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Recommended Citation

D'Ambra, John; Toorn, Christine Van; and Dang, Geoffery, "The Negative Aspects of Email and Productivity: Towards Quantification" (2007). *ACIS 2007 Proceedings*. 72.

<http://aisel.aisnet.org/acis2007/72>

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The Negative Aspects of Email and Productivity: Towards Quantification

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Abstract

Email has evolved as the most widely used information system in organisations. Many organisations are now dependent on the use of email to manage internal communication as well as other communication and business processes. With this emergence of the universal use of email have emerged some negative aspects of email usage which have a negative impact on personal and organisational productivity. It is now necessary to recognise these negative impacts of email so that structures may be put in place to minimise and control them and related impacts on productivity. In an approach to quantify the negative impact of email this paper identifies negative aspects of email usage and proposes a model which may be used to quantify each aspect and, in turn, quantify the impact of these aspects on productivity. This approach would allow the confirmation of negative issues of email usage and allow formulation of approaches for their management.

Keywords

Email, negative aspect of email, Task-Technology Fit

Introduction

In an organisational context email has emerged as one of the most widely used information systems. Email now plays a significant role in organisational communication to the extent that many organisations now depend upon the use of email in the support of business and administrative processes.

Email was originally designed as a communication tool, it now has become much more than a medium for the exchange of messages. Email systems now present as a personal productivity tool offering the following functionality: messaging, time management, task management, project management, document exchange, and document and knowledge repository. This list is by no means exhaustive. The limit of email system functionality is bounded only by the innovativeness of the user.

The benefits and productivity gains of email and computer-mediated communication in general have been well documented. Much research has been conducted investigating theories of media choice in the context of the new media including email. Despite the lack of a definitive model in terms of explaining media choice in organisational contexts the use of email has grown to such an extent that its use is unquestioned and expected in most, if not all, modern organisation settings.

This unquestioning acceptance of email is changing. In a seminal editorial Weber (2004) identifies the need for research into the costs that the use of email imposes on modern workers both within and outside their work contexts. Weber calls for a deeper understanding of the impact of email as a well as the need to develop understanding of the impacts of email on individuals, groups and organisations. To this end Weber examines some phenomena associated with receivers and senders of email considered to be problematic. These phenomena include:

- The time and effort required to manage email;
- The email backlog;
- Keeping up with the immediacy of email;
- The inappropriate use of email;
- The intrusive nature of email into personal time, travel, and work intruding into non-work time;
- Some obsessive behaviours of individuals induced by email.

What emerges from Weber's examination of the above phenomena is that email has a very real potential for a negative impact on individual productivity. These negative impacts have now been realised and detract from the use of email as both individuals and organisations now incur costs through the use of email.

In response to Weber's call for more research into the use of email this paper proposes to build on Weber's examination by further investigating the negative aspects of email and proposes a model for the investigation of the relationship between the negative impact of email and personal productivity in a work context. The paper aims to make a contribution by proposing an approach to quantify and measure the negative impact of email on personal productivity. The remainder of the paper is structured as follows: firstly the literature on the issues of email use in organisational settings is consolidated under a number of proposed dimensions of the negative impact of email; the issue of email/Internet addiction is also considered in the context of email use and finally the Task-Technology Fit model is proposed as a theoretical context for quantifying and measuring the above concepts.

Issues of Email Use

As email has evolved into the most widely used information system it has become the 'computer user's multitasking environment' (McCrickard et al 2003) or the users 'electronic habitat' (Ducheneaut and Bellotti 2001). As the scope of the functionality of email increases issues are now emerging concerning the impact that this unbridled increased use of email has on productivity. As these issues become more apparent research has been undertaken to quantify these issues as a means to manage and counteract the negative outcomes.

A fundamental issue is the number of emails received and the amount of time required to deal with the sheer volume of emails, individuals spend a significant amount of time dealing with email messages, up to 25% of the working day (Pendharkar and Young 2004; Whittaker and Sidner 1996; Weber 2004). A review of the literature reveals that this fundamental issue of volume is multi-dimensional, consisting of multiple negative impacts of email usage. Recent research has identified perceived negative aspects of email or 'email defects' (Burgess et al 2005). These email defects are considered below.

