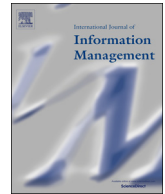




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Opinion Paper

Digitally transforming work styles in an era of infectious disease

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ABSTRACT

As a new perspective in this era of infectious disease confronting humanity (that cannot be avoided), and in light of research done to date, this article identifies the importance of exploratory research on the business and social impacts of “collaboration systems” which include video conferencing tools - important IT applications for companies. The article proposes analysis integrating four research streams on the digital transformation of work styles through collaboration systems.

1. Introduction - a strategic shift to digital work

Due to the impact of the novel coronavirus (COVID-19), an infectious disease, the digital transformation of work styles around the world is progressing faster than ever. “With corona”, and looking ahead to “after corona”, corporate strategies all over the world face major transformations. In these circumstances, the digital shift (transformation) in the historical nature of work styles has been garnering a lot of attention with demands for it rising in societies, while the spread of IoT, AI, 5 G, cloud services, etc. is further accelerating this digital transformation (Kodama, 2019).

Notably, the global scale of the spread of infections of the novel coronavirus have increased demands for cloud services all over the world. Notable in this expansion is the demands for video conferencing tools, which are indispensable for telework. For example, interest in online learning (e.g., Kodama, 2000, 2001b) and online healthcare (e.g., Kodama, 2001a, 2002) is rapidly increasing, while the implementation of telework and online seminars etc. is rapidly progressing - after the outbreak of the novel coronavirus, the stock price of “Zoom” (NASDAQ: ZM), a video conferencing software developer, rose sharply.

In China, Ali Baba offered chat and video conferencing services to 10 million companies free of charge, and increased its memberships to 200 million. Other companies such as Tencent, ByteDance that offers TikTok, and Baidu, provide telework tools for free to over 18 million companies with a total of more than 300 million people teleworking. In this way demand for video conferencing tools has skyrocketed all over the world - downloads of Zoom in the second week of March 2020 were 14 times higher in the United States, 20 times higher in the UK, 27 times higher in Spain, and 55 times higher in Italy, compared to the average downloads per week in the fourth quarter of the last year.

From before the outbreak of the novel coronavirus (COVID-19) to the present (after the 2003 SARS outbreak to the present), the author’s research team analyzed the use of collaboration systems such as various video conferencing tools and business chat in global corporations in Europe, the United States and Asia that use these systems proactively, through qualitative research methods such as ethnography, participant observation, action research and in-depth case studies.

Prior research has shown that various IT-related functions for information management, IT infrastructure, and planning can bring performance benefits to businesses (e.g., Lu & Ramamurthy, 2011; Mithas, Ramasubbu, & Sambamurthy, 2011), although there has not been any detailed reportage on the various effects on business of particular IT applications such as collaboration systems.

This article proposes new knowledge, and research and practical implications from four research streams for exploratory research on the forms of usage and business effects (business process reform such as product development, supply chain reform, decision making process reform, knowledge management, new business model creation, etc.) of collaboration systems entailing a high degree of interaction (communications, collaboration, etc.) among people and organizations.

2. Collaboration systems facilitating global collaboration

The use of collaboration systems is spreading all over the world with typical corporate and organizational IT applications such as business chat (Slack, Microsoft Teams, etc.), cloud services (Zoom, Spark, Skype for Business, etc.), video conferencing systems, web conferencing systems and unified communications (UC).

Notably, collaboration system video communications functions have been included in iPhone (FaceTime) and various social networking services, and can be seen across not only the B2B and B2C areas but also

