



Virtual organization and organizational learning: A literature review and conceptual model

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ABSTRACT. *Establishing virtual organizations is a novel work environment that requires preparing employees with information, technology, and knowledge for better performance. However, these competencies require an ability to learn, which is also significant to the success of organizations, and the inquiry of how such learning happens remains a crucial topic in management research. The current paper sheds light on the significant and related works and how and why virtual organization applications could affect organizational learning. Few researchers have yet deliberated how virtual organizations affect organizational learning: the characterization of people, objects, and processes by digital representations offering superior occasions for the interpersonal and organizational interactivity and attachment that induces organizational learning. A comprehensive review of the literature is developed. A conceptual model based on theories is proposed that suggests relationships that could interpret and provide a better understanding of the mechanisms that foster organizational learning.*

INTRODUCTION

The pace of our world before the coronavirus pandemic was rapid; however, the affluence of this pandemic has entirely vanished. Organizations that have outlined their digital strategy once throughout phases, ranging from one year to three years or even five years, have become unavoidable to enlarge the range of their initiatives for just days or weeks in the current era. Accordingly, these digital strategies need to be more effective and, at the same time, very fast; otherwise, it could be extra hard to cope with status, which in turn, makes the possibility of survival stake. An

influential organization needs exceptional learning competencies and mechanisms in an environment characterized by rapid change and an economy relying mainly on knowledge.

These competencies and mechanisms are the primary keys to an organization's success in an uncertain, changing environment (Fiol & Lyles, 1985; Jägers et al., 1998). Most importantly, the capacity to learn is vital to the execution and for the long-term organization's success, and continuous inquiry into how such learning arises is a significant theme in organization study (Argote & Miron-Spektor, 2011). Moreover, a bulk of studies have investigated the effect of information and communication technologies on organizational learning and its ability to assist in overcoming the constraints that hinder organizational learning (Huang, 2015; March, 1991; Stein & Vandenbosch, 1996; Tortorella et al., 2020; Tucker et al., 2002).

Furthermore, organizations frequently adopt novel digital initiatives, intending to learn from them before rolling them out on bulky domains. In ordinary periods, such experiences merely examine a single aspect simultaneously (e.g., event execution rates, inclusion, customer satisfaction, a sole economic unit of action, or experience utilizing a digital solution) (Al-Edenat, 2023). Organizations, then, find themselves involved in various experiences, such as digital software or applications on a large domain (Ahmed et al., 2020). The rapid move to the broad diffusion of different sorts of digitization processes and digital interaction edges concurrently take part in numerous challenges, such as allocating laptops for each employee to help them work remotely. In addition, due to the lockdown caused by the Coronavirus, a vast number of organizations were forced to have alternative methods to serve customers, such as digital gates and platforms (Kenney & Zysman, 2015, 2016; Saberian et al., 2020; Aşık & Naima, 2021). Increasingly, these digital tools and solutions used to serve customers (e.g., digital platforms and gates) reflect sorts of virtual VO applications (Jägers et al., 1998; Bekkers, 2003; Tobidi & Jabbari, 2012; Lakshmi et al., 2021).

Organizations rely significantly on digital tools and applications to provide customers with products and services (Fang, 2002; Fitzgerald et al., 2014; Dirican, 2015; Jafari-Sadeghi et al., 2021; Lakshmi). These tools and applications allow organizations to gather and analyze a significant quantum of data that could help them better their products, services, and even their way of dealing with customers' needs (Brown, 2014). As a result, most of the prior pen-and-paper business practices have been reassigned to digital forms. This transformation enables enhanced operational efficiency, productivity, job automation, and availability of information, records, and resources. Which, in turn, puts big data analytics at the top of organizations' priorities. However, these widespread datasets mainly in the characteristics of volume, variety, velocity, and/or variability that need a scalable construction for efficient warehousing, handling, and analysis (Al-Jaroodi & Mohamed, 2017; Ishwarappa & Anuradha, 2015; Müller et al., 2018).

