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E-Communication Analysis : The Cost of an Internal Email Messaging System within Organisations

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A cost-benefit analysis of the use of internal email was carried out at the Danwood Group at Lincoln in the UK. This was a pilot exercise forming part of a larger exercise to evaluate the costs and benefits of using computers to help further communications throughout the company.

The times taken to read, write and carry out other functions with email were measured for a sample of employees. The email content was also monitored to determine which emails were business related. It was found that nearly two thirds of all emails dealt with were non-business related at the start of the research, but this figure decreased exponentially to a consistent 43% towards the end of study.

Overall the findings indicate that despite the fact that only one third of email use was business orientated, the time taken is still worthwhile compared with other traditional communication methods. However, it was not possible to fully quantify the benefits of email over these other methods, as the data for the alternatives has not yet been collected. The study showed that further research is necessary in this respect.

The paper concludes that the analysis has been a useful learning experience for the company showing the value of cost-benefit research and highlighting the difficulties involved. It has also identified the possible benefits that could be obtained by monitoring the email system.

1. Introduction

Through communicating we exchange our thoughts, ideas, opinions, feelings with other people, at work, and in every other part of our life. The communication process is so commonplace that it becomes second nature, though by analysing the process it is seen to be much more complex, and much less efficient, than it is normally assumed. By understanding the communication process we can optimise communication mediums to increase the efficiency of our communication, with benefit to the productiveness of our work. As communication pervades nearly everything we do, even small improvements in the effectiveness and cost of our communication processes can have significant benefits.

Email is becoming an integral part of the communication structure within organisations, but the costs and benefits are not being assessed. Communication is carried out in many different forms, but the common underlying motive of communication is to improve working practices and to increase productivity. Research shows that 77% of managerial problems are related to poor communication [6]. This paper has resulted in the creation of an internal email costing formula and tables that show when internal email starts to become more productive. This paper builds on other published work from Jackson [3] and Solingen [7], to identify the productivity and efficiency costs of using email. This paper resulted from a study of the communication methods within an organisation that retails office solutions: The Danwood Group. This study is part of a wider research programme to identify the costs and benefits of the IT within the company.

During the last few years building a reliable, scalable messaging infrastructure has become a strategic business initiative in most large companies today. In less than a decade, electronic messaging has become as important as the telephone system as a core business utility. Yet there has been no structured growth of this infrastructure. It has evolved by applying available technology to solve local problems. Many reports and statements have been issued regarding the cost of not having an email system and the cost to the organisation when the email messaging system goes down [4, 5]. The majority of the organisations time is spent on keeping their systems up and running, as system downtime costs companies large amounts of money. Undoubtedly any system that goes down costs organisations money for reasons such as lost revenue or a decrease in employee productivity. A company with 3000 employees will lose an average of \$2.1 million (\$684 per user) annually, on lost productivity and lost revenue due to messaging system downtime

[4]. The authors agree that system down time is probably always going to be the biggest cost to an organisation, but by analysing any system, in this case a messaging system, the analysis will normally show that changes made to the system will increase employee productivity. In the authors case the analysis also resulted in providing the Danwood Group with the actual costs of running the system during different stages of its lifecycle.

The costs of using an internal email system outlined in the paper only accounts for the employee's time spent dealing with email. The costs of the email message system can be broken down into many parts such as, the cost of the email system crashing, the cost of support and the cost of the necessary hardware required to run the system, to mention a few [4, 5].

2. The Move Towards Electronic Messaging

Gone have the days when the telephone was once the main medium for communication. Email is now working along side the telephone to communicate information to colleagues, suppliers and customers. The introduction of electronic messaging has brought many benefits to organisations, but the main benefit is having the capability to monitor its progress by capturing communication metrics. The amount of time spent on personal and business phone calls is very hard to monitor via the telephone system. Recording telephone metrics is difficult because there is no cost-effective way of monitoring the nature of the calls. Over the past three years electronic messaging has moved from a service available to I.T. staff and selected isolated departments within an organisation to a corporate-wide service. Expectations have radically shifted, employees used to be happy if the email system was up when they checked their email. Today people expect the system to be available around the clock, accessible from home PCs or from laptops whilst travelling. Where employees were once satisfied if they could reach co-workers in departments using email, they now expect that their corporate messaging system will allow them to contact business partners, customers, and suppliers around the globe. Electronic messaging has matured and become a network utility and an expected service, like copying machines and faxes, that people need to do their jobs.

