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The Productivity of Workers with a Disability: Evidence Dispels Past Myth; Entrepreneurship Plans Future Reality.

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Are Workers with a Disability Less Productive or Less Understood? An Empirical Investigation from an Entrepreneurial Business Planning Perspective.

ABSTRACT

This study investigated selected work-performance data of a large call centre using the entrepreneurial business planning paradigm as a theoretical framework and tested the hypothesis that levels of productivity would be different for each group between workers with a disability and workers without a disability. On five measures of productivity, no significant differences were discernible but on a sixth measure, length of employment, it was found that disability workers remained in employment significantly longer. These results strongly refute the ‘intuitive wisdom’ that workers with a disability are less productive. The results support a growing body of corporate experience and descriptive research indicating that workers with a disability perform as well as or better than their non-disability colleagues. Yet workers with a disability remain disproportionately under-employed. The key to translating the growing evidence of this research into higher levels of employment of workers with disabilities will depend upon employers adopting an entrepreneurial approach to the planning of human resource management.

Key Words: Disability, workers, productivity, entrepreneurship, entrepreneurial business planning.
INTRODUCTION

The Research Problem

The purpose of this study was to investigate selected work-performance data of a large call centre to detect any significant productivity differences between workers with a disability and workers without a disability. The research was conducted from an entrepreneurial business planning perspective in order to enhance both ability to understand and capacity to utilise a possibly misunderstood human resource. The null hypothesis was that there are no differences in average productivity between the two groups of workers.

Much of society in general and many employers in particular hold it as axiomatic that workers with a disability are less productive than workers without a disability. If this seemingly self-evident proposition is both strongly believed and demonstrably wrong, workers with a disability are an under-utilised human resource. This under-utilisation might give rise to an entrepreneurial opportunity. Organisations understanding the true value of workers with a disability might plan and derive resource benefits not available to competitors operating on false assumptions and averse to the alleged risks of utilising people with disabilities to perform important tasks. So, this study had its origins in the contextual development of one simple question: is the general assumption that workers with a disability are less productive true or false? Guided by the developing theory of entrepreneurial business planning (EBP), a focused empirical investigation emerged. Theoretical context was provided by the EBP paradigm (Hindle 1997; Legge and Hindle 1997). The empirical context was provided by data randomly sampled from the employment-performance records of a call centre run by Telstra, Australia’s largest telecommunications company.
Definition of Key Terms and Problem Orientation

A *call centre* is defined as a ‘managed environment where telephone is used systemically to provide value added contact with customers and suppliers ‘(Hallis: ?). The definition of *disability* is ‘a condition caused either by accident, trauma, genetics or disease that may restrict a person’s mental, sensory or mobility functions to undertake or perform a job in the same way as a person who does not have a disability’ (ref ?). *Entrepreneurship* is ‘the creation and management of a new organisation designed to pursue a unique, innovative opportunity and achieve rapid, profitable growth’ (Hindle 1999: ?).

For the purposes of this investigation, the essential characteristic of entrepreneurship is its emphasis upon what might be called ‘opportunity-driven management’. This is a managerial approach not constrained by resources currently controlled but where efficient and effective deployment of the minimum feasible set of required resources is an essential component of planning and operating an enterprise (see Stevenson, Roberts and Grousbeck: 8-11 and 22-28). An entrepreneurial business plan is the key tool for securing this minimum feasible set of required resources (Hindle 1997: xx). Detailed definitions of the entrepreneurial business plan as an *output*, entrepreneurial business planning as a *process*, and the EBP paradigm as an *operational framework* are provided in a following sub-section of the paper.
The Disability-Productivity Literature: Alleged Productive Capacity Unmeasured and Unused

American and Australian figures suffice to demonstrate that workers with a disability constitute a heavily under-utilised resource in developed countries.