Consequently, the current paper seeks to provide a comprehensive literature review that deliberates the most relevant prior studies regarding VO, OL, and BDA. This will be followed by proposing a conceptual framework that might offer more understanding of the mechanisms of leveraging OL processes through VO applications and BDA characteristics. The new technologies in the last two decades have disturbed the traditional way of learning, working, and personal and organizational development. Also, this technology results in enormous amounts of data that we need to get new efficient methods to deal with, analyze, and interpret until we finally extract the resulting information, which could help make decisions to solve the faced problems. Also the ambiguity

regarding new ways and tools used to enhance OL still under research and require more investigations and attention (Orth & Schuldis, 2021).

The paper is structured as follows:

- 1) Introduction of VO applications, OL processes, and BDA characteristics.
- 2) Critical discussion of previous works that link directly and indirectly to the significant of VO, BDA, and OL issues.
- 3) Propose a conceptual framework by employing theories that reflect suggested relationships between the current study's variables.
- 4) Conclusion and potential directions for future research based on the magnitudes acknowledged in this study.

CRITICAL LITERATURE REVIEW

Virtual organization and organizational learning

With the latest frameworks of organizational developments and due to the extensive use of information technology over decades, the form of performing work has been shifted impressively. Consequently, new organizational configuration has arisen, that is, VO (Mohammad, 2009). At the same time, VO indicates two distinct sorts of structures. Firstly, individuals perform within a shared entity to achieve organizational goals. In this situation, individuals might perform in virtual teams from different physical places. Second, different organizations communicate a shared project to offer products or services efficiently and beneficially (McAfee, 2011). However, information is documented in our everyday lives on the internet by reporting the human aspects of the electronic lodge. The work environment is, similarly, an aspect of our social material (Bailyn et al., 1992; Berry, 2011; Markus et al., 2001; Mowshowitz, 2002; Raghuram et al., 2019). Keeping in mind that the ability to exchange information and knowledge speedily has noticeably reformed the learning processes in organizations (Döös et al., 2005; Overby, 2008; Berry, 2011; Dodgson et al., 2013; Tortorella et al., 2020).

On the other hand, organizational learning is a technique that enables organizations to utilize their employees' knowledge in business decisions. A business unit that employs organizational learning has recognized the significance of including the entire organization's workforce in decision-making. An organization builds knowledge and empowers its workers by providing them with the power to grow their abilities and perform in a more integrated manner through organizational learning. Organizational learning capability is a management and organizational feature or characteristic that facilitates learning (Tobidi & Jabbari, 2012). At the same time, some researchers assert that in a virtual organization, learning should be an intentional aspect of the organization's continuing operations. As a result, learning for individuals, teams, and organizations must be planned cooperatively (Rouse, 1997). This indicates the importance of knowledge and learning obtained through the work done virtually (Introna & Petrakaki, 2007). The analysis of learning VO is built on the trust dimension, and learning from social networks is vital to Internet-based applications such as VO. However, learning with virtual team members via cooperative engagement dramatically benefits the organization's functionality and success (Indiramma & Anandakumar, 2009).

Along the same line, researchers believe that OL will most likely occur via one of two paths. The first path includes learning that is straightforwardly obtained through trial-and-error scenarios,

allowing for the accumulation of experience and the strengthening of new knowledge (Kogan et al., 2017; Marsick & Watkins, 2008). The second path includes work processes and protocols derived from the organization's stored knowledge (Antunes & Pinheiro, 2020; Cook & Yanow, 1993; Wang et al., 2015; Sheng et al., 2010). Moreover, this knowledge store should be built rapidly for rapid response and bettering the decision-making process, and therefore, working virtually is the pathway to do so (Plisson et al., 2007).

Based on the above discussion, we proposed that:

Proposition 1: Virtual organization has a direct and positive impact on organizational learning.