Interruption Effect

An interruption is an 'externally-generated ... event that breaks the continuity of cognitive focus on a primary task' (Corragio 1990). Interrupts are common in the workplace, and include telephone calls, unscheduled visits by colleagues and subordinates, and the notifications from new electronic devices and media. Interrupts in the work place need to be managed; otherwise negative impacts on productivity will result. Users of email may either adopt a systematic or ad-hoc approach to reviewing their email. A systematic approach may reduce the interrupt effect, while the ad-hoc approach may increase the interrupt effect. This issue can be further amplified by the use of both visual and sound based system notification of the arrival of email to the user's in-box. There is a general sentiment that interruptions are annoying and a reduction of interrupts would be well received (Jackson et al 2003).

For some users the use of email is an integrated component of their work process. As new events occur, new work is initiated via email that may have to be dealt with immediately. Consequently, some believe email interrupts to be a necessary part of the way they work, however they are perceived as negative as the user's focus is disrupted (Solingen et al 1998). This interruption is harmful to the performance of the task (Czerwinski et al 2000; Cutrell et al 2001). Although email interrupts are believed to have little significance, Jackson et al (2003) found that '70% of emails dealt with were viewed within 6 seconds, which is quicker than letting the phone ring three times.' Alongside this, they found that it took 64 seconds for the individual to return to their work at the same work rate before they were interrupted. With the large amount of emails entering inboxes everyday, this effect can be detrimental with a large amount of time lost. However, there is some evidence that with some experience in handling interrupting tasks, the harmful effects could be reduced over time (Cutrell et al 2001).

Information Deficiency

Information Deficiency is the lack of information in email messages to provide appropriate context and reduce ambiguity. Frazee (1996) found that message quality was consistently inefficient. Frazee further identified that:

'More than 65% of all e-mail messages failed to leave receivers enough information to enable them to act on the message. Lack of organisation and clarity, poor construction and grammar, and misinformation were all cited as common problems.'

In addition, ambiguity can occur if there is not sufficient context provided by the sender (Kimble and Abu Bakar 2001). Firstly, the email medium does not provide as many opportunities to reduce ambiguity, because it does

not provide any other communicative cues. Senders are less likely to ensure that their messages convey sentiments such as importance or disapproval. Secondly, senders do not use all the functionality of email appropriately, for instance the advanced formatting features or templates (Takkinen and Shahmehri 1999). A noted weakness is the subject line of emails, as too often the sender does not provide enough information about the message, or even leaves it blank, for the recipient to be able to decide whether or not it is worth reading (Burgess et al 2005; Jackson et al 2003; Nantz and Drexel 1996). Important information can easily be overlooked if the recipient deems it to be unimportant. The implications of this are grave, especially when decisions can be made without complete or correctly interpreted information.

Task/Message Mismatch

One aspect of task/message mismatch is the inappropriate use of the carbon-copy function and inappropriate addressing of email messages (Kimble et al 1998). Such practices impose a cost on the recipient of the email. The recipient is burdened by the cost of having to process and deal with the email (Kimble and Abu Bakar 2001; Nantz and Drexel 1996; Weber 2004).

The other aspect of Task/Message Mismatch is the inappropriate choice of email as a communication medium. Too often users do not match the task to the appropriate medium thereby increasing the cost of the communication as further communication is required in another medium to reduce equivocality (Ducheneaut and Watts 2005).

Processing and Filing of Email

Email needs to be managed; messages must be read, processed and then either deleted, saved or archived. If a response is required, the difficulty arises in prioritising the task in light of other tasks. Categorising the email, when the need to file it arises, then becomes a major difficulty. At the time of retrieval, the *how* and *why* of the categorisation needs to be remembered to actually recall where a message or related document was stored (Ducheneaut and Watts 2005). As such, storing and categorising information leads to a dilemma. On the one hand, the more time it takes to categorise an item, the less likely that the user will actually undertake the task. However, on the other hand, if the process of categorisation is more automated, the user will less likely be able to recall where an email was stored because associations are formed by the active involvement of the user storing the email in a particular place (Ducheneaut and Watts 2005).

Filing emails is one of the most time consuming tasks, but if it is not done, then the inbox becomes overloaded. It can be seen that the ability to file successfully depends on being able to foresee the future retrieval requirements, however that in itself takes considerable effort. Filing in folders may not be successful for some individuals, mainly due to the fact that some users are less likely to remember folder names and the purpose of those folders after a period of time (Whittaker and Sidner 1996).