In the USA 11.4 million people with work disabilities do not participate in the labour force and in addition there are 723,000 who are actively looking for work. This number alone represents a 13.4% unemployment rate among jobseekers with a disability - more than twice as high as the 5.6% unemployment rate for people without disabilities (LaPlante et al. 1998). In all, only 27.8% of working age people with a disability have jobs (4.7 out of 16.9 million) compared to 76.3% of those without disabilities. Among working age unemployed people with a disability 79% say they would like to have a job. Australia also has an opportunity gap. The Australian Bureau of Statistics (1993) reports that 3,176,700 or 18% of the Australian population have a disability. The workforce participation rate of people with a disability is 46.5% compared to the participation rate of 76.9% of people without a disability. These under-utilisation rates occur in an environment where, as Lankard says:

‘The cultural, educational, economic and societal diversity among members of the workforce will continue to force organisations to look to unique staffing, scheduling, and training policies and practices that will attract qualified workers and meet their personal as well as professional needs.’ (Lankard 1993: 1)
Such corporate and academic research as has been done indicates both favourable attitudes and positive performance when workers with a disability are given a chance.

Concern that persons with disabilities are often eliminated from consideration for jobs because of erroneous stereotyping led Smith and others to a study the issue. They found, unsurprisingly, that both attitudes towards and performance appraisals of workers with a disability were more positive from employers who had previously worked with or supervised people with a disability. (Smith et al, 1985: 39-41). Wolfe found that managers at DuPont who had worked with people with a disability rated their performance at levels comparable to employees without disabilities (Wolfe 1973). In a qualitative study, Johnson et al. (1988) found that despite many employers perceiving employees with physical disabilities as having positive work performance capacity, there was still reluctance to employ them because of worries about mental, emotional and communication stability.

Some corporations have transcended these concerns, expressing and acting on strong belief in the capacities of workers with a disability. Sears, Roebuck and Company has been running affirmative action programs for people with a disability since 1947, and now employs people with a disability at all levels from repair technicians to attorneys. Sears also monitors their progress to ensure they are being promoted on the basis of their performance. IBM started teaching typing and key-punching to the blind as well as persons with cerebral palsy in the 1940’s. As long ago as 1972 IBM began a major program to train and place people with severe physical disabilities as entry-level computer programmers. This initiative now embraces 16 centers throughout the United States. IBM’s efforts have also included developing and
marketing new products for people with a disability, such as computers that can print Braille.

One major and continuing corporate attempt to assess, systematically, the contribution of people with a disability to a workforce has been maintained by the DuPont Corporation in the United States. A series of studies under the heading, Equal to the Task - A Survey of Employment of the Handicapped, have been conducted and internally published in 1958, 1973, 1981 and 1990. The studies do not use inferential statistics but report simple percentages of those surveyed. DuPont found that using the data collected in 1973 from 1,452 employees with a disability and in 1981 from 2,745 employees with a disability, the diversity of their impairments did not adversely effect safety, job duties or attendance. What stood out, was the uniformity of their performance irrespective of particular disabilities (DuPont 1981: 5-8). DuPont stated that ‘the significance of the 1981 and earlier surveys is the picture that emerges of workers with disabilities as an important human resource’. DuPont lists a number of individual case studies that demonstrate how employees with a disability have mastered a broad range of occupations and how many, through uncommon ingenuity, have overcome serious limitations in order to pursue their professions. (DuPont 1981: 10 –16 and 1990: 8 -19).

A small volume of mainly descriptive academic research supports the faith of pro-disability corporations.

Based on a study of the responses of 65 supervisors in human service agencies and 27 employers, Reisman and Reisman (1993) found that people with a disability compare favorably to the general population in terms of some basic work habits. Zemans, and Voelckers (1994) argued that there are long term benefits to employing the disabled. Rusch, Wilson, Hughes and Heal (1994) found that interactions between workers
with disabilities and workers without disabilities are remarkably similar. Zivolich (1997) reported that Pizza Hut’s laudable initiatives for persons with severe disabilities over 10 years, have in the company’s belief, resulted in substantial financial benefits. Levy, Jones, Jessop and Levy (1992) studied 1,140 CEOs of Fortune 500 industrial and service corporations seeking to measure their attitudes to employing people with severe disabilities. 16 predictor variables were chosen as representing respondent characteristics, and the mean scores recorded on attitude scales by corporate executives responsible for hiring decisions were analysed. The findings suggest, once again, that it is positive contact around work itself that determines the attitudes towards employability and that attitudes towards people with a disability are also similarly effected by such employment contact.

Outside corporations, the American population is favourably disposed. A 1991 Harris poll showed that American people recognise the potential contribution of workers with a disability. Eight out of ten people agreed that people with a disability have under-used potential ‘to contribute by working and producing’ and only one out of ten disagreed. (Brown 1993: 60-62).