Virtual organization and big data analytics

Modern technological developments, embracing the departure of cloud computing, make work to be done faster, which implies that organizations need to respond as quickly as possible to any situations and circumstances. This quick response also requires to be adequate based on critical analytics of the vast amount of available data. While utilizing cloud computing, virtual groups can cooperate on an elevated level. Additionally, organizations need to collect information accurately and with a high level of skills to gather the required intelligence through individuals within the virtual group. The stain of VO permits this resilience, whereas cloud computing removes connectivity restrictions (Urso et al., 2015). In fact, cloud computing is one of the systems developed to support big data analytics (Zanoon et al., 2017). At the same time, the extensive data process reflects interactive processing and decision-making support, data-at-rest processing, and data-in-motion processing in real time (Gupta et al., 2012). Accordingly, this massive amount of data needs to be analyzed so that it can be used to enhance organizations' performance. At the same time, BDA is the use of superior analytic techniques for large data sets. As a result, BDA is really about two matters: huge data and analytics (Russom, 2011).

Furthermore, it has been argued that some manufacturing systems in which every procedure or part of equipment delivers incident and status information, linked with market research for true advanced BDA, appear to be the right elements for incident response selection and operation virtualization, bringing manufacturing operations closer to the cloud manufacturing pattern (Babiceanu & Seker, 2016). Along the same line, a multi-organizational manufacturing supply chain exemplifies this type of cooperation by establishing a VO through the incorporation of distributed systems with complex, high-volume transactional, and data warehousing activities that must adhere to strict security, auditability, availability, and service level agreements requirements (Demirkan & Delen, 2013; Demirkan & Goul, 2013; Foster, 2005). However, Oliveira et al., (2016) advocated that collaborative networks are usually come with two forms: first, long Term-Strategic Network such as virtual breeding environments. Second, Goal-Oriented Network such as VO. While these types of collaborative enable better BDA opportunities (Paajanen et al., 2017). Contrary, in other context, VO was found to mediate the relationship between BDA and achieving the survivability of the supply chain (Sheng & Saide, 2021). This is justified because of the nature of the industry as different hypothesized relationships might fit a specific sector while it could not be applicable to other sectors and industries (Aladwan and Forrester, 2016).

Moreover, the rising ability of enterprises to digitally depict the real world, often known as 'virtualization' has contributed significantly to the expansion of BDA and, more recently, artificial intelligence applications (Dodgson et al., 2013). For example, Sensors of all kinds have become inexpensive and commonplace in recent years. Mobile phone and web-based services, which are used

in commerce and services, create real-time recordings of customers' and users' behavior. Within enterprises, information systems record all employee tasks, behaviors, outputs, and interactions, which are stored in data warehouses (Schildt, 2017). In turn, this allows more data to be collected and then analyzed towards eliminating any shortage that previously exists within the procedures and processes that customers or users used to face in traditional work environment (Ishwarappa & Anuradha, 2015).

Based on the above discussion and arguments we proposed that:

Proposition 2: Virtual organization has a direct and positive impact on big data analytics.

Big data analytics and organizational learning

Connecting BDA to OL might create vital contributions to understanding how knowledge is created as organizations engender diversities of clarifications and how learning processes through technological growth form (Al-edenat, 2022; Argote, 2011). Employees can augment resource practice by utilizing BDA applications through developmental actions. Also, these development actions expand the knowledge level and boost the competence of employees' learning (Imran et al., 2018), which, in turn, reflects in enhancing organizational learning (Bolívar-Ramos et al., 2012). Generally speaking, big data is a good approach to encourage higher-order kinds of OL because it can reveal unexpected views of things beyond what is already known. On the other hand, learning depends on continual sense-making effort to establish, frame, temper, and expose forms of persistent, practical meaning. As a result, the mutual interaction between the organizing activity of sense-making and the disruptive, re-organizing activity of learning depends on engaging these tensions for big data reflexively (Clegg et al., 2005; Coghlan et al., 2012, 2014).