Whittaker and Sidner (1996) were able to categorise users into different types of filers based on the usage of folders and frequency of maintenance. Although there may be an optimum strategy to filing, management of filing differs greatly with experience and folder strategies (Ducheneaut and Bellotti 2001). As a consequence, email overload could prove to be email's undoing, with inboxes cluttered with in excess of hundreds of messages that are unread, partially read or outstanding (Whittaker and Sidner 1996) and with no foreseeable way of solving this problem.

Internet Addiction

Internet addiction is a phenomenon that has been well documented (Beard 2002; Potera 1998; Young 1998). Internet addiction has been identified as similar to television addiction (Kubey and Csikszentmihalyi 2002) but potentially more serious. Younger people have shown greater tendency to be affected through Internet addiction due to their exposure and engagement in online activities including asynchronous (email) and synchronous communication activities (Song et al 2004). As young people with large amounts of exposure to these Internet based activities increase their participation in the work force their excessive Internet usage, and in some cases addiction, may intrude in the workplace and impact on productivity (Eversible 2000).

An investigation of gratification and Internet addiction found that for university students the factors of *relationship maintenance* and *virtual community* (among others) were significantly related to Internet Addiction (Song et al 2004). The *relationship maintenance* factor emphasised maintaining relationships with existing acquaintances while the *virtual community* factor focused on communication with new people met through the Internet. These findings are salient as they suggest that mediated communication through the use of Internet media does contribute to gratification obtained from excessive Internet use. Further evidence for this relationship was found by Kubey et al (2001). In a study of university students who self-reported Internet dependency and impaired academic performance it was found that both Internet dependency and impaired academic performance

were associated with greater use of all Internet applications but particularly with much greater use of synchronous communication applications such as chat rooms and MUDS, as opposed to asynchronous applications such as email and Usenet newsgroups. Hur (2006) found that at least 2% of Korean teenagers are seriously suffering from Internet addiction disorder and that approximately 50% are exposed to a form of Internet addiction disorder.

These studies on Internet addiction and youth are seminal as they indicate that use of the Internet does provide gratification for the young and that mediated-communication is a significant dimension of this gratification. As this younger generation moves into the workforce it is reasonable to hypothesise that their addiction will accompany them and that the related gratification experienced by communicating on the Internet will lead to excessive and inappropriate use of Internet based communication tools in the workplace, including email leading to negative impacts on productivity.

Influence on Email Usage, Task-Technology Fit, and the Nature of Usage

Two traditional models help provide the basis for identifying possible influences on email usage: The Theory of Planned Behaviour and a synthesis of usage and Task-Technology Fit models.

The Theory of Planned Behaviour is a model designed to explain specific human behaviour. It has been used to explain why people participate in different recreational activities and health related behaviours. The most direct influence on behaviour is intention to perform an activity ('behavioural intention'). In turn, this is influenced by: (1) Attitude to outcomes -- the person's attitudes to the results of performing the action; (2) Social pressure -- the influences resulting from the individual's environment; and (3) Perceived behavioural control -- the extent to which a person believes he or she has control over his or her behaviour. The Theory of Planned Behaviour is the foundation of models examining people's intentions to utilise organisational systems (Davis et al 1989)

Various measures of the three general categories of influence on technology use are possible:

- (1) One measure of attitude toward using a specific information technology, such as email, would be the extent to which an individual believes that using email will improve his or her performance. Another would be perceptions of how much using email is an interesting, enjoyable, or a productive experience.
- (2) Social influence may be measured by identifying sources from which potential users may experience pressure to use email (possibly weighting beliefs according to the individual's motivation to comply with these pressures). Pressures to use email may come from peers (both non-Internet and Internet based), the workplace, behaviour learnt outside the workplace (Internet usage in other contexts: home, study) and the media.
- (3) Perceived behavioural control may be measured by identifying potential costs of, and barriers to, email usage, such as the cost of using email, accessibility to a computer with an Internet connection, understanding email, organisational and legal implications and fear of being monitored.

