The Role of ICT Based Communication from a Pollution Prevention Perspective

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Abstract

The role of virtual mobility, i.e. various possibilities of substituting travel by the use of ICT-based communication, in reducing environmental impact from travel in Swedish organisations is being discussed. The paper focuses on virtual meetings, such as audio-conferencing, videoconferencing and web-meetings, and their actual as well as potential substitution of business trips. Particularly audio-and videoconferencing was empirically found to substitute travel in organisations, but the use of virtual meetings is still limited. This fact is discussed by highlighting the benefits and costs of business travel and a number of limiting factors for the virtual communication technologies. The paper also brings up some suggestions on how to enhance the use of virtual meetings.

1. The Concept of Virtual Mobility

The emerging Information and Communication Technology (ICT) provides us with the possibility get access to information and services, and to communicate with persons who are spatially remote. With the help of telephones, videoconferences, and computers, it is possible to have a business meeting without having to travel to a specific place, or to work from home or another place outside the office. Consequently, the technology has the potential to substitute some of the travel that is presently associated with those activities. These various possibilities of substituting travel through the use of ICT-based communication have jointly been termed Virtual Mobility (Arnfalk, 2002).

The potential of virtual communication as a substitute for travel was recognised early. Not long after Alexander Graham Bell invented the telephone in 1876, a letter to the editor of The Times published May 10, 1879, pointed out that the obvious

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2 This text is largely based on the author’s recently published doctoral dissertation: “Virtual Mobility and Pollution Prevention – The emerging role of ICT based communication in organisations and its impact on travel”, Lund University, May 2002.
The benefit of Mr. Bell’s invention was that it could ‘replace the rapid journeying which wearied the businessman of today’ (Albertson, 1980). Expectations of large travel savings have been expressed, triggered by the fact that travel has a very high societal cost, mainly in terms of construction and maintenance of infrastructure; casualties and injuries; and environmental impact. External costs of transport are estimated at approximately 8% of GDP (EEA, 2001). Transport is a major energy consumer and source of CO₂ and other emissions, and these emissions are far from what is considered being at a sustainable level. Therefore, lessening of the impacts from travel would be well received, not the least, from an environmental perspective.

However, the travel volume has continued to grow and the impact of virtual mobility has not been able to reverse this trend. Moreover, there are reasons to believe that ICT stimulates more travel, as it facilitates more contacts in a given time at a larger distance, and that these contacts generate the need or willingness to meet physically, face-to-face. The technology also makes it possible to keep contact and work during travels, which increasingly enables people to travel in business. Empirical findings have supported a predominant net effect of a complementarity between virtual communication and travel (Mokhtarian/Salomon, 1997). A conclusion that may easily be drawn is that ICT and virtual mobility will not assist in reducing travel volumes, and can thus be dismissed as a means to reduce the cost and impact of travel.

Consequently, as we are moving into an ICT era, an opportunity for virtual mobility has emerged that unfortunately does not appear to be as promising as it may have seemed at first glance. Should this be interpreted as a reason to dismiss its potential to achieve environmental improvements? The author’s firm belief is that it would be irresponsible and thoughtless to do so, considering the gains that may be lost. In an attempt to shed some constructive light onto this issue, this paper will discuss issues regarding the role of ICTs in an organisation’s efforts to lessen the environmental impact from travel.

2. Focus on Organisations

However, what relevance does virtual mobility have for individual organisations, such as companies, municipalities, agencies, universities, NGOs, and other employers? In many organisations, travel is not only associated with large expenses, but it also constitutes a major source of environmental impact. Examining environmental reports of large Swedish employers like Ericsson and Telia, we find that business travel accounts for the majority of all CO₂ emissions (Ericsson, 1997; Telia, 2001). Along with increasing travel costs, and that these organisations are required to take on a larger responsibility for the environmental impact related to their activities, in-

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3 Commonly also labelled the Information Society or Knowledge Society.
Including transport, the virtual mobility alternatives becomes more interesting. Nevertheless, relatively few companies have started to take any action to reduce the environmental impact of their travel related activities. In a survey of Swedish companies, approximately 7% were using audioconferencing and 4% videoconferencing to reduce business travel. Telework was the most common measure (1% of the companies) to reduce commute travel (Trivector, 2000).