On the other hand, OL is increasingly recognized as evolving and graceful, socially multifaceted, and developed from the pressures within organizations as multifaceted adaptive systems. Generally, big data incriminates the complexity easiness interface, where patterns, metrics, search words, and storing means are employed to obtain easy clarifications from multifaceted data sources (Antonacopoulou & Chiva, 2007; Antonacopoulou, 2014; McAfee & Brynjolfsson, 2012). Therefore, attaining simplicity for big data in organizations indicates the ability to describe the data away from their commonly "big" facet; understanding that amount does not all the time equivalent to quality, nevertheless rather that the accurate desirable facets of the data and the analyzed methods which makes them "smart" data that guide to useful visions (Chen et al., 2013; George et al., 2014; Shouhong Wang & Wang, 2020; Zhang et al., 2021). Keep in mind that the big data concept reflects changes in the methods of working and living. In that, we live in a technological and data-driven world, learning as an organization becomes increasingly important to the survival, performance, and success of the business. (Manyika et al., 2011; Mayer-Schönberger and Cukier, 2013; Del Vecchio et al., 2018). It has been argued that, in terms of reframing problems that an organization seeks to address, the supply of organizational resources is critical to organizational learning. In the age of big data, comprehending the difficulties that a company faces will require reframing knowledge and proactive collaboration with other businesses to acquire and embed information (Okwechime et al., 2018).

Most importantly, based on the qualities and tools that big data provides, it plays two significant roles in organizational learning. The first pertains to the function of big data in the knowledge conversion process, while the second pertains to the role of big data in the knowledge management process or value chain. In addition, Big data aids the process of knowledge management in

organizations through its properties at various phases of knowledge management. At the creation stage of managing knowledge with BI tools, a variety of organized, semi-structured, and unstructured data is displayed. At the creation stage, the veracity of data and the speed with which data arrives “velocity” are critical. The usage of business intelligence tools to save data at the storage stage demonstrates volume, with velocity being critical at the transfer step (Al-Edenat & Albawamdeh, 2022). Finally, at the application stage, a combination of business intelligence, data modeling, data mining, and statistical application tools is utilized to extract value from big data (Marfo & Boateng, 2015). Indeed, by satisfying a motivation to comprehend links that could be between individuals, locations, and incidents, in order to predict their routes and perform effectively, big data tightly put side by side sense-making with organizational learning (Klein et al., 2006)

Based on the above discussion and arguments we proposed that:

Proposition 3: Big data analytics has a direct and positive impact on organizational learning

Mediating effect of big data analytics

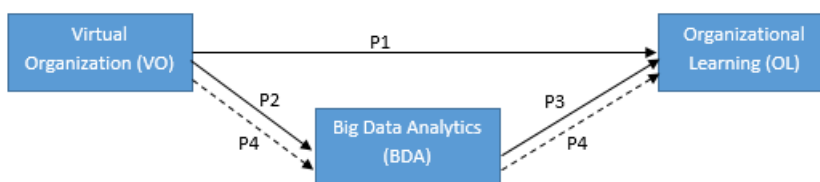
Papert (1980), in his early work, highlighted the significance of instruments, media, and environments in human growth, as well as how his interactions with artifacts foster self-learning and the construction of new knowledge (Al Hawamdeh, 2024). Nevertheless, it is critical to note that Papert's microworlds are not simply learning items from which individuals learn but rather an intellectual environment in which the stress is on the process (Ackermann, 2001). Moreover, the knowledge-based view (KBV) posits that the portfolio of human and social knowledge is the organization's greatest valued resource and the primary predictor of competitive advantage (Grant, 1996). Thus, BDA is seen as a crucial organizational ability, given its ability to create knowledge regarding the environment, particularly technology, and the market, which might be exploited to beat the competition (Gupta & George, 2016; S. Gupta et al., 2020). Furthermore, the concept of BDA has obtained popularity as a pattern for benefiting from expanding information flow to enhance the data's usefulness and make better-supported judgments (Richard et al., 2017).