However, one important construct is not included in this model: the tasks for which email is used. Insofar as usage of email is optional, the decision to use it may be based on an individual's expectation that email may have some impact on the task or that using email to solve a communication based task may be a satisfying experience. There must be some degree of *fit* between the task and the technology that has been chosen to accomplish it. In a response to unresolved issues in studying user evaluations of systems, Goodhue and Thompson (1995) proposed a user-specific construct: Task-Technology Fit (TTF). The essence of this model is the assertion that IS will have a positive impact on individual performance if the system is used, and it is a good fit with the tasks it supports. The authors derived this model by analysing the limitations of two streams of research that have proposed models of technology use: utilisation and TTF (D'Ambra & Rice 2001). While each of these perspectives provides insight into the impact of IS on performance, each alone has some important limitations. First, usage may be more a function of how jobs or tasks are designed than of the quality or usefulness of systems, or of the attitudes of users toward using them. Mathiesona and Keil (1998) similarly argue that task-technology fit issues may override interface design and system accessibility issues. Second, DeLone and McLean's (1992) work investigating the many aspects of IS success lends support to the TTF model, but also concluded that there is not one, but many, measures of success, including: system quality, information quality, use, user satisfaction, individual impact, and organisational impact. Other studies show that user satisfaction may be a more powerful influence on performance outcomes than technology utilisation (Gelderman 1998; Goodhue et al 200). Dishawa and Strong (1999) also emphasise the value of integrating multiple models, such as the technology acceptance model, with its emphasis on attitudes developed through perceptions of usefulness and ease of use, and the TTF model, with its emphasis on matching IS functionality with user needs. Thus, the fit model can benefit from the addition of this richer understanding of the nature and forms of utilisation.

Integration

This paper argues that the focus of the Goodhue and Thompson model matches the environment of email usage. This is a technology for which use is optional (in terms of media choice); at the same time usage is dependent on user perceptions of the impact of email on the task, as well as a host of social and contextual factors. The following integration of the prior constructs suggests a model for explaining usage and evaluation of email in voluntary situations, and thus identifies potential concepts and scales that should be used to study email usage (D'Ambra & Rice, 2001).

Tasks are broadly defined as the actions carried out by individuals in turning inputs to outputs in order to satisfy their information needs. Characteristics of the **individual** (knowledge, expertise, motivation, experience, age, and role) could affect how easily and well he or she will utilise email. **Technologies** are tools (hardware, software and data) used by individuals in carrying out their tasks, and the technology's attributes (accessibility, response time) can affect usage. **Task-technology fit (TTF)** is the correspondence between task requirements, individual abilities, and the functionality of email. **Social norms** are the external factors that influence use of email (peer pressure, others using email at their workplace, organisational policy and culture). **Control factors** may limit the use of email, such as cost, accessibility of hardware and software, local, institutional or legal restrictions, and concerns over monitoring by others of usage. **Utilisation** is the behaviour employed in completing tasks (communicating). **Performance impact** involves accomplishing a portfolio of tasks by an individual. High performance implies a high level of task-technology fit, and satisfaction with the IS (Goodhue et al 2000) (here, email). **Feedback** through actual use is of course an important aspect of the model, as it may change users' perceptions of possible consequences, and thus both their future utilisation and performance outcomes (Goodhue et al 2000).

In support of the above arguments we propose that the model presented in Figure 1 can be used to measure the negative aspects of email and personal productivity in the workplace. The model illustrates perceived work productivity as the dependent variable. The determinants of perceived productivity are: TTF and utilisation. These three constructs are in turn determined by various control variables. The model proposes that:

1. The negative aspects of email can be measured.
2. TTF factors (negative aspects of email) will be positively related to perceived negative impact on productivity.