This paper will now focus on the impact of the virtual mobility application virtual meetings: the use of audioconferencing, videoconferencing and web-meetings to communicate and collaborate in business. The type of travelling that this application has the potential to reduce represents about one tenth of all travel in Sweden (in passenger km travelled).

3. The Impact of Virtual Meetings on Business Travel

To what extent can ICT based communication replace travel in an organisation? Several attempts to estimate the potential have been made the past 30 years, yielding results ranging between 15 and 40% (Rapp/Skåmedal, 1996; Cook/Haver, 1994; (Burger, 1995) cited in (Roy/Filiatrault, 1998)). A more moderate view is given by a Canadian study, where Roy and Filiatrault (1998) estimated the current impact of videoconferencing at 1.8% and the potential effect on air trips 3.6-8.6%.

In order to examine what the actual impact of videoconferencing is on travel in Swedish organisations, the author studied the relative importance of the three effect categories substitution, supplementation and generation in four different organisations. In two surveys at Telia and the Scandinavian Videoconferencing User Group (SVUG), on the average 46% of the respondents claimed that videoconferencing had replaced business trips they would have made without access to this option. In addition, 19% claimed that their use of videoconferencing had replaced other people’s travel.4 The proportion of the respondents answering that videoconferencing had no, or only a minor effect on their business travel was on average 32%, while the ones who experienced a generation effect was on average 3% (see Figure 1).
Fig. 1. Respondents’ impression of the effect that their use of videoconferencing has had on their own and others business travel, averaged in the company Telia (N=158), and at the Scandinavian Videoconferencing User Group (SVUG) (N=73).

Two smaller surveys were made at the Scanian farmers’ Association (Skånska Lantmännen) and at the company Tetra Pak. The results from these two surveys are well in accordance with the results from the studies at Telia and SVUG. Consequently, in all of the studied organisations, travel substitution was found to be the dominant effect, as about half of the respondents experienced that videoconferencing had replaced their own travel, and approximately another fifth that it had substituted other people’s travel.

How significant is the actual substitution effect, i.e. how much of the total travel of the organisations does it represent? Due to the lack of reliable figures for the total travel, this kind of comparison could not be made. However, some indications of travel substitution can be found in the companies’ own accounts. The company Tetra Pak has subsequently estimated its travel savings made possible by videoconferencing at about 10% (Miljörapporten, 2000). Another of the companies involved, Telia, has for three consecutive years (1997–2000) reduced business travel by air, cutting the volume with more than a third, thereby breaking a long-lasting trend of travel.

However, estimates were made of the substituted travel distance in each of the organisations, based on the respondents’ own figures of how often they attended a videoconference, if it actually replaced a trip, how they would have travelled there, and the average distance to the meeting partners. These figures can be found in previous work by the author) Arnfalk, 1999).
travel growth. During the same period of time, their use of virtual meetings (mainly audioconferencing) has increased dramatically.

A small-scale example collected from Telia Nära (a subsidiary of the Telia AB group), illustrates how this substitution can look in practice. The top management at the company started using audioconferencing combined with NetMeeting for three out of four quarterly meetings involving 60-70 managers all over Sweden. For these meetings alone, the company saved 3 million SEK (approximately EUR 330 000) in reduced costs for travel, hotel and loss of working time in two years.

4. So it works – but why are still so few using Virtual Meetings?

Virtual meetings are still used to a limited extent by organisations in Sweden. Starting with audioconferencing, 5% of all employed in Sweden had participated in an audioconference in 1999. The use of videoconferencing is more limited. Only 1% of the employed Swedes had participated in a videoconference during a 30-day period in 1999. On average 9% of companies had access to videoconferencing equipment in 2000, and another 4% planned to acquire equipment during 2001 (SIKA, 2001).

In order to understand the limited use of this technology, we need to get an understanding of the thing it is supposed to replace. Business travel, can add value both for the organisation as well as for the traveller. Most people travel on business to attend meetings. Other common reasons for business travel are to attend conferences and training (Arnfalk/Kogg, 2001). In large organisations with extensive geographical distribution, a majority of business trips are triggered by internal collaboration (Nilsson, 2001). Upper management, project leaders, and sales and purchasing personnel are the groups travelling most frequent.

