The Impact of Information and Communication Technology (ICT) in University-Industry Interaction: Malaysian Case

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Abstract

Contemporary workplace studies have claimed that the latest advancements in information and communication technologies (ICTs) and flexible work arrangements have enabled alternative ways of working that can now provide a wider scope of interactivity across geographic distances - a scope that would have once restricted interaction among groups, if not prohibited it altogether. Such claim has challenged the conventional understanding that asserts that proximity among firms provides crucial to face-to-face interaction in the inter-organisation collaboration.

It is, however, debatable that the acceptance of the alternative workplace depends on the nature of the work, the context and culture of the organisation or nation. Therefore, this research examines the extent to which traditional locational assumptions and the proclaimed transformations performed in a developing country, Malaysia. This research aims to investigate the impact of university location - in terms of the characteristics of place and distance between places - to users' face-to-face and ICTs interactions in the collaborations.

The research analysed a structured interview conducted with 32 academic staffs in two universities and 25 scientists and engineers in 15 research organisations. The findings show that face-to-face interaction has strong relationship with distance, and the impact of telecommunication technology in replacing face-to-face interaction is rather small.

Keywords: ICT, face-to-face interactions, communication, location, distance, and inter-organisation collaboration.

1. Introduction

This study investigates how knowledge workers in the universities and industrial firms interact by face-to-face and by using ICT such as an alternative work arrangement. The aim is to increase our understanding of workers’ communication across organisational boundaries. The study was conducted at public research universities and high-technology industrial firms in Malaysia. Each of the three universities and the industrial firms are located at different locational environment. The study interviews 32 academic staffs from two universities and 25 scientists and engineers (SEs) from 15 high-technology firms. The respondents are involved in the research work that includes providing analysis, advice and technical expertise in relation to research works. Each respondent has conducted trips to their counterpart premises and also making contacts via ICT and has access to information and internet technology in their workplace and home. The study examines how these knowledge workers interact over distance.

2. Organisation, Communication and Workplace

Communication has proven central to the concept of organisation. It is the single-most important process to the success or failure of an organisation (Hargie et al., 1999). Hence, corporate communications are being increasingly perceived as an essential competitive weapon to support an organisation in its pursuit of strategic objectives and goals. Increased attention has been given to this aspect because today organisational structures demand more extensive communication. According to Leahey (1993), 60 percent of the working population is engaged in creating and processing information, and that high productive performance, in some way, depends on the quality of communications. In the big picture, communication is important not just from the functional point of view of getting the message across, it is also central to the development and maintenance of positive working relationships, harmony, and trust (Hunt and Owen, 2000). Corporate communications integrate three forms of communication:

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management communication to both internal and external target groups, marketing communication such as advertising and selling, and organisational communication (van Riel, 1995). As such, communication is crucial to organisations both internally and externally.

There is a growing number of literature and studies giving the attention to the physical workplace environment in relation to communication. Studies from various literature (e.g., Becker, 1990; Becker and Steele, 1995; Raymond and Cunliffe, 1997; Duffy et al., 1993), have shown that several characteristics of the new physical workplace have been identified, and the major emphasis of these characteristics have to do with improving communication among the workers.

One example on increasing communication in the workplace is shown by Becker and Steele (1995) at Steelcase Incorporation. The workplace emphasis on informal communication makes stimulating face-to-face interaction, especially among groups such as project engineering, industrial design, and marketing, a key element in creating the design centre. The corporation's emphasis on informal communication was based on the work of Allen (1977) that found performance in R&D settings is related, in part, to the number of informal contacts people have with others outside their own department, discipline, and project team, as well as communication within the team. The significance of this finding has convinced the corporation to create a working environment that encourage informal communication across project teams and across disciplines stimulates creativity.

In spite of this understanding on the importance of the working environment that enhanced workers communication, the findings are rather limited on the workers’ communication beyond the organisational boundary or interaction over spatial distances especially in the less-developed countries. It is also important to address this issue as the nature of knowledge workers’ job includes both interactions inside and outside the organisation’s workplace.

The first section of this paper discusses the issues of ICT on the location of workplace. The second section describes the research method of the research. The next section presents the findings of the research. The final section discusses implications for future research on human resource management policy.

3. The Issues of Location and ICT

Workers, especially those at the professional and managerial levels, have increasingly interacting and communicating with professionals and clients from other organisations. According to Fulk and deSanctis (1995) and Rockart (1998), the widely held view is that the merging of computers and ICT has been seen as the 'essential component' facilitating the drastic changes in workers communication with one another and their modes of working (Fulk and deSanctis, 1995; Rockart, 1998).