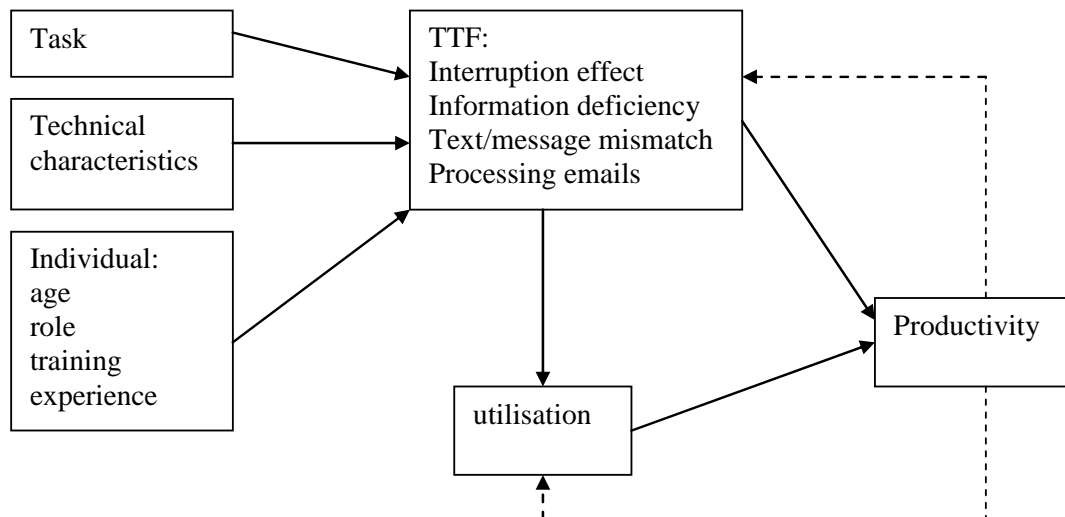


Figure 1: A proposed model for quantifying the negative aspects of email

To consider these research propositions the constructs, their relationships and specific research propositions are discussed below.

Task In the broad TTF perspective tasks are defined as actions carried out by individuals in turning inputs to outputs in order to satisfy their information needs. The information domain here is the use of email to communicate in an organisational context.

Individual The evaluation of the TTF of email and perceptions of performance may vary depending on the abilities and attributes of an individual, including: age, role, training, and experience with computer-mediated communication media.

Technology Characteristics are tools (hardware, software and data) used by individuals in carrying out their information tasks. The technology's attributes (accessibility, ease of use, response time, functionality) can affect usage and users' perceptions of the technology. This proposition is basic to the efficacy of user evaluations of information systems. It asserts that user evaluations will not be random, but will reflect the objective characteristics of a system.

Task-technology fit (TTF) is the correspondence between task requirements, individual abilities and the functionality of email. This is a multi-dimensional construct with factors identifying the negative aspects of email which should influence perception of email's impact on work performance.

Proposition 1: Task-technology fit factors as negative aspects of email can be identified and quantified.

Social norms are the external factors that influence use of email (peer pressure, organisational policy, practice and culture, using email and other web-based communication tools outside of the work context). This construct recognises the role of the Theory of Planned Behaviour in usage of email. That user's intention to use email may draw on their attitudes to the results of performing the action, the influences resulting from the individual's environment (social norms) and the extent to which users believe they have control over their behaviour.

Utilisation is the behaviour employed in completing tasks, using email to communicate. As use of email is discretionary (in terms of media choice) it must be considered. Because of social norms individuals will not always utilise technologies with the highest TTF. However, at any given level of utilisation greater than zero, a technology with higher TTF will give better performance. In the context of this proposal though, the greater the usage of email, performance may decline as the negative impacts of email increase through rates of usage.

Proposition 2: Utilisation of email will have a negative impact on productivity.

Productivity impact is the user's perception of the impact of email on their productivity at work. High TTF increases the negative impact on personal productivity.

Proposition 3: TTF is positively related to perceived negative impact on productivity.

Discussion

This paper aims to make a contribution to the understanding and identification of the negative impact of email on personal productivity in the work place. Importantly it proposes an approach to quantify the negative aspects of email and related influence on personal productivity. There is a need to understand these phenomena so that organisations may undertake initiatives (policy, standards, and training) to modify the behaviour of employees thereby decreasing the negative impact of email on personal productivity. To achieve this, firstly, the negative impacts of email must be identified. Much of the current literature is devoted to self help approaches as to how individuals may modify their behaviour to counteract the negative aspects of email. Such approaches are not sufficient in an organisational context as email is a technology which has universal penetration and inappropriate use by a few can impose high costs on the majority.

This paper identifies some negative aspects of email and the issues that contribute to their development by individuals and their behaviour. It is important to prioritise these issues in terms of their relative impact. This can only be done by quantifying the variables themselves and their individual impacts on productivity.

The paper proposes that the TTF model is a suitable framework for such quantification. Through the use of the TTF model the interaction between control variables, the negative behaviour of individuals, levels of utilisation and the impact of these variables on productivity can be ascertained.

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