So, despite the perceptions and good intentions of pro-active corporations and the general public, why is it that workers with a disability constitute a heavily under-utilised resource in developed countries?

A clear theme emerging from the productivity/disability literature is that ‘you have to try it to appreciate it’: that ability to judge the capacities and productivity potential of workers with a disability is a function of experiencing their performance in the work environment. One absent theme in the literature is evidence of any willingness on the part of small, entrepreneurial and early-stage businesses to try using workers with a
disability. All the descriptive studies come from large corporations. This is dangerous because it is well-established by research too numerous to cite that the majority of job growth in an economy will come from entrepreneurship: high-growth-potential new ventures. It is a reasonable inference that entrepreneurs may be making the judgement that, with so many risk factors already militating against new venture success, it would be foolhardy to add the risk of lower employee productivity. These two themes converge on one problem.

The problem lies with employers’ – and especially entrepreneurial employers’ - preparedness to take the alleged risk of employing people with a disability in the first place. And here, research to date has not provided truly hard evidence of the desirability of ‘taking the plunge’. Existing research does not encourage the entrepreneur to be entrepreneurial. Entrepreneurs are attracted to challenges not risks. No study until this one has formally tested, in a dispassionate, empirical, quantitative manner, the hypothesis that there is no difference between the average productivity of workers whether or not they have a disability.

An empirical test of this ‘no productivity difference’ hypothesis will be valuable. If there were a clear, empirical demonstration that the alleged risks of employing the disabled are not risks at all, this might enhance the likelihood that the most important constituency of all employers – the entrepreneurs of potentially high-growth new ventures – will increase their willingness to employ people with a disability. The consequences for employment could be profound.

**The EBP Paradigm as a Theoretical Framework**

Any examination of the productivity of workers with a disability runs the risk of being embroiled in some highly emotive issues. ‘Disability’ at any
level of debate is a philosophically, socially, morally and anecdotally complex concept. On the other hand, ‘productivity’ at its most general conceptual level, is relatively simple. It is a description or measure of economic performance: not social, moral or any other kind of value. At its crudest, productivity is a ratio: a number obtained from dividing the yield of outputs by the cost of inputs. Of course, no sensible social scientific approach to the productivity of human beings – with or without a disability - can operate in either a social or a moral vacuum. However, a concentration on quantitative performance comparisons between people with and without disabilities can be helpful if it is recognised as merely a first step to an integrated approach. This is especially so if a structured empirical investigation can help to dispel a myth. The balancing trick to is to find a theoretical framework where focus on measuring productivity is sharp but context is still rich enough to support discussion of extended implications.

The theory of entrepreneurial business planning provides a useful balance between the requirement for hard, empirical numbers and an ability to interpret those numbers as meaningful social science. Hindle (1997) sought to put EBP on a sound theoretical basis. He provided the following core definitions (12).

'Entrepreneurial Business Planning (EBP) is the process of convincing investors of the desirability of investing in a new venture by articulating and programming the economic consequences of a strategy which determines relevant antecedent variables, expresses them in holistic relationship and subjects them to sensitivity analysis in order to maximise the probability of a desired change of state.'
'An Entrepreneurial Business Plan is the formal argument used to secure, from prospective investors, resources required for a proposed entrepreneurial process.'

These definitions clarify the research problem. The task of getting an employer to make that first crucial decision to ‘give a worker with a disability a chance’ is an example of soliciting an investment decision in an entrepreneurial context. In this case, the ‘plan’ is very abstractly conceived as an argument to convince employers to make an initial investment in employing a worker with a disability. The EBP paradigm is appropriate.

In general, the entrepreneurial business planning paradigm at any given time will be the accepted mixture of theoretical and practical principles which best describes, explains and justifies EBP as a distinct field of human endeavour and posits rules for the creation of a successful entrepreneurial business plan. To clarify the many issues involved in understanding the EBP paradigm, Hindle developed the ‘interrogative matrix’ illustrated in table 1, below. The four column headings - boundaries, laws, success rules and instrumentation requirements - are the four essential elements of any paradigm. The three row headings - communications, control and simulation - represent the three roles of a plan, as defined by Mintzberg (1994, *passim*) and others.