The advances in telecommunication and information technology have greatly enhanced our ways of accessing and working with spatial-related activities. It is argued that the new ICT infrastructure has the potential to stimulate a paradigm shift from the transportation infrastructure that have significant impact on professional’s interaction and workplace location decisions in the past. ICT is viewed to bolster decentralisation in space as the new infrastructure (the electronic superhighway) both compresses distance space and reduces turnover time.

With respect to this development, organisations have considered a variety of alternative work environment choices as the ICT has been seen as liberating the influences of location on workers interaction. For example, the recent developments in ICT have created an increasing number of telecommuters and other virtual workers (Swink, 2001; Solomon, 2000; Weiss, 2001). The new kind of work arrangement breaks the relative modern concept of office as a place to which people travel, spend the day working then travel home again (Kumar, 1997; Stocks, 1998 and Markland, 1998). As Eley and Marmot (1995) quote, ‘your office is where you are.’

However, one should be careful about accepting the proclaimed shift and its lauded benefits. Despite widespread recognition of the potential and popularity of ICT, there exist many substantive criticisms on the strategic use and application of ICT. There are some reservations on the acceptance to the new alternative workplace in both in organisations and across continents. It is still unclear how many organisations, and what kinds of organisations by either sector or specific culture has successfully implemented this strategy. Interestingly, most of the literatures on telecommuting are based on the United States (US) experienced and little is known from that the European and Asian.
The analyses from several studies have exposed more perplexing picture of the ICTs led alternative workplace than what is generally presented. Considering all the attention that telecommuting is getting these days, it is rather surprised to find that the acceptance of alternative workplace as exemplified in telecommuting is not to the expectation even in the industrialised countries (e.g. Handy and Mokhtarian, 1995; Bertin and Denbigh, 1998; Lupton and Haynes, 2000). For example, the National Economic Development Office's 1986 prediction that 10-15 per cent of the UK workforce would be working from home by 1995 has proved to be vastly over-estimated. The 1997 British Labour Force survey quoted a figure of 4 per cent (Bertin and Denbigh, 1998). Data taken from the European Telework Online website (http://www.eto.org.uk/index.htm), shows that the practice is most common in the USA - and then Scandinavia (Harpaz, 2002).

The factor that influences an individual's choice of communication medium has also been the subject of much research. It is also argued that what influences an individual's choice of communication medium has been the subject to the task he or she wanted to accomplish (e.g., Daft and Lengel, 1986). Although ICTs can provide communication across spatial barriers but such systems have limited capacity. According to Nohria and Eccles (1992), electronic forms of communication cannot transmit all required information and therefore employees will not be motivated to use it for a range of tasks. Daft and Lengel (1984) added that face-to-face communication is perceived as richer, because the information being received reduces uncertainty and is clearer or less ambiguous. In this sense, e-mail is not considered a 'rich' medium, therefore there are range of tasks for which it is not suitable. In supporting this view, several studies (for example Poole, 1988; Dufner, 1989; Hiltz et. al.1991) have shown that people ignore the electronic medium when they can communicate face-to-face.

Cultural factors both between different groups and those within the same groups have also shown play important role in the pre-deposition toward and selection of electronic communications media. Straub (1994) found that US companies exploit the advantages of IT such as electronic-mail while the Japanese firms do not. Within the organisation, Fulk (1993) suggests that motivation for use may depend on organisational context and the existence of a 'culture' of e-mail use. Similarly, organisational studies which have focused on the use of new communication technologies (Ciborra and Patriotta, 1996) have suggest that emerging communication patterns are much more dependent on the pre-existing organisational context and culture.

ICT has also been seen to have unsatisfactory performance in supporting the group work such as in collaborative research work. Using computer-mediated communication to accomplish collaboration will be difficult, especially for tasks that require interactive, expressive communication (Galegher and Kraut, 1994). This is more apparent in the inter organisation collaboration. As Litter et. al. (1995) has shown, collaboration between two firms requires frequent face-to-face communication among all involved parties. Dickson (1996) point out that whether the collaboration is successful or not, a personal relationship is often established which may prove useful. Similarly, Harrison and Laplante (1994) find that the absence of reciprocity in co-operation and partnership is an obstacle during the transition to a more harmonious relationship, which is fundamental to the development of co-operation between actors. As Littler et. al. (1998) conclude that collaboration is an evolutionary process in which management skills of learning, mutual adaptation and accommodation can be more important to the eventual success of a collaboration. In this sense, face-to-face contact is crucial and ICT does not appear to be supportive to group works.