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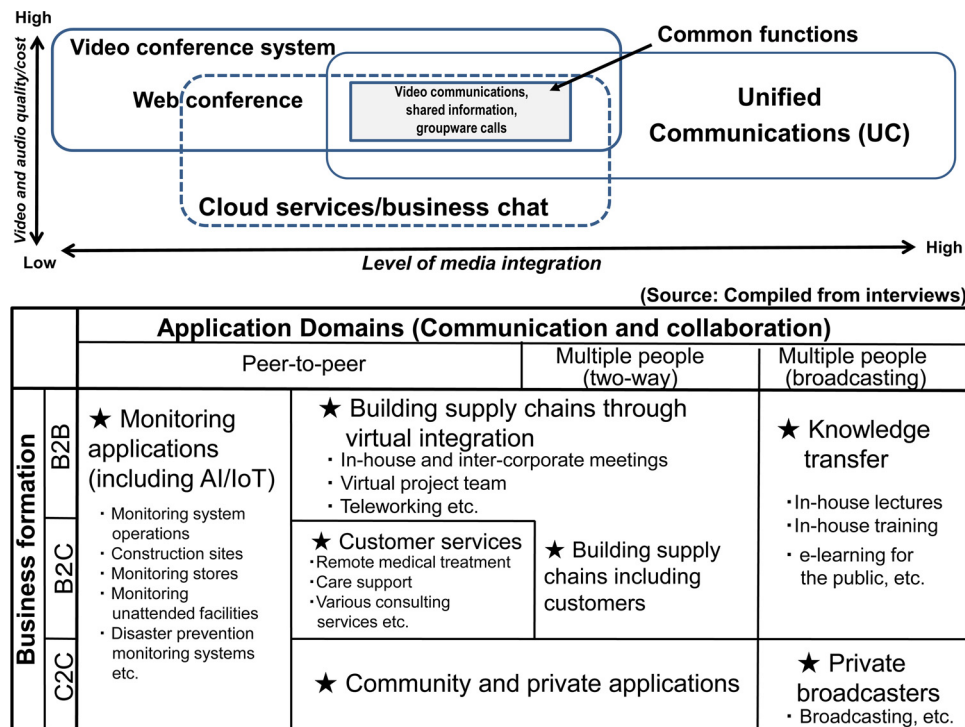


Fig. 1. Positioning of Various Collaboration Systems and Application Domains.

widely in C2C. As shown in Fig. 1, various collaboration systems are positioned on two factor/functional axes (video and audio quality and cost vs. level of media integration). These systems have common functions for video communications, information sharing and groupware calling, etc. In this product positioning, corporations (organizations) that pursue agility and efficiency in business processes skillfully use these systems depending on the characteristics of their business portfolios.

In particular, in the business, education, healthcare and welfare fields, new forms of services are beginning to become popular that entail the use of interactive video communications (e.g., Clifton, Jo, Longo, & Malone, 2017; du Plessis, 2008; Dubé, Bourhis, & Jacob, 2006; Maher & Prescott, 2017; Piotrowski & Robertson, 2017; Zournazis & Marlow, 2015). Video communications offer high-potential communications methods that hold promise for application in a wide range of fields from corporations through to families and individuals - not only do they faithfully convey image information, but have also long held promise as methods of personal expression, and as usage in the education, healthcare and welfare fields, or even for fusion with art, etc. (e.g., Kodama, 1999,). In addition, in the era of global 5 G mobile telecommunications systems, there are also hopes for these video communications functions as crucial broadband communications platforms for generating new virtual and video businesses using AI and IoT.

On the marketing side, the use of collaboration systems such as video conferencing tools has become increasingly popular for various reasons such as facilitating global business, speeding up work in dispersed projects, sharing information inside and outside of companies, speeding up decision-making, human resource development by conveying or passing on certain skills and know-how, as well as improving motivation by facilitating telework and emergency measures for natural disasters, etc. (e.g., Bond-Barnard, Fletcher, & Steyn, 2016; García-Álvarez, 2015; Wolfe, 2007).

Conversely, on the technical side, technical developments such as the spread of broadband such as the new 5 G mobile telecommunications systems, VoIP (and multimedia over IP), lower costs (the emergence of simple video conferencing systems and video conferencing software), higher image quality and higher functionality (HD,

Telepresence, 4 K, 8 K, etc.), a variety of mobile terminals (smart-phones, tablets etc.), unified communications (UC), cloud services and AI/IoT/VR have also caused video conferencing tools to spread.

These synergistic effects between the market and technology sides have further reduced the costs of collaboration system products, services and communications, including video conferencing tools which driven expansion of usage by users, resulting in further cost reduction and market expansion - positive feedback triggered by these network effects (Kodama, 2007, 2009) (see Fig. 2).

3. Exploring company-unique IT capabilities through IT application usage - existing research and new research questions

In information system (IS) research covering IT applications which are these collaboration systems, the relationship between IT and business process agility has been taken up as a key research theme (Luftman et al., 2013; Roberts & Grover, 2012). Prior research has shown that various IT-related functions for information management, IT infrastructure, and planning can bring performance benefits to businesses (e.g., Lu & Ramamurthy, 2011; Mithas et al., 2011). Moreover, there has also been a focus on the impacts on business process agility of IT resources and capabilities, and their resultant impacts on business performance (Chen et al., 2014; Tallon & Pinsonneault, 2011).

