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Implementing continuous adaptation to technology innovation in complex adaptive organizations

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ABSTRACT

Purpose: Most organizations integrate technology innovation through a complex, ad-hoc, top-down model of assimilation. However, a continuous and autonomous adaptation process may be more natural and improve the quality of assimilation. Organizational workers who function as “fractals” in a Complex Adaptive System (CAS) demonstrate higher quality of digital technology usage. The current study investigates whether “fractal workers” demonstrate more positive attitudes toward technology innovation, and whether these attitudes translate into quality technology usage.

Design/methodology/approach: Online questionnaires were completed by a sample of 300 workers in 20 organizations that have recently introduced technology innovation. Pearson and regression analyses were used to examine the relationships between the functioning of workers as CAS fractals and their attitudes toward the innovation, and between their attitudes and the quality of technology usage.

Findings: A strong positive correlation was found between functioning as CAS fractals and the attitudes toward technology innovation, and between these attitudes and the quality of technology usage.

Practical implications: Increasing the autonomy of workers and encouraging them to function as CAS fractals within the organizational environment can facilitate an efficient, dynamic, and continuous process of adaptation to technology innovation.

Originality/value: To the best of the authors' knowledge, this is the first empirical research to study how functioning as a CAS fractal translates into attitudes toward technology innovation and to technology usage within organizations. It sheds light on the important differences between assimilation and adaptation of technology innovation.

1. Introduction

The development of digital technologies and the Internet has had a remarkable impact, not only on the lives of individuals, but also on the organizational working and decision making process. Digital information technologies (IT) can facilitate the conversion of information collected in the organization and from specialized workers in it into organizational knowledge, by allowing global and updated communication, distribution of relevant content, and the sharing of work between workers, while transcending the limitations of time, place, and specialties (Potter & McGittigan, 2013; Tsui & Malhotra, 2005). As such, digital IT facilitate the generation of customer-tailored solutions and products in organizations (Stacey, Griffin, & Shaw, 2000) and shorten the duration required to

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integrate these solutions and products into the market (Jackson, 2008).

Today, small organizations appear to increasingly use multidirectional communication applications (e.g., Twitter) to better cope with a complex market and strong competition, while organizational workers use digital applications to enhance communication capabilities, distribute information, and make shared decisions within the organization. The type of digital applications that organizational workers use within the organization is influenced by the type of digital applications that they use in their personal lives, namely, by the culture, communication methods, and commerce that are typical of the surrounding environment (Gálvez-Rodríguez, Caba-Pérez, & López-Godoy, 2016). Nevertheless, in contrast to how digital applications typically enter the personal surroundings of the workers, many organizations still employ a relatively slow and complex process of implementing information systems, including digital applications. Such complex processes may detach the daily functioning of the workers from their organizational functioning, thus impairing the ability of the organization to connect with its environment, sell its products, or match between its products and the needs of clients.

To improve communication and Internet-mediated content management within the organization, contemporary digital technologies utilize designated applications, which facilitate social networking and enable the management of global and updated interactions between workers, distribution of information in real-time, maintenance of information clouds, and sharing of user-specific multimedia content (Potter & McGittigan, 2013). Accordingly, in recent years, organizations have begun to share intra-organizational knowledge, exchange solutions, manage work processes, and cope more efficiently with rapid changes in customer demands. This was achieved by employing various innovative digital means – such as intra-organizational employee communication networks, information clouds, and digital applications – which allow lateral updating, transparency, sharing, and complex analysis of organizational information, in addition to empowering workers (Hartono & Basuki, 2015). However, as technological innovation in the digital sphere is characterized by rapid development and a short interval between product development and market implementation (Brock & Moore, 2006), the integration of digital technology innovation – and of its associated applications – within organizational processes must be rapid, continuous, effective, flexible, and long-lasting.

The purpose of this article is to delineate a study that compared the pros and cons of continuous adaptation – relative to instant assimilation – of digital IT innovation in organizations characterized as Complex Adaptive Systems (CAS). The study investigates whether an ad-hoc model of technology assimilation, which characterizes most organizations today, is sufficiently equipped to integrate new technologies within the organization, or, alternatively, whether the complex reality of the digital era and its characteristic rapid advances necessitate a change in the attitudes of workers and managers toward the technology and its assimilation process (and, if so, which conditions are required to facilitate this change in attitude). To answer these questions, 300 workers were sampled from organizations that had undergone a process of implementing technology innovation, e.g., integrating novel information systems, social networks, or digital applications, for organizational purposes.

Described below are the theory and paradigms on which this study was based, followed by a description of the empirical study. Finally, the findings are discussed and conclusions are drawn.

2. Background and pertinent paradigms

2.1. Assimilation versus adaptation to technological innovation in organizations

To extract the advantages of technological innovations, working processes and organizational resources must be adjusted (Burge, 2014) such that the structure of the organization, its worker management and control methods, and its time and resource allocation all take advantage of the technology (Chen, 2007). However, another crucial aspect in the assimilation of technological innovation is the psychological needs of the workers and their attitudes toward these innovations and to the accompanying changes in organizational processes. Indeed, workers usually resist to changes and are inclined to prefer the known organizational culture and climate over novel ones; thus, the integration of technological innovation may raise feelings of uncertainty and imply the addition of new assignments, which many workers prefer to avoid (Wadmany, 2012).

The process of integrating innovation within known frameworks is often termed an “assimilation process”—a term that is taken from the field of natural sciences, where it expresses a continuous process in which an organism develops features, capabilities, and a lifestyle that can optimally meet the changing environment (Thorndike & Hagen, 1961). Unlike in the natural world, however, the social information processing model (Fulk, Steinfield, Schmitz, & Power, 1987) postulates that “assimilation” in people also involves a conscious aspect of adjusting one’s culture and lifestyle to the environmental change. Thus, while the effect of the assimilation process on the organizational lifestyle is unconscious, the assimilation process itself is made consciously and includes the processing of new information, receiving feedback from the environment (e.g., from other workers) regarding the change, and analyzing the impacts of the change on the known working processes as a basis for decision-making and adjustments (Hartono & Basuki, 2015). Therefore, maximizing the assimilation of technological innovation in organizations requires that the workers consciously and willingly accept the change [For a quantitative model of the IT evolution in organizations, see (Ahituv & Greenstein, 2010)].

The traditional approach to assimilating new technologies in organizations is a hierarchical approach, which emphasizes top-down control (Knight, 2006). According to this approach, managers maintain control by adjusting the organizational reward system and by being involved in all aspects of the assimilation process – both at the level of managerial activity and at the level of goal implementation. Such a top-down process is conducted in steps, namely, by determining specific milestones, such as learning the new terminology, analyzing the capabilities of the new technology, adapting the technology to the working environment and to the organizational goals, and forming a framework for instructing and constructing the novel technology within the working environment (Wadmany, 2012). Accordingly, this approach requires that the managers cope with the psychological and perceptual aspects of

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