**Table One**

**The Questions Involved in The EBP Paradigm**
At any given time, the ‘state of the art’ of the EBP paradigm will be defined by the answers to questions contained in the various cells of the matrix. With increased knowledge and research, the paradigm will develop by providing gradually changing answers to the key questions contained in this framework. The current state of the EBP paradigm – i.e. the replacement of all the question marks in figure 1 by answers - is described in detail in Legge and Hindle (68-94) and a summary in matrix format is attached as appendix 1. The prevailing EBP paradigm is a complex network of research-derived relationships involving seven boundary conditions, twelve laws, six success rules and two primary instrumentation requirements.

However, what is most important for this study is not every item of paradigm detail: the current specific answers to any of the key EBP questions in the framework of figure 1. It is the overall managerial perspective that EBP provides on the issue of resource evaluation. At its essence, EBP is focused on assessing, acquiring and managing resources – including human resources - in the context of opportunity management. This is an appropriate perspective for investigating the possibility that workers with a disability may be a misunderstood, opportunity-laden resource for organisations capable of an entrepreneurial approach to management. The paper demonstrates that the EBP perspective proved

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THEORETICAL JUSTIFICATION: Why does this paradigm contain these prescriptions?
useful both for designing and interpreting the empirical aspects of this research.

**Measuring productivity in an EBP context**

An initial sharp focus for this study was established by taking a subset (three laws) of the prevailing EBP paradigm and using it to develop an empirical approach to the disability/productivity question. Subsequent ability to discuss and interpret results broadly was guided by the totality of the prevailing EBP paradigm.

Three laws of the prevailing EBP paradigm (Hindle 1997: 122) are set out below.

*Law 4.* Identify all major plan objectives, primarily as financial targets.

*Law 5.* Define the investment offer(s) as an expected return on investment.

*Law 7.* Provide comprehensive statements of opportunities and risks.

Any decision to employ a worker with a disability is primarily concerned with the balance between opportunity and risk. To assess that balance requires the ability to specify financial objectives and calculate an expected return on investment. An ROI calculation relies on financial targets. Financial targets for resources are dependent upon productivity. Thus, from an EBP perspective, any measured decision about the value of workers with a disability must start from establishment of some measures of productivity.

The entrepreneurial business planner’s expectation of employee productivity is a construct composed of measures in five distinct categories. For ease of illustrating the distinction between these five
measurement categories, the simple analogy is made of the worker being a male ‘digger’ whose task is ‘digging holes for fence posts’ (illustrations are in brackets). The measurement categories are:

1. Measures of Experience. (How long have you been a digger?).
2. Measures of Attendance. (OK, you’re experienced but I won’t get the benefit of it if you are often absent from work.)
3. Measures of Task Engagement. (The ratio of digging time to paid time – digging versus tea breaks etc.)
4. Measures of Task Efficiency. (OK you’re digging – not having cups of tea – but is the hole getting deeper or are you just resting on your spade?)
5. Measures of Task Effectiveness. (OK, you’re making holes but are they deep enough, in the right place, well-constructed etc?)

The method section of the paper (below) shows how these measurement categories were represented by specific operational variables.

The Investigative Context: Anatomy of the Call Centre Industry

Increasingly, organisations are gaining efficiencies by establishing or subcontracting centralised telephone call centres. The first commercial call centre began in America in 1968 when a US federal court judge ordered the Ford Motor Company to establish free phone lines to facilitate recall of a faulty car. Today, the telemarketing and call centre industry is one of the fastest growing industries worldwide and in Australia. For many organisations, call centres provide the entry point for customers to an organisation: they are the focus of the organisation’s service provision. Call centres cost companies about half what it costs them to communicate in writing and play an increasingly important role in improving customer retention rates, assisting with customer acquisition
and generating increased sales (Hepworth and Co: ?)\(^1\) In Australia, in 1998, the industry was reported to be worth $1.8 billion a year, growing at an annual rate of over 20% and employing over 40,000 people\(^{\text{ref}.2}\) Ibis Research has forecast that currently in Australia, 3 of every 1,000 new jobs created are in a call centre. Ibis predicts that, by no later than 2003, the figure will have increased tenfold to 3 out of every 100 new jobs created \(\text{(ref).}^{3}\)

The call centre environment was chosen for three reasons.

