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Market Insight Paper

The Impact of Network Downtime on Business Today

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Foreword by Peter Titmus, Managing Director,
Networks First Limited

Just how important is IT infrastructure maintenance to most businesses? Given the rise of online trade and tight links to suppliers and customers, it is, surely, becoming ever more critical. Add in the increasingly critical role of IT in meeting escalating compliance requirements, from Sarbanes Oxley to Turnbull, and it is essential that IT solutions are not only robust but that downtime is minimised.

In an environment where some companies estimate the cost of downtime at £1 million per minute and the compliance implications of network failure are potentially devastating, Networks First has found it increasingly difficult to understand how companies can justify their failure to undertake the simple due diligence required to ensure that their significant IT investment is appropriately supported and maintained.

For the service provider, working on a low investment business model that builds in high levels of customer churn, such failures in service delivery are inevitable. Indeed, it is estimated some providers are failing to meet upwards of 40% of all service calls. Can UK organisations really afford to take such a high risk? Yet many organisations appear to be taking a less than rigorous approach to service provider selection in this area, opting naively to believe the promises of a growing number of low cost operators without pausing to assess the implications to their business of service failure.

Does the risk of even one additional hour of business downtime really warrant a 20 percent at best saving in annual maintenance fee? Perhaps for some businesses it does – but given the current economic and regulatory landscape, it is unlikely. However, no organisation can make that assessment without a real understanding of the short and longer-term impact and real costs to their business of such downtime.

The aim of this project was to identify the tangible and intangible costs of network downtime and to provide companies with a tool to discover for themselves the probability and real cost of downtime in their organisation. The end result is a **Network Downtime Calculator** which is easy to use and accessible online. We would like to thank Warwick Business School for their assistance in helping us achieve this and hope that you will find the results of the research conducted of interest.

To use the online Network Downtime Calculator, please visit
www.networksfirst.com

Background

A network unavailable for even a relatively short period of time can represent a substantial loss to a business. While the economic consequences of network downtime are a primary concern, the exact costs of downtime are rarely quantified. The cost of downtime is subjective and invariably contains a wide range of constantly changing variables such as transaction volume and end-user access requirements. Thus many organisations make no attempt to accurately estimate downtime costs.

In the summer of 2006, IT network support services company, Networks First commissioned Warwick Business School to conduct a study on the cost of network downtime and to calculate the true cost of this to a business. This research was run over a period of six months up to January 2007. Networks First chose Warwick Business School because of its expertise in business and organisational research and the knowledge students and tutors would therefore be able to bring to the project.

Key conclusions from data gathered via the online Network

Downtime Calculator

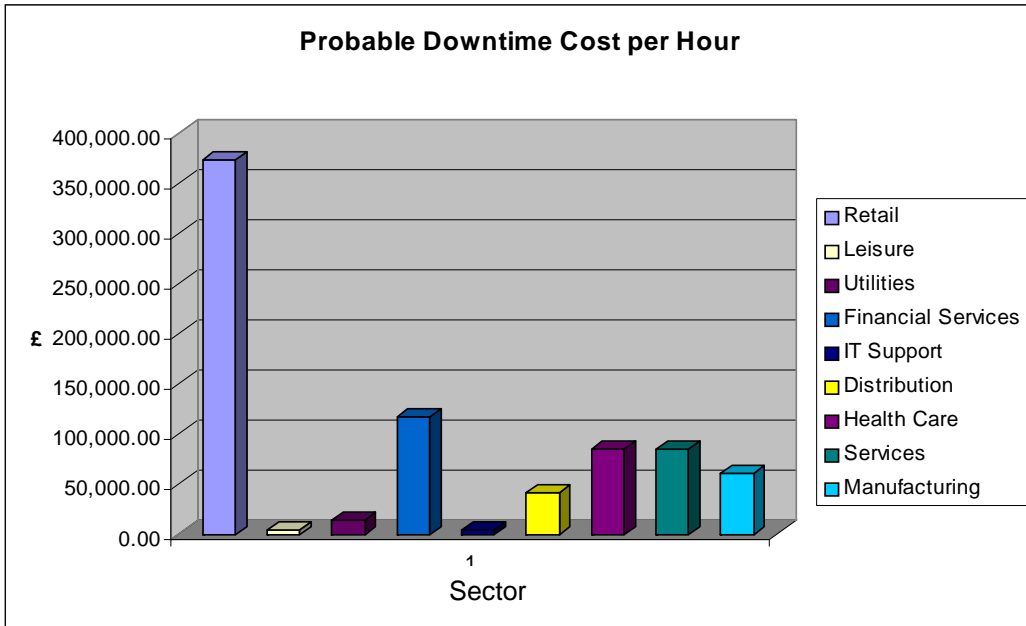
Networks First gathered results from seven different market sectors, including, retail, leisure, utilities, and local government.