Despite ranges of issue and criticism that challenged the acceptance and application of the alternative workplace, the consensus suggested that the alternative workplace is not altogether unacceptable. It depends on some conditions such as the types of works, and the organisations or national context and culture. For example, Schrage (1995) mentions several cases of successful collaboration on complex, non-routine tasks took place “at a distance” in the domain of scientific research, the arts, and etc. as in this case direct face-to-face contact is not necessary although the activity is complex and non-routine. Nevertheless, strong contrast to these findings are the reports of several researchers that stress the importance of actual face-to-face presence of people who participate in non-routine activities (Daft and Lengel, 1984; Nohria and Eccles, 1992).

Therefore, whether ICT actually leads to more flexibility in working practice for employees is a debatable issue. Taking the above criticisms into account, it is unwise to generalise that ICT may alter the concept of traditional location advantages, especially in different socio-cultural contexts, places, and organisation settings.

This research compared the frequency and pattern of users interaction through ICT and highway infrastructure (i.e. by face-to-face) because of the two common functions: linking scattered and distant places, and speeds up work processes. This comparison, aimed to
provide managers and policy makers based on the decentralising effect of ICT to enhance collaboration activities.

4. Research Method

This research interviews 32 academic staffs from two universities and 25 scientists/engineers from 15 industrial firms. The selection of the respondents from the public and private sectors are intentionally done to observe if there is any difference between the knowledge workers in the private sector and public sectors organisations interactions patterns with their counterparts from other organisations. One of the universities is located in the city of Kuala Lumpur and the other one is located in Johor, 350 KM from Kuala Lumpur. 17 of the industrial personnel works at firms that are located around the city of Kuala Lumpur while the remaining 8 work with firms that located outside the region of Kuala Lumpur. All the respondents are involved in the science and technology based research works. The idea of selecting organisations from different locations is to observe if there are any interactions difference between the knowledge workers from different location.

Most of the respondents are the key players in the research teams and has the experience of more than 4 years in the research works. The respondents regularly interact with their counterparts by both face-to-face interactions and by using ICT.

The interviews were conducted in their offices, laboratories, coffee shops, during seminars, Science and Technology (S&T) exhibitions and via telephone for about 10-15 minutes per person. Respondents were contacted when necessary for follow-up enquiries by using e-mail and other electronic communication media.

5. Research Findings

The findings of this research have shown that spatial distance has a significant impact in knowledge workers' interactions. The importance of spatial distance in this context can be described in two interrelated aspects:

1. the importance of face-to-face interaction and its strong relationship with distance, and
2. the small impact of telecommunication technology in replacing face-to-face interaction.

Although the frequencies of using the telecommunication technologies are two times higher than by face-to-face contact (Table 1), it does not necessarily mean the technologies are more important kind of communication medium. Both the university's and industrial firm's personnel considered face-to-face interaction as more important communication medium than by using the ICT. Since there are no significant differences of the above results with the universities and firms that are located in different environment or region, this implies that face-to-face interaction is an important communication medium in research works in all sectors and at any location.

| Table 1. Frequency of face-to-face and ICT meetings (per month) for all respondents |
|---------------------------------|------------------|------------------|
|                                | Face-to-face     | Meetings via ICT |
| Responses                      | 57               | 57               |
| Mean                           | 5.2430           | 14.1447          |
| Std. Deviation                 | 2.6022           | 3.5175           |

| Table 2. Frequency of face-to-face and ICT meetings (per month) for academic staffs and firm’s personnel |
|---------------------------------|------------------|------------------|
|                                | Academic staffs  | Firm’s personnel |
|                                | Face-to-face     | Meetings via ICT | Face-to-face     | Meetings via ICT |
| Responses                      | 32               | 32               | 25               | 25               |
| Mean                           | 6.3156           | 12.5641          | 3.8700           | 16.0820          |
| Std. Deviation                 | 3.0375           | 2.7904           | 1.6421           | 3.3492           |

Despite the professionals from both organisations consider face-to-face interaction are more important, the frequency of firms' personnel visiting the university are lower compared to the academic staff’s visits to firms' facilities (Table 2). One explanation for this result is because the academic staffs spend about 20-30 hours per week (45 - 67% of the time) for teaching and other formal commitments, thus, having more times that may allow them to travel more frequent than the firms' professionals.