Organisations have now been given the opportunity to improve communication practices by monitoring the email tool. With the capability to monitor email communication, organisations can experiment with the implementation and running of the email system to see the effect on employee productivity. This is a strong motivation for companies to encourage their employees to communicate via email rather than using the telephone and other communication mediums.

3. Recording the Metrics

As some companies have email usage policies, it was important to research a company that had no email restrictions, so the results were not biased. There were two stages involved in recording the email metrics.

The Danwood Group currently has no email policy to restrict the employees, however the users were aware that email metrics were recorded for research purposes in stage one, but in stage two they were unaware of the recording of the email metrics. Stage one involved developing an email application that would record email metrics. A special client based email application [Figure 1] 'The Danwood Mail', was written to analyse the users activities whilst using the package for communication. The mail application could have been used for both internal and external email communications, but was only used for internal email, as at the time of the study the company had not yet set-up the necessary external network. The program records how many words are in a message, how long it takes the user to read or compose the email, the subject of the message, who it is to, the author, and the time and date the email was sent. The 'The Danwood Mail' replaced the Microsoft Windows Messaging application. Though not as sophisticated as Microsoft's Windows Messaging application 'The Danwood Mail' received good feedback from the Danwood users for its speed and user friendly interface.

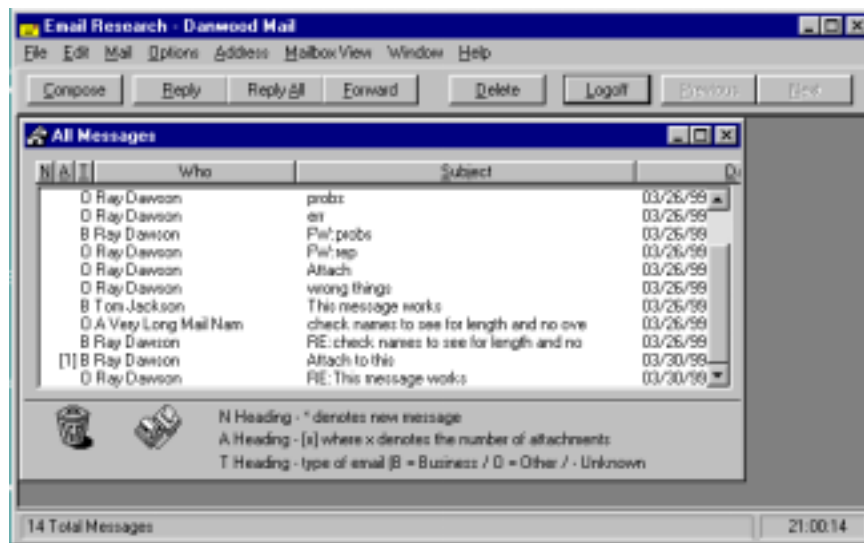


Figure 1 – The Danwood Mail Application

An example of how an email can be composed within the Danwood Mail Application can be seen in Figure 2. The sub window that has focus is the composing window (“send note window”), which is also like the window that is used to read an email. Every time a composing or reading window has focus a timer is activated. Each time the window loses focus the timer is stopped and a log of the activity is written to a file. For example if the sub window in Figure 2 lost focus, the log would contain the following: -

- amount of words in the main message body of the email - 67 words
- how long it took to compose the email - 136 seconds
- the subject title of the email - “Test Email”
- who the email is for, both the To and Cc fields are logged - tom.jackson@bigfoot.com
- the author of the email - Tom Jackson
- the time and date the email window lost focus - 04/01/00 20:33:45

The deletions of emails were logged but not timed, as the time taken was insignificant. Email messages were normally deleted after they have just been read or deleted at a later date by simply highlighting the email in the received message window and pressing the delete key, but in both circumstances very little employee time is used to carry out the deletion operation.