- Across the seven sectors the average number of downtime hours per annum was 37.1.
- Employee numbers ranged from 50 – 26,000 people.
- Companies with annual turnover of £4.1m to £100m completed the online questionnaire.
- The retail sector had the lowest probability of downtime but a high cost of downtime per hour if the network did fail. This may be because employees

dependent on network uptime are unable to process transactions or locate stock. Packaging which is automated through computer systems relies on 24 hour up time; this example was seen through the data received by an online retailer.

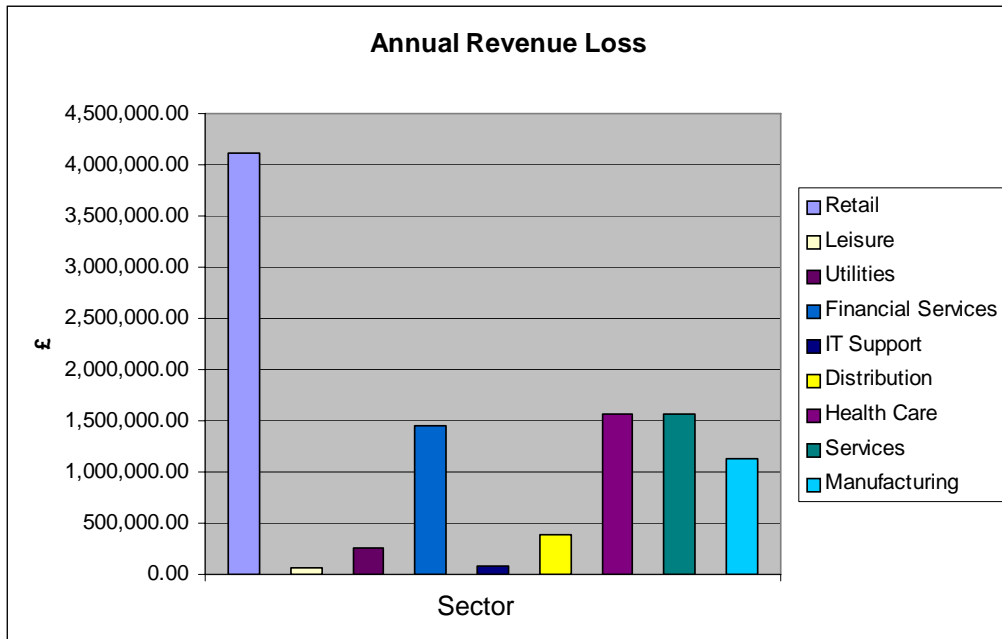
- The average annual number of hours a retail network is down for per annum was 40.
- The average cost of downtime for all vertical markets that completed the calculator totals £7122.94.
- The highest sector cost for employee downtime was IT. The lowest was the utilities sector. This is because many IT companies rely on their network to support customers. The drop in VPN lines means faults on remotely monitored networks are missed, therefore SLA's are broken and penalty payments are enforced.
- In the distribution sector the value of the average sale was greater than any other sector.
- Customer retention can be affected by network downtime. If a company is unable to support its customers the loss in confidence may cause them to leave. If this happens too frequently the loss of business will affect revenue and ultimately therefore the stability of the company.