The frequencies of the visits are shown significantly correlated to the geographical proximity between the organisations (Figure 1). The face-to-face interactions of the professionals from both organisations' are inversely
correlated to distance. The result is consistent with the traditional locational theory (Dickens and Lloyd, 1991) which hypothesised that interaction is affected by distance between two places. In the R&D context, this is consistent with several authors (see Howells, 1995) who indicated that the role of geographical distance and the importance of face-to-face contacts have clearly been recognised in terms of communication and research performance.

Despite the frequency of using IT combined with other telecommunication technologies as communication medium is two times more than face-to-face interaction, there is no strong evidence that the technologies are replacing face-to-face interaction or it compresses distance. Almost all of the findings from this research scheme did not show any

1. significant (negative) correlation between the frequency in using the telecommunication media with face-to-face interaction, and
2. significant (positive) correlation between the frequency in using the telecommunication media with distance between the organisations.

In fact, this study observed the reverse to the expectation when the frequency in using telecommunication media is positively correlated to face-to-face interaction (Figure 2).

In other words, the results show that the groups of users that interact more frequent by face-to-face are also interacting more frequent by using telecommunication media. One explanation of this may be taken from Nohria and Eccles (1992) conclusion that the viability and effectiveness of an electronic network will depend critically on an underlying network of social relationships based on face-to-face interaction. This suggests that telecommunication technology is rather complementing and goes hand in hand with face-to-face interaction instead of replacing it. Another explanation to this finding is that probably much of the research works are rather complex (e.g. Suchman and Wynn, 1984; Rice, 1994) that may necessitate face-to-face interactions.

This finding is not surprising as it has been discussed earlier that even in the industrialised countries the impact of ICTs on teleworking are not to the expectations. Considering this view, it is suggested that the idea on the impact of ICT on distance and its ability to replace face-to-face interaction in research works whether in Malaysia or anywhere else is still premature.

In view of the discussion above, it is likely that the trend of decentralisation as reflected by teleworking, teleproducing, teleconferencing, satellite officing, remote telecentres and virtual officing facilitated by telecommunication technologies may be less dependent on face-to-face communication considerations, or communication related factor is considered as secondary to other factors.

6. Conclusion

This result reflects the importance of face-to-face interaction in research works which modern telecommunication technologies yet to replace. When face-to-face interaction is necessary, therefore the distances between places will affect users’ interaction. The more frequent use of ICTs does not wholly support the ideals of the virtual interaction without some form of face-to-face interaction. In spite of their fascinating potentials and opportunities, ICTs alone cannot be seen as the main source to the trend of decentralisation as reflected by the various virtual activities (e.g. teleworking, virtual office). The inclusion of advanced
telecommunication technologies especially the ICTs as a new factor in spatial theory cannot be seen as a crucial factor for alternative working arrangement and decentralisation trend. Therefore, further research on location and decentralisation pattern must also take into consideration of other crucial factors than ICTs.

The study has shown that the impact of telecommunication technology on distance and face-to-face interaction if any is rather small. As such, it is best to view telecommunication technology more as complementing face-to-face interaction rather than replacing it. As the impact of advanced telecommunication technology on location is still far from the expectation even in the industrialised countries, it is unlikely that telecommunication technology have a drastic impact on location in Malaysia in the near future. It is still premature to give credence that the extensive diffusion of telecommunication infrastructure and services can stimulate a new conception of locational advantages (accessibility).

The immediate issue on ICTs is how we can dictate or control its use. Future direction should look forward on how organisations and users be more critical of the technology and its uses, and the influences of these processes rather than discussing whether ICTs support new ways of working. Insight into communication behaviour and understanding on how to dictate or control the technologies can help organisations better understand effective and ineffective application of appropriate communication medium at the individual level, which in turn affects the larger system. In this way, we can draw conclusions on their relationship to new organisational forms.

Research organisations need to consider the importance of location that are in proximity with other research organisations as research works requires greater frequency of face-to-face interaction. On the other hand an alternative working arrangement can be developed as a long-term strategy for other types of research works (e.g. social sciences) that require low frequency of face-to-face interaction. Therefore organisations are urged to consider both aspects in response to the changing environment and also to improve research activities.

References