IT capabilities are the “ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities” (Bharadwaj, 2000, p. 171), and as mentioned, in prior research, various aspects of IT functions (security and risk management, communication, data management, application infrastructure, IT equipment management and IT architecture) have been studied. A series of empirical studies in prior research have shown that IT functions are an important enabler of corporate performance (e.g., Chen et al., 2014; Kim, Shin, Kim, & Lee, 2011; Mithas et al., 2011; Queiroz, Tallon, Sharma, & Coltman, 2018).

In contrast, much research has argued that the main impacts of IT occur at the business process level, and those impacts can be aggregated to the corporate level (Barua, Kriebel, & Mukhopadhyay, 1995; Melville, Kraemer, & Gurbaxani, 2004; Mithas et al., 2011; Setia,

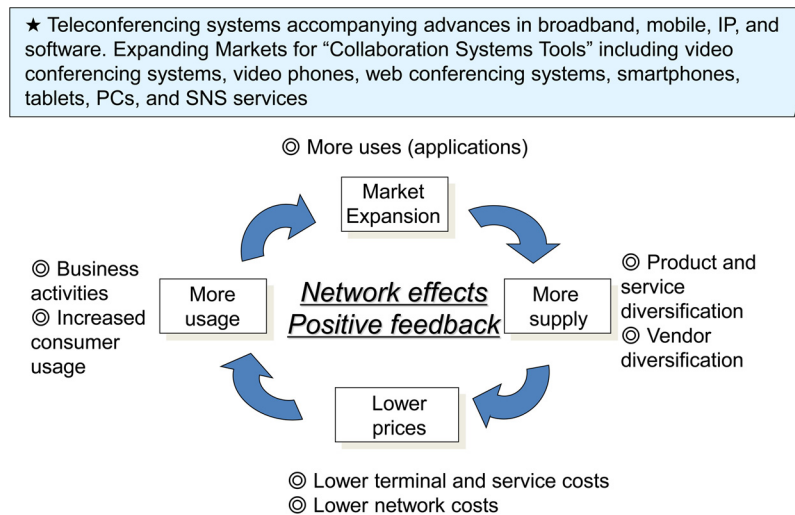


Fig. 2. The Expanding Collaboration Systems Tools Market.

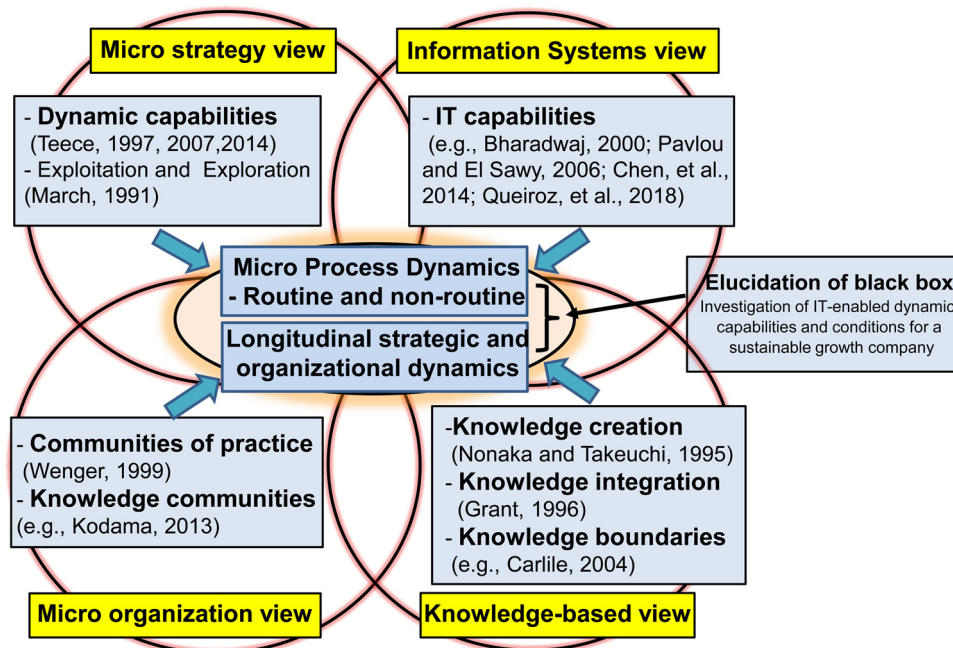


Fig. 3. Approach from Four Research Streams - Academic Significance of This Research.

Sambamurthy, & Closs, 2008; Tallon, 2007). This suggests that IT process-level impacts are important in understanding the relationship between IT functionality and corporate performance.