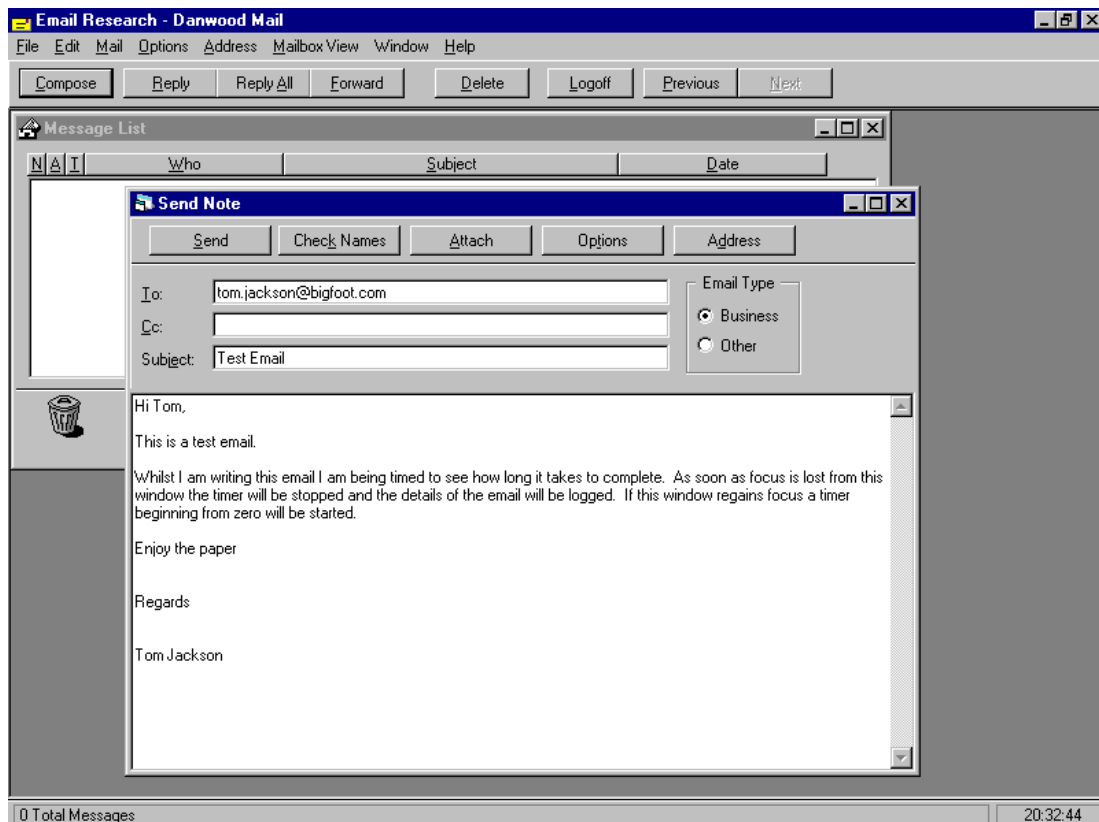


Figure 2 – Composing a Message in the Danwood Mail Application

Stage two involved removing The Danwood Mail application as maintenance was becoming too high and the users needs were became increasingly more sophisticated. Microsoft Outlook and Microsoft Outlook Express replaced the Danwood Mail application. Before the Danwood Mail system was removed it was replaced by a new email recording metrics application. The new system is server based and runs on a dedicated machine. Unlike the Danwood application, the new software was not able to record the time an employee spent on email, as it was harder to monitor individuals from the server. This functionality is due to return in a later phase, with a newly created add-on that records user email times from the server.

4. Analysis of Email Communication

Email is undoubtedly a versatile communication tool capable of sending a message anywhere in the world within seconds regardless of the time boundaries. Email like any other communication tool can be used for both personal and business communication. Recently email was installed at Whitehall and other British embassies around the world, speeding up internal channels of communication. Instead of the old fashioned telegrams, email enabled them to pass information more quickly and securely, reducing the amount of paperwork and making them all more effective [2].