Organizational learning and its sub-processes (Argote, 2011; Vera, 2009) are closely linked to strategic management concepts such as dynamic capacities (Bogers et al., 2019; Teece et al., 1997; Véronique et al., 2009; Wenzel et al., 2021). Whereas transactive memory systems, or knowledge of who knows what, have been claimed to constitute a micro foundation for dynamic capacities (Argote & Ren, 2012; Wegner, 1987). Meanwhile, BDA enables organizations to create perceptions that assist in strengthening these dynamic capacities (Mikalef et al., 2019). That is, these memory systems emerge as a result of group collaboration and empower both groups to be further effective (Liang et al., 1995). As a result, it is necessary to gain a better grasp of how these dynamic capacities evolve through organizational learning (Argote, 2011). However, BDA assists organizations in identifying market and client tendencies, predilections, and preferences in order to produce products and services to fulfill demand (Jeble et al., 2018; Holmlund et al., 2020).

The bulk of previous studies have proposed and examined the concept of BDA as mediator in different contexts and fields such as supply chain (Raut et al., 2021; Singh & Singh, 2019); innovation and performance (Aljumah et al., 2021; AlNuaimi et al., 2021; Arias-Pérez et al., 2021; Mangla et al., 2020; Maroufkhani et al., 2020); in teaching (dos Santos, 2014); greening e-procurement (AlNuaimi et al., 2021); supply chain and performance (Gunasekaran et al., 2017); building relationship innovation (Akhtar et al., 2019) and technology and business value (Akter et al., 2017).

Based on the above discussions and arguments we proposed that:

Proposition 4: Big data analytics mediates the relationship between the virtual organization and organizational learning



CONCLUSION

The main purpose of the current research is to propose a conceptual model that depicts the relationships between VO, OL, and BDA. Recently, the three variables have taken the attention by many scholars and researchers (Antunes & Pinheiro, 2020; Babiceanu & Seker, 2016; Holmlund et al., 2020; Mikalef et al., 2019; Tortorella et al., 2020). This literature review shedding the light on the importance of VO, BDA, and OL in the era of clouding that changes the way of running businesses, which in turn, needs more emphasize on modern methods of gathering and analyzing information in order to provide rapid responses in terms of new products, new ways of serving customers, and modeling businesses to meet the new requirements needed for such rapid business change environment (Cook & Yanow, 1993; Demirkan & Goul, 2013; R. Gupta et al., 2012; Indiramma & Anandakumar, 2009; Marsick & Watkins, 2008; Sheng Wang & Noe, 2010). Consequently, the current research has offered the researchers, practitioners, scholars, and the organizations with instances of the details of VO, BDA, and OL techniques, and technologies which can be implemented. This provides managers and employers an awareness of the crucial technologies needed, as well as an awareness of what they can do to afford further improved explanations for, from the one hand, the role of VO in enhancing both BDA and OL in support of decision making. From the other hand, the role of BDA in improving OL. Therefore, the support of VO and BDA to OL was depicted.

Ongoing learning and development in the era of digitalization, big data, clouding, and virtuality are the most important priorities issues in our rapid changing environment. Moreover, an important part of digital business transformation is OL in the framework of the clouding and big data, which emphasizes more flexible technical goods, procedures, services, and processes, as well as integration among various businesses. (Belinski et al., 2020). However, in order to train information, technology, and knowledge workers for working in inter-organizational teams, virtual organizations are a new workplace concept (Larsen & McNerney, 2002). In other words, the introduction of VO has raised hopes for the start of new spatial development. Central to the discussion is whether or not a VO model can serve different goals such as development and learning (Pibkala et al., 1999; Riemer & Vehrung, 2012). Whereas in the digital age we now live in, massive amounts of high-speed data are generated on a daily basis, and within them are intrinsic details and patterns of hidden knowledge that should be collected and utilized. As a result, by applying advanced analytic approaches to BDA and discovering hidden insights and valuable knowledge, BDA may be used to leverage business change and improve decision making (Elgendy and Elragal, 2014).

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