given birth to a broader notion of open content which encompasses any type of creative information-based work, including articles, pictures, audio, or video published under a license that explicitly allows its copying and editing. The original open content license was the GNU Free Documentation License, designed by the Free Software Foundation (FSF) to complement their General Public License (GPL). Other examples of open content initiatives include the MIT's Open Courseware project, the California Open Source Textbook Project, the Harvard University Library Open Collections Program, and a wide spectrum of popular licenses designed by Creative Commons (http://www.creativecommons.org), and Wikipedia, currently the world's largest encyclopaedia. The open source revolution has instigated the emergence of a new philosophy stream that relies on the free nature of any type of information and that emphasizes free collaboration and sharing among human beings acting in virtual communities.

Researchers have tried to understand the OC movement from a descriptive point of view, in terms of ideologies, values, culture and participants' motives [21,35]. While acknowledging the overall success and quality of most OC projects, the 'bazaar-view' of the open source movement leads us to see OC as an obscure environment from which some quality projects arise. But, in fact, such interactions may still be governed by rules and standard group mechanisms among their members, who, in turn, determine the success of the projects.

Our research focused on answering two research questions:

1. What are the group input factors that contribute to high-quality products in open content practice?
2. What are the group process factors that lead to high-quality products in open content practice?

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doi:10.1016/j.im.2011.04.004

2. Literature review

We explored the open content project quality issue using a group perspective. Recent studies have employed group theory to examine open content projects [7,16]. We focused on group input and group process factors in OC communities by using two theoretical foundations: the input-process-output approach and the time, interaction, and performance theory.

2.1. Input-process-output models on group research

Input-process-output (IPO) models are a direct expression of the functional view of groups; this approach was first introduced in group research in the domain of social psychology. According to IPO models, both the inputs and processes that the groups uses when working together influence the effectiveness of the group; i.e., whether they achieve their production goals, meet members' needs, and maintain themselves over time.

2.1.1. The functional perspective and the general input-process-output model

The *functional perspective* examines groups in terms of the inputs and processes that function to influence group effectiveness [30,34]. This perspective considers group performance as its main focus. It is characterized by the three assumptions [13,14,23,32]: they are goal oriented, their performance varies and can be evaluated, and that internal and external factors influence group performance *via* the interaction process. *Inputs* that influence group function include the nature of the task, the internal structure of the group, its cohesiveness, composition, and environment. *Outputs* include group effectiveness (productivity, efficiency, and quality), leadership effectiveness, and satisfaction with the outcomes. In IPO models, the inputs have both a direct and indirect effect (by influencing the group process). Inputs include resources such as personnel, task, tools and time [19].

2.1.2. Review of recent MIS studies using an IPO approach

Recent studies investigated the effects of a GSS on the quality of group processes and outcomes [4], the nature of effectiveness within virtual teams [22], and a comparison between face-to-face GDSS and distributed GDSS [3].

An extensive review of processes and outcomes in computer-supported group decision making was conducted by Fjermestad and Hiltz [11]. They integrated 200 different controlled experiments that were discussed in 230 articles. Two of their resulting categories were particularly related to the *type of group system* that was used: consensus [15]; and *usability measures* due to the use of technology [2]. These did not appear relevant when applied to the performance of OC processes. Another category concerned *satisfaction measures* such as participation [28], cohesiveness, conflict management (as an outcome), influence and confidence, all of which are perception-related. Such measures, however, do not capture aspects of group tasks. Finally, the two most studied issues are efficiency and effectiveness measures. Depending on technology and task type, the efficiency measures that have been used are varied. They include decision time, number of decision cycles, number of ideas, time spent in activities, and time spent waiting for responses.

Effectiveness measures have varied widely in group research. Several approaches have been used: communication, number of comments [10], idea quality, decision quality, decision confidence, process quality, creativity or innovation, level of understanding, task focus, depth of evaluation, and commitment to results.

2.2. Time, interaction, performance (TIP) theory

A majority of the reviewed articles used short-term experiments in which groups of participants were formed to perform certain group tasks. This method can ascertain the causal relationships between the independent and dependent variables but omits the temporal dimension of group processes. Because of the overall temporal nature of open content group dynamics and production practices, there was a need to identify additional theoretical considerations that provide a deeper view of the mechanisms involved in group processes.

Group coordination behaviours occur at different levels: by the individual member, among team members, and within the social context. Groups simultaneously perform a number of tasks:

1. *Group production function*: The relation between the group as a functional entity and the environmental conditions and constraints within which a group operates.
2. *Group well-being function*: The activities that are related to the development and maintenance of a group as a system.
3. *Member support function*: The activities related to the ways an individual is embedded within a group.

As MIS group research has often observed artificial groups through laboratory experiments, few studies were found to have drawn insights from the different levels. Using an analogy from the competition between VHS and the Sony Beta videocassette, Dennis and Reinicke [8] argued that brainstorming sessions may not be primarily concerned with the number of ideas generated but may seek group well-being and member support. They developed arguments and empirical evidence that suggested that electronic brainstorming was not as effective as verbal brainstorming in providing group well-being and support.

In conclusion, the social notion of the group is needed in understanding OC practice's overall success. Such a view allows researchers to understand OC processes better by focusing on a level of analysis that will show what factors contribute to OC product quality.

3. Research hypotheses

The overall model used in our study is shown in Fig. 1. *Group effectiveness* was defined as the extent to which a group is able to perform a certain group task that fulfils a pre-determined list of quality and excellence standards. It was chosen as the primary dependent variable as it is particularly appropriate in solving information-based tasks where quality can be measured through the categorization and specification of quality standards in the OC community.

3.1. Input variables

In order to test the relevance of a group research perspective in explaining group effectiveness, we selected the most commonly acknowledged group input variables from our review of the literature. Only those variables that were applicable to open content groups and communities were included. Three main categories of input factors were studied: those that concern the entire group, the individual member, and the organisational factors that consider the context of group work.

3.1.1. Context variables

The management literature has shown that in an organisational context perceived organisational support leads to an increase in employee creativity. Organisational support is defined as an