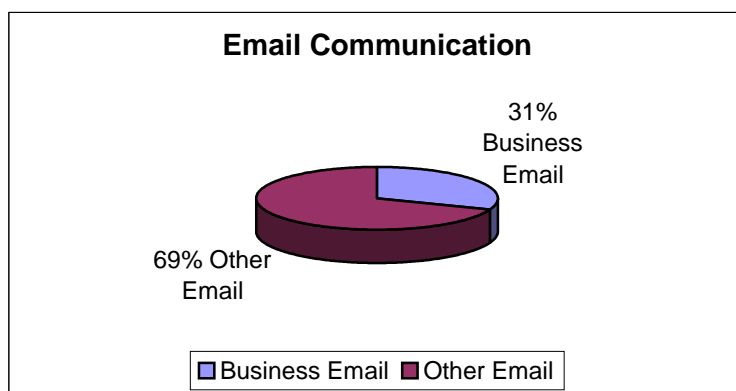


Figure 3 – A breakdown of email messages dealt with by the average employee at the beginning of stage one [3]

Analysis of stage one and stage two of the study shows a sliding scale of results. At the start of stage one, 69% of email was non-business related and during stage two that figure has decreased, to the level shown in figure 5. The amount of non-business email has been at a consistent level around 43% for several months and the authors believe that this level of non-business email will not change unless an email policy or different email application is introduced. The metrics show email is not as productive as first anticipated. Firstly, as shown by figure 3, the average employee uses email mainly for non-business purposes, for example sending jokes or telling their colleague to make the tea. The reason for such high non-business usage of email could be the ease of use and privacy that email offers compared to communication mediums like the telephone. In a working environment everyone surrounding you can hear your telephone conversation, which makes it harder to use the

telephone for personal calls. At the beginning of stage one, only 31% of the messages dealt with were business related but that has increased with time reaching a consistent level of around 57% [3].

Converting the percentages from figure 3 shows that 54 hours a working year (48 weeks) per average employee is spent on non-business communication in figure 4. This means 14 minutes per average employee a day is spent on non-business email, in addition, recovery time has to be added for each interrupt. If it takes 15 minutes to recover from a phone call, according to DeMarco's

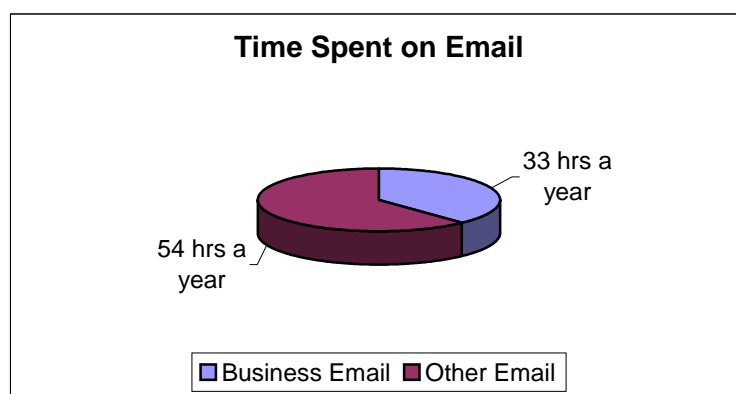


Figure 4 –The amount of time the average employee spends on communicating a year

research [1], it is clearly going to take some time to recover from an email interrupt. The extent of the recovery time will vary from person to person, many employees appear to react to an incoming email immediately, implying the recovery time is likely to be similar to the recovery time after a phone call for these employees. Other employees wait until a more convenient moment and then deal with several emails together. This type of reaction will result in a much shorter recovery time.