Benefits and costs for business travel can be identified at three levels: societal, organisational and individual, as summarised by Table 1.

Virtual meetings offer a number of advantages as compared to physical meetings, but are at the same time associated with some limitations. In addition to cutting travel costs, advantages include more focused, effective meetings, supporting documentation and offering more people that chance to participate and take part of the information. More frequent, ad hoc meetings are made possible, as well as the chance to involve key persons. Limitations include limited technical access to networks and equipment, immature technology, and limited bandwidth.

We also have to recognise that communicating virtually differs considerably from face-to-face communication. Particularly the differences in Social Presence and Media Richness makes it necessary for the participants to adjust and to develop new communication skills, and to learn how to select the appropriate type of meetings when the technology should be used (Kogg, 2000).
Table 1. Summarising costs and benefits of business travel on a societal, organisational and individual level.

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<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Society</td>
<td>Stimulating growth and progress</td>
</tr>
<tr>
<td>Organisation</td>
<td>Access to established and generating new contacts, exchange of ideas and information, supporting an expanding business</td>
</tr>
<tr>
<td>Individual</td>
<td>Nice experience, developing personal and professional contacts, knowledge, skills, experiences, travel allowance and travel bonus</td>
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Replacing a physical meeting with a virtual one has a number of implications, including economic and social implications. Even if only a fraction of business travel is replaced in an organisation, the economic consequences can be significant, as the costs associated with travel are very high. However, the potentially large savings are seldom fully realised. The important social dimension include the ‘time-rebound’ effect – less time per meeting but more meetings, the risk of losing out on ‘small-talk’, social and professional isolation of remote participants in meetings, and finally the ‘fun-factor’ – the fact that many people simply do not enjoy virtual meetings.

5. Identifying barriers

A number of barriers for an extended use of virtual meetings have been identified. Among the organisational barriers, we find a well-established business travel culture with the focus on travel – not for meetings. This is expressed in terms of many function and routines, such as travel budget, travel allowance, travel manager, travel agency, and travel policy. These functions seldom include or promote the non-travel alternatives. A heterogeneous meeting behaviour complicates adoption of virtual meeting routines and skills. Lack of responsibility and support for the virtual meetings infrasystem discourages its use, as well as a sub-optimisation of investments.

Personal barriers include some drawbacks from not travelling: reduced professional output; loss of status, personal development, nice experience, travel allowance,
travel bonus points, and even tax-free goods. Moreover, the lack of skills in how to manage a virtual meeting and the resistance to learn new things, also constitute barriers. The lack of institutional pressure can also be interpreted as a barrier for a shift towards virtual meetings, particularly as legal and normative pressure on an organisation, in the form of environmental policies, largely fail to address the impact of travel.

Practical barriers in the organisation include limited availability to equipment and facilities for virtual meetings, poor reliability of existing equipment and unsuitable premises for this kind of communication.

6. How to influence the use of Virtual Meetings?

How can an organisation support this change and reap the maximum benefits from technology’s virtues? A first step is to recognise when to use virtual meetings and when not to. The preferred form of meeting is decided by a number of situational and contextual factors. Among the situational factors, we find critical parameters such as the purpose and type of meeting, but also considerations of costs and benefits for the meeting, influence the decision. A second step is to decide what type of virtual meeting technology that should be used, which is partly determined by the amount of social presence and media richness required.

However, the organisation can influence the meeting behaviour, by manipulating contextual factors such as the organisation, meeting infrastructure, and also personal factors. The organisational factors that the organisation can influence, closely relates to organisational barriers, are found within the areas of human resource management, organisational culture, management control system, organisational structure, meeting infrastructure, and policies for travel, the environment and information.

The meeting infrastructure aspects correlate to how to overcome the practical barriers, such as providing access to good equipment at strategically important nodes in an organisation, and allocating funds for support and service. Finally, personal factors that can be influenced include attitudes, by information, education and practical tests, and by providing incentives not only for business travel, but also for virtual meetings.

The user – a company, municipality, state agency, university, NGO or other organisation is the key change agent in this process. Within the organisation, top management and project leaders are central for implementation, but also the areas of ICT, finance, human resources, travel and transport, and environment should be emphasised. In addition, policy makers have both a direct and an indirect possibility to influence the development of virtual meetings.
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