Probable Downtime Cost per hour by sector



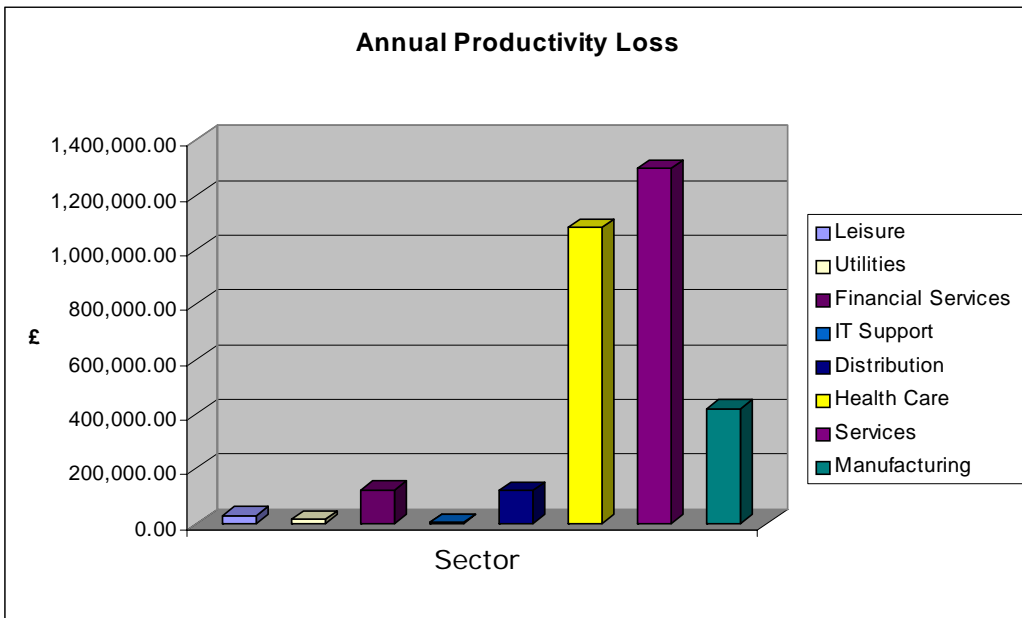
- The retail sector is particularly at risk, with an average probable downtime cost of over £350,000 per hour. This is more than three and a half times greater than finance, which itself faces downtime costs of over £100,000 per hour.

Annual Revenue Loss



- Other sectors at significant risk from network failures are finance, services and healthcare.

Annual Productivity Loss



- In general, the larger the difference between annual revenue loss and cost per hour of downtime.

Business dependence on IT networking

The past two to three decades has witnessed a high dependence on IT infrastructure by businesses. Interactions ranging from reserving airline seats and maintaining financial databases to trading goods online are dependent on the use of IT networking. The success of most organisations lies on their ability to communicate information on a large scale where factors such as time, accuracy and security determine success. The more reliable and advanced the networking infrastructure, the higher the efficiency of transferring information. [1]

A business in this situation can witness a considerable monetary loss due to the unavailability of a network for even a moderately short time scale. Networks play a crucial role in the business and must be well equipped to perform even when a failure occurs.

Due to the vast expansion of the Internet as well as internal Intranets, one of the main goals of most organisations is to add resiliency to their networks in order to achieve a greater amount of uptime with regard to their servers and network.

The heavy dependence of networks in today's business world means that a network breakdown can prove costly. It is advisable for an organisation to critically plan and design networks so damage can be reduced to a minimum. Such networks are known as resilient networks and prevent a complete network breakdown even when a key link has been damaged. The network is designed in a manner where it is equipped to switch to a back up link when one of the links fails to operate and when the failed connection is restored the network switches automatically back to its original flow.

Network Failures

The cost of a network failure can be estimated by considering the time required for the network to be repaired. It is essential to analyse the different possible causes of a network breakdown. Each scenario is likely to have a different impact on the time a network remains down as well as the number of users affected. For example resilient networks will have a smaller impact when compared to a non-resilient network because the former has a back up mechanism that allows the continuous flow of data even when one component is damaged.

The other significant factor is the dependency of one department on another. Often in large businesses a department functions from the data generated by another. If the network for the department that generates data fails, the other department will also fail to perform its activities.

As a result of networks not being able to be used, three situations may occur.

A network failure has occurred	
Cause	Effect
1.Inability of employees who rely on IT to work	A decrease in work productivity
2.The loss of interaction with customers via email	Decrease in customer service, loss of reputation and decrease in work productivity
3.Customer inability to access information	Possible loss of reputation and customer service

During a network failure the amount of work produced declines. A decrease in productivity can cause a delay in the service provided by a firm, which can lead to customer dissatisfaction. In some cases time is a crucial aspect and the network failure results in a failure to deliver a product or provide a service on time.