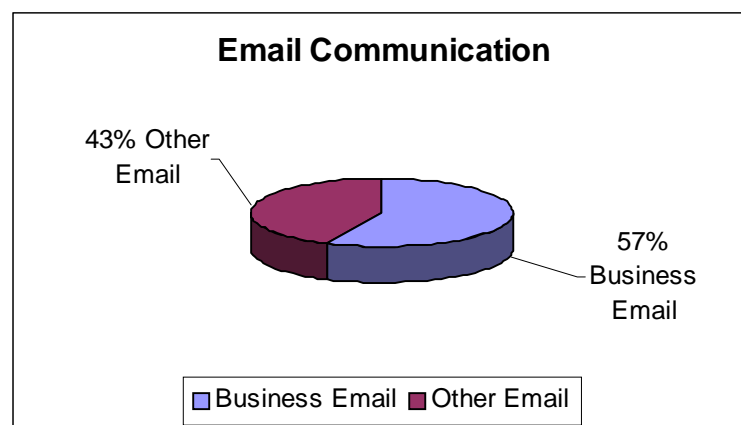


Figure 5 – A breakdown of email messages dealt with by the average employee at the beginning of stage two

There are currently no figures for how long it takes an employee to recover from an email interrupt but the estimate based on an informal survey of expert opinion is just over 1-minute per interrupt, a saving of just over 13 minutes compared to the phone [3].

After the initial findings of high non-business email usage Danwood considered the introduction of an email policy to try and reduce this. They decided against the policy, as there were signs of a natural reduction in non-business email. With more employees using the messaging system for business and the high volume non-business email users reducing the amount of non-business email, it resulted in the natural reduction of non-business email.

5. The Cost of Running an Internal Email System

Stage two of the analysis was unable to record the time an employee spends on an email, so the figures from stage one were used to calculate the tables entries below. The column ‘Day since Implementation’ has a time scale in days from when the internal email messaging system was implemented within an organisation. The column ‘Other Email a Day’ denotes how long an employee spends on non-business email a day depending on how long the email system has been implemented. The column ‘Business Email a Day’ denotes how long an employee spends on business email a day depending on how long the email system has been implemented.

Through carrying out the analysis, the cost of running an internal email messaging system can be calculated. It can be seen from Table 1 that in the early days of implementation more time is spent on non-business email, though this decreases exponentially. The analysis has provided Danwood Group with a baseline to work from in trying to increase employee productivity

| Day since Implementation | Other Email a Day | Business Email a Day | Total Minutes a Day |
|--------------------------|-------------------|----------------------|---------------------|
| 1 to 39 days | 13.53 minutes | 8.34 minutes | 21.87 |
| 40 to 84 days | 10.98 minutes | 11.84 minutes | 22.82 |
| 85 days plus | 8.43 minutes | 15.33 minutes | 23.76 |

Table 1 – Breakdown of time spent by an average employee on Email a day without Recovery Time

5.1. Cost of Other Email

| Day Since Implementation | Other Email a Day | Estimated Recovery Time | Total Minutes a Day |
|--------------------------|-------------------|-------------------------|---------------------|
| 1 to 39 days | 13.53 minutes | 14 minutes | 27.53 |
| 40 to 84 days | 10.98 minutes | 11 minutes | 21.98 |
| 85 days plus | 8.43 minutes | 8 minutes | 16.43 |

Table 2 – A breakdown of time spent by an average employee on Other Email and Recovery Time a day

The current cost of non-business email can be calculated by using Table 2 in conjunction with the formula 1 below. To illustrate the sort of costs that can be incurred by the email message system the formula will be applied to a medium size company with 120 employees with the average wage at £320 per week, with an assumed overhead of a similar figure of £320 per week. In this company the email system was installed over a year ago, so therefore the formula will use figures for over 85 days since implementation.

$$\text{Total Minutes} * \text{Email users} * \text{Average Employee Wage per minute} = \text{Cost}$$

Formula 1 – Current Cost of Non-Business Email

The cost to the company per day for 120 employees to use the internal email system for non-business purposes is £524. The cost to the company for the year is over £ 26,000.