Also, some studies have reported that technical IT skills and IT infrastructure flexibility do not affect process performance (Ray, Muhanna, & Barney, 2005). This research states that shared knowledge impacts process performance and further, relaxes the links between IT technology and process performance. Shared knowledge is developed and accumulated by organizations over a long period. Thus, a shared body of firm-specific knowledge able to effectively utilize new IT applications (e.g., video conferencing tools) takes years to evolve into numerous joint development projects. Therefore, the development of shared knowledge is a path-dependent, socially complex process.

Accordingly, such knowledge is valuable as the essence of building IT capabilities, and as long as it is unevenly spread among companies, it has the potential to be an important factor in differentiating IT capabilities, because it cannot be imitated at low cost. This research suggests the importance of the knowledge-based view (e.g., Grant, 1996;

Nonaka & Takeuchi, 1995) of knowledge management, etc. in analysis of IT capabilities.

In addition, Kodama (2013a), who discusses the relationship between in-house and external usage of video conferencing tools (IT applications) with knowledge communities, offers 2 insights. First is the diverse communications and collaboration effects of video conferencing tools. Real-time communications and collaboration functions, which combine and modify video, voice and data, bring about unique usage forms and structures in a company. Accordingly, video conferencing tools promote the learning process, which increases the frequency and type of meetings, and the number of temporary meetings and meetings outside companies for specific projects, etc.

Second is the formation of new business networks and the promotion of knowledge creation activities (Nonaka & Takeuchi, 1995). With the implementation of video conferencing tools, brand new dialogue and meetings begin, new information flows, and practitioners are moved to practical activities. Video conferencing tools increase meetings and facilitate the flattening of in-house organizations. Also, as

video conferencing tools enable communications without the participants having to physically go to a predetermined meeting location, they enable design of new business networks that are free of constraints on speech (Ba and communities of practice). In particular, it has been clarified that regular meeting bodies develop into knowledge communities such as communities of practice (Weinger, 1999) dependent on specific contexts, and that video conferencing tools facilitate the formation, maintenance and development of knowledge communities inside and outside of companies (Kodama, 2020).

However, Kodama (2013a, 2013b) does not clarify the characteristics of knowledge communities that use video conferencing tools, the kinds of strategic and organizational contexts in which these knowledge communities use these tools, how new business networks are formed, or how knowledge creation activities are facilitated. Nevertheless, from the theoretical and practical perspectives, there is great significance in clarifying how video conferencing tools usage has positive effects on knowledge creation, and, more broadly, knowledge management in what strategic and organizational contexts, and with what type of IT capabilities. The “micro organization view” as the “community-based view” (e.g., Kodama, 2013b; Wenger, 1999), which is organizational analysis at the micro level, has been suggested as important in this research.

Existing research to date has focused on functional competencies, especially management capabilities related to IT infrastructure (e.g., IT infrastructure functions and infrastructure services such as security and risk management, communications, data management, IT equipment management, IT architecture, etc.). However, as IT infrastructure has become commoditized, it can no longer be a differentiating factor for companies (e.g., Bhatt & Grover, 2005).

Little attention has been paid to researching IT application-related functions such as video conferencing tools, nor attention paid to how businesses can profit from IT applications (Nazir & Pinsonneault, 2012). However, even IT applications that enable companies to differentiate themselves tend to lose value quickly due to market changes, the fast pace of IT innovation and shortened IT application lifecycles (Ross, Weill, & Robertson, 2006; Vessey & Ward, 2013).

In such circumstances, to realize the real benefits of IT, companies must build new IT application portfolios that entail the positioning and utilization forms of various video conferencing tools as shown in Fig. 1, and pour continuous efforts into developing new systems and applications with new usage forms (Kappelman, McLean, Johnson, & Torres, 2016; Luftman et al., 2012, 2013).

However, it is mostly unclear how capabilities of corporations utilizing IT applications such as video conferencing tools affect agility, efficiency, and even creativity, and to what degree agility impacts on corporate performance. Research on the impacts of IT capabilities on new product development (NPD) (e.g., Pavlou & El Sawy, 2006) is consistent with the aforementioned argument that the main impact of IT occurs at the process level, and shows that competitive advantage for NPD is related to IT-enabled dynamic capabilities (Teece, 2007) and functional competencies.

Various existing research to date has examined the functional competencies of IT, although there is very little research on dynamic IT capabilities using IT applications such as video conferencing tools that have a high potential to enable corporate differentiation strategy (Koch, 2010; Pavlou & El Sawy, 2011; Roberts & Grover, 2012). Notably, almost nothing is known about the impacts of IT-enabled dynamic capabilities for video conferencing tools on process-level outcomes such as business process agility and efficiency. Accordingly, it is suggested that the micro strategy view as the “dynamic capabilities view” (Teece, 2007, 2014; Teece, Pisano, & Shuen, 1997) is important for the analysis of IT capabilities.