Unavailability of a service to customers can result in customer dissatisfaction. Customer loyalty can play a major role in customer retention but it can be lost if a service continually deteriorates.

Types of Business Loss

From the research conducted, losses associated with network downtime were broadly classified into the following two categories:

Productivity losses

These costs covered factors that affected the applications of an organisation along with the various processes that develop around those applications and the departments that are dependent on them. Productivity losses can affect individual users or entire workgroups. They can be estimated by using variables such as the annual revenue of the firm, number of employees, number of working hours and days etc. The productivity losses can be determined by performing calculations that can be used to determine the duration of the downtime along with an estimation of the probability of a failure to occur. *(Pisello, Quirk, 2004)*

Business losses

These are composed of sales opportunities denied by the network downtime, loss of customer loyalty, poor market reputation and other indirect costs. It is difficult to quantify the business losses as they can vastly vary due to the different business orientation of each firm. The business losses can be determined by using a qualitative approach that involves a more linguistic or less mathematical (soft Operational Research) method in solving the problem. *(Pisello 2004)*

Business Impact Analysis: measuring the business loss

The business impact analysis (BIA) approach was used to reveal the costs of downtime and business disruptions. The purpose of BIA was to identify the internal and external impact a network failure could have on the various business functions. Information to complete the BIA was gathered through primary research methods such as questionnaires and/or interviews. The information obtained was then used to analyze the different impacts associated with downtime through the causal mapping approach.

The following are key steps that were taken for the Business Impact Analysis process:

Step 1: Defining the core business functions

Identifying the core business functions that are associated or dependent on the use of IT. They can range from a process or product to the service provided by a firm, i.e. emailing facilities, internet research, and stock inventory. For an online company the ability for financial transactions to take place is a core business function.

Step 2: Prioritising business functions

After identification of the core business functions it was necessary to prioritise which would be affected when a network breaks down. This can be achieved by determining the process and time scale for the restoration of the network. Some functions will have a higher cost of interruption compared to others. For a shipping company, the package tracking application is the critical business function that must be restored immediately. [2]

Step 3: Categorising the impact of network downtime

The impact of network downtime can be classified into the following four main categories:

- **People** — How many employees will be inactive when a network goes down? (this can take into account the cost of paying them)
- **Property** — What equipment will be required to be replaced?

- **Systems** — How much time would it take to recover the system for the business to continue normally? (the probability of a particular failure to occur and the time it takes to get repaired)
- **Data** — Identifying the data that is crucial and essential to ensure business continuity — (how will the essential data be recovered?)

This classification provided a general layer that can be applied in all the different sectors of industry. [3] All four categories mentioned above can be used in any vertical market e.g. retail, public sector, professional services and manufacturing.

Step 4: Classifying outage types, frequencies, and duration

It is important to analyse the devices a network is dependent on as some devices have a high cost of downtime. Determining downtime related to networks also required knowledge of the hardware and software configurations that provide support to the core business functions. The key task was to identify the possible points of failure with respect to the hardware and software configurations and then quantify their hourly costs associated with the system interruptions. The process of quantifying hourly costs was achieved by identifying the types of failures associated with the equipment used and then finding out their frequency and duration.

Software information

Costs per downtime hour

The costs per downtime hour are costs that contribute towards the productivity loss of a business. These can range from the costs of paying employees who become inactive during a network breakdown to the number of customers lost as a result of network breakdown.

The variables that were required to be input by respondents are:

- The total number of employees in the organisation
- The percentage of employees affected by the downtime
- Average cost of an employee per hour
- Annual revenue of the firm
- Fraction of revenue affected by downtime
- Total number of working days in a year
- Number of working hours in a day
- Annual number of sales/customers
- Duration of failure

The variables above can be used to calculate the costs of downtime for the first hour as well as the loss incurred for the duration of the failure. The following are the costs that can be calculated per downtime hour:

1) Hourly Corporate Contribution loss

Costs linked with the productivity loss of a firm. The IT dependent business functions become inoperative and productivity stops.

2) Employee Downtime Cost

When a network failure occurs employees dependent on the use of IT become inoperative but still require salary payment.