5.2. Cost of Business Email

| Day Since Implementation | Business Email a Day | Estimated Recovery Time | Total Minutes a Day |
|--------------------------|----------------------|-------------------------|---------------------|
| 1 to 39 days | 8.34 minutes | 8 minutes | 16.43 |
| 40 to 84 days | 11.84 minutes | 12 minutes | 23.84 |
| 85 days plus | 15.33 minutes | 15 minutes | 30.33 |

Table 3 – A breakdown of time spent by an average employee on Business Email and Recovery Time a day

The cost of business email can be calculated in the same way as non-business email. Again to illustrate the sort of costs that can be incurred by the email message system, the formula will be

applied using Table 3 to a medium size company. The company has 120 employees with the average wage at £320 per week and an assumed overhead of a similar figure of £320 per week. Again like the above example the company has a mature email system and therefore the formula will use figures for over 85 days since implementation.

$$\text{Business Email minutes} * \text{Email users} * \text{Average Wage per Minute} = \text{Cost}$$

Formula 2 – Current Cost of Business Email

The cost to the company per day for 120 employees to use the internal email system for business purposes is £968. The cost to the company for the year is more than £46,000.

5.3. Cost of Running Email a Day

The formula below can be used to calculate the joint cost of using the internal email system for both business and non-business activities. Again to demonstrate the cost of running the system, the figures used to calculate the cost of non-business and business emails will be used.

$$(\text{Total Non-Business} + \text{Business Minutes}) * \text{Email Users} * \text{Average Wage per Minute} = \text{Cost}$$

Formula 3 – Current Cost of Running Email for a Day

The cost to the company per day for 120 employees to use the internal email system is nearly £1,500. The cost to the company for the year is over £71, 000.

5.4. Cost of running External Email

Little research has been carried out into calculating the costs of using the external email system. Initial research carried out so far by the Danwood Group shows that 73% of the emails are non-business related, though further research is required to confirm the figure.

6. Future Work

The results highlight employee productivity could be significantly higher, especially in the external email messaging system, but further research is required into calculating how to achieve this. In particular the following points need investigating:

1. The recovery time after reading email needs to be more accurately quantified as opinion could prove to be very unreliable for this type of measure. This may also bring to light issues of how and when people react to incoming messages. It is likely that employees who tend to react immediately to a message are subjecting themselves to a greater level of interrupt. Research into recovery time could lead to a need to educate employees in the best practices of handling incoming messages.
2. Reducing the amount of time spent on all email. One of the authors is developing an add-on to Microsoft Outlook and Outlook Express. Through using this program the Danwood Group hope to reduce the time an employee spends dealing with an email. The add-on will give the user the option of creating a full email or an email that only consists of one line of text. All the pleasantries at the beginning and at the end of the traditional email message will not be included and the user will have just one line of text to deliver the message. The add-on will not replace the capability of writing a full traditional email, but give a choice to the user on how to communicate messages. Informal observation by the authors shows that 50% of email communicated could be handled in a one-line message.
3. Reducing the employee's time to sort through incoming email. Currently in both Microsoft Outlook and Outlook Express there is an inbox assistant that is controlled by the user to sort

incoming email into a folder defined by the user. The problems with the system are the rules are static and the majority of users do not use the facility. The authors have started a project to create an intelligent inbox assistant that will learn through a user rating system. The intelligent inbox should cut down on the time the user spends on sorting their email. Whilst the intelligent inbox is learning the user will have to rate each email in order of priority. The system will learn to sort the email according to the users preferences. If an email is prioritised incorrectly by the system the user can re-prioritise it and the system will learn the new rule for next time.

7. Conclusions

The Danwood Group performed their communication measurement programs within the company for 7 months. The authors realise that this gives a limited data set, but the results are already of interest. Further research as outlined in the previous section is needed to fully quantify the costs and benefits of email relative to traditional communication media. However, the company has taken significant steps forward in the research and already has indications on how to increase employee productivity.

This pilot exercise has been successful in showing the value of carrying out a cost-benefit exercise on the company's IT infrastructure. While the results are not yet complete the study has already increased the understanding of use of IT within the organisation. The analysis has also been a useful learning exercise for the company. It has shown both the value of obtaining metrics on their activities and the difficulties involved. It has also shown that for a cost benefit exercise to be effective it is necessary to put as much effort into obtaining data on the alternatives to the IT being evaluated. The company has also learned that IT cannot simply be evaluated in isolation, but as an integrated part of the company processes it must be studied in conjunction with the effects on the surrounding people and environment.

The advantage of email is that the electronic medium lends itself to measurement through which companies can then act in producing usage policies and providing education to try and reduce wasted time and improve employee productivity.

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