4. Implications for research and theory

In light of the above prior research reviews, this article identifies

some important remaining research issues - specifically, the following three points.

- (1) Prior research on IT applications has been limited to investigation at the macro corporate or business unit level.
- (2) Prior research does not clarify how IT capabilities impact agility or efficiency (or creativity) at the micro organizational level (or at the team or business community level), nor does it clarify the mechanics of how changes to agility are brought about at the micro process level.
- (3) IT tools investigated in prior research cover a wide range of technical fields such as infrastructure systems and application systems, but prior research does not clarify specifically what types of individual IT tools (e.g., collaboration systems such as video conferencing tools) are involved in the above contexts of (1) and (2).

Therefore, from the above perspectives, as a new approach to research of IT capabilities, longitudinal, process level analysis and consideration of micro-IT strategies and organizational dynamism that integrate the four research streams of not only the conventional information system-view, but also the aforementioned knowledge-based, micro organization (community-based), and micro strategy views (the dynamic capabilities view) are required.

In light of existing research to date, as a new perspective in this era of infectious disease confronting humanity (that cannot be avoided), this article proposes the necessity to explore the business and social impacts of collaboration systems such as video conferencing tools - important corporate IT applications that have a high potential to bring about differentiation strategies. In particular, IT capabilities to effectively utilize video conferencing tools at the micro process level of organizations and teams (business community level) must be clarified, because collaboration systems greatly affect the business processes and knowledge sharing of people and organizations (community level), and furthermore, greatly affect innovation as knowledge creation activities.

As a future research approach, from the perspective of integrating the four research streams of the main prior research of the micro strategy-view [e.g., dynamic capabilities framework, exploitation and exploration], micro organization-view [e.g., communities of practice, strategic communities], knowledge-based view [e.g., knowledge creation, knowledge integration, knowledge boundaries], and information systems-view [IT capabilities], it will be necessary to extract a new theoretical framework and knowledge by clarifying IT capabilities black boxing (see Fig. 3). The integration of these four research streams will be extremely important in clarifying black boxing of the micro-strategic and organizational dynamism of IT-enabled dynamic capabilities and, more broadly, IT-enabled capabilities. This black boxing has not been clarified in detail in prior research with its focus on quantitative studies using statistical analysis.

5. Implications for practice

The idea that companies incorporate IT applications such as collaboration systems into the core of their IT strategy not only to transform their businesses, but also to generate new business models, will become increasingly important over the long term in this era of infectious diseases facing humanity. The IT capabilities of companies that utilize IT applications to innovate business and bring about new business models are not limited to the technical functions such as hardware and software of IT applications, but are heavily reliant on the knowledge (especially intangible assets) possessed by people and organizations (Kodama, 2013a).

Put differently, the most important sources of lasting competitive advantage for most companies are not IT applications themselves, but condensed wisdom as the high-level knowledge of ideas, know-how and skills to develop, combine and use new IT applications.

Knowledge is also the dynamic capabilities (e.g., Kodama, 2018,

2019; Teece, 2007, 2014) that underpin dynamic innovation activities to continuously bring about new creations, while IT applications themselves are the methods of acquiring various new knowledge and achieving innovation. In other words, capabilities that enable people and organizations to generate new knowledge through interaction with IT applications are driving forces that maximize the use of IT applications, transform business and bring about new business innovation.

As practical implications, this article proposes that clarification of the usage patterns and management effects of IT applications such as collaboration systems will help companies to generate and develop IT-enabled knowledge communities (Kodama, 2013b) within and between companies, including customers, and bring about strengthened corporate competitiveness. In practice, strategic use of collaboration systems has the potential to facilitate corporate exploration activities and enhance the creativity of people and organizations. On the other hand, strategic use of these systems also has the potential to facilitate enhanced speed, efficiency, and upgrades and improvements of existing knowledge utilization in corporate exploitation activities.

6. Conclusions

Corporations (organizations) must take the “with corona” and “after corona” environments as an opportunity for self-transformation, and further drive digital transformation of work styles. This article has proposed new knowledge, research and practical implications integrating four research streams for exploratory research on the usage forms and business effects of collaboration systems which have a high degree of interaction with humans and organizations.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ijinfomgt.2020.102172>.

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