3) **Lost Data and Rework Cost**

When a network fault is repaired the IT network is not resolved instantly. IT staff are required to restore all configurations before the IT dependant business operations become functional.

4) **Sales/Customer Opportunity Loss**

When network downtime occurs customers are unable to access information which could result in customer dissatisfaction or the loss of a customer. The inability to interact with clients or the delay in delivering a service or product can also result in the loss of sales.

The probable downtime cost can give an estimate of the tangible downtime costs.

Finding the Annual Revenue Loss

As the project revolves around the impact of network downtime this section focuses on employees that are dependent on IT. In order to calculate the loss of revenue information on the following variables is required:

- The annual number of hours of failure or downtime experienced by a firm
- The total number of employees in the firm
- The percentage of IT dependent employees
- Average % of productivity lost by the IT dependent employees
- Annual revenue of the firm
- Total number of working days in a year
- Number of working hours in a day

The variables above can be used in a formula that gives the total annual revenue loss an organisation can suffer.

Annual Productivity loss:

A company's business target or competitive advantage can be affected if its productivity decreases. This can occur if the employees are unable to access the network resources. The productivity loss with respect to a network outage can be calculated by using the following variables:

- The annual number of hours of outage or downtime experienced
- The total number of employees in the organisation
- The percentage of employees affected by the downtime
- Average % of productivity lost by employees
- Average hourly cost of the employees
- Annual revenue
- Total number of working days in a year
- Number of working hours in a day

The productivity loss can be broken down into two categories:

- Productivity lost by IT dependent employees
- Productivity lost by non- IT dependent employees

Conclusion

Network downtime can affect a company in a variety of ways, the most obvious being financial. The software produces an estimate of the cost a network failure could have on a business. The ability to complete the software requires data from the respondent on employee statistics, the occurrence of current network failures and financial information.

Downtime can also cause a loss in company reputation and customer loyalty. For example a customer waiting to pay in a reputable high street store while the tills are down may cause short-term loss of customer loyalty. While the same situation in a new store may cause some customers not to return. This cause and effect can be best illustrated through an online store not being able to process a transaction.

Cause	Effect
Not being able to process transaction	Loss of customer to another store. Short or long term loss of business.

The impact of downtime on any network will not be the same in all vertical markets. Examples of vertical markets include, retail (uptime during key sales periods is essential i.e. Christmas), public sector (local councils have government targets to meet on network uptime), professional services (loss of income and reputation), and manufacturing (computerised machinery will stop production or cause stock inventory updates to be unavailable).

There are a number of benefits a company can achieve if they prevent the failure of a network and carry out business functions at a maximum uptime rate. By employing effective risk management techniques an organisation can prevent downtime, retain customer loyalty, improve financial performance and protect its corporate reputation

It is vital for business executives to realise the importance of the impact a network failure can have on the revenue of a business. Even within the IT industry however, some network managers are unaware of the significant loss their organisation may suffer due to a network break down and often over look the economic factors of updating the network. To be able to quantify the monetary value accurately, IT managers need to think about the number of employees who would be unable to function because they are IT dependent.

Research methods

Research methods used during the project include the Markov Model, causal mapping and Business Impact analysis.

Markov model – an engineering and mathematical modelling measuring availability. The Markov model takes into account the different interdependencies, and the probability of one device affecting another.

Causal mapping – a popular operational research technique used for expressing and integrating ideas, issues or decisions to define complex problems.

Business Impact Analysis – to identify internally and externally the impact a network failure can have on business operations.

References

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About Networks First

Networks First's tailored network support service is based on service level agreements aimed at restoration of network services rather than the traditional break-fix approach. The service incorporates: escalation procedures, access to highly trained accredited engineers, remote diagnostics, customer questionnaires following every fault call and comprehensive customer reporting. Customers also benefit from first class network support 365 days a year, with access to 24 hour services throughout the UK.

About Warwick Business School

Founded in 1967, Warwick Business School is one of the most successful and highly regarded business schools in Europe. The largest department of the well-regarded University of Warwick, it has a turnover of over £34million. The current student population of 1,186 undergraduates, 182 research students and 3,164 taught masters, MPA and MBA students, come from 111 countries worldwide.

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