1. Call centres constitute one of the fastest growing industries in the world and the features of the work environment are similar irrespective of nation, language or culture. Thus, any findings might have a higher illustrative value than findings from a less cosmopolitan environment.

2. A call centre is a highly monitored environment where accurate record keeping of work-performance and productivity data is highly automated. This reduces the chance for bias and human error in the data recording process. Each individual employee's performance is closely monitored and recorded electronically in the same way, for every hour of paid work and so meaningful comparisons between people with a disability and people without a disability can be conducted.

3. People with a disability make up 14 % of Australia's workforce and 50% of these are currently unemployed \(\text{(ref).}^{\text{ref}}\). Many call centres have up to 33% of their workforces composed of people with a disability and are large places of employment. This makes them better providers of sample sizes conducive to effective quantitative research.

\(^{1}\) 'Canadian Society of Consumer Affairs Professionals Tollfree Number Study' 1996
Hepworth & Company Ltd

\(^{2}\) call centre Staff Salary Survey. Hallis May 1998
METHOD

General Research Design

The empirical study was a simple comparison of means design using t-tests, supported by the non-parametric Mann-Whitney U test as a precaution against the distribution of results not coming from a normally distributed population. The mean performance of two samples (one representing the call centre’s population of workers with a disability and one the population of workers without a disability) were compared on six variables. The analytical aim was the same for each performance variable: to gather evidence against the null hypothesis that there was no difference between the mean performance of workers with a disability and workers without a disability.

Data Source, Sampling and Collection

The research reported in this paper was conducted using Burwood call centre (hereafter ‘Burwood’) as a sample frame. Burwood is operated by Telstra, Australia’s largest telecommunications company. In July 1998, Burwood employed approximately 250 people, with and without disability. Australiawide, Telstra has over x call centres ranging in size form more than 800 operators to less than 10. In metropolitan Melbourne (a city of over 3 million people) Telstra has x call centres ranging in size from over x operators to less than y operators with an average employee complement of z. After agreeing to provide productivity data to the researchers, Telstra nominated Burwood as the sample frame, because it was a ‘typical, large, metropolitan call centre’. Of course, this does not

3 Ibis Research 1997
qualify the choice of Burwood as a random selection. However, from this point on, random sampling was employed.

Within the Burwood call centre, three samples were drawn at random. Taking three samples rather than one was a decision motivated by ethical considerations on the part of Telstra management to help ensure respondents’ anonymity. First a sample of 200 names was drawn to supply data for the first variable – ‘length of service’ (see next section for details of all variables). Second a separate sample of 200 names was drawn to supply data for the second variable – ‘absent days’. Finally, a sample of 65 employees was used to provide data for the final four ‘efficiency and effectiveness’ variables.

Once the samples were drawn by Burwood’s centre manager, recorded performance data were ordered from Telstra’s central records department. The records covered all operators employed in Burwood as at the 8th of July 1998, ensuring that neither Telstra nor the researchers were infringing privacy laws, or any ethical standards required of responsible social research. Privacy protocols were established in conjunction with Telstra’s national call centre manager, Mr. Robert Holland, who consulted with Telstra’s legal team.

Assumptions

1. Currently 68% of call centres intend to base the future remuneration of their staff on workers individual performance. This study assumed individual performance would increasingly be a factor in the employment of staff.

__________________________________________________________________
2. Workers are employed and assessed on the basis of their capacity to undertake call centre telephone operations, and not their capacity to move into other staff roles in the call centre or the larger organisation.

3. The skill shortages currently faced in the industry will continue, leading to the recruitment of new employees into the sector.

4. Advances in technology will not significantly change the basic competencies or performance required for call centre operators.

5. The environment at Telstra's Burwood call centre is generally representative of call centre technology and staff performance.

6. No environmental change or other influencing factor significantly affected established patterns and trends in performance during the data collection period covered by the research.

7. There are no significant differences in performance of permanent staff compared with part-time staff on a shift-for-shift basis.

Limitations

- This was a study with high internal validity and limited external validity. There is no reason to think other than that Burwood represents a typical Telstra call centre. However, Burwood was a convenience choice mandated to the researchers by Telstra. So, this study limits its inferential arguments to the claim that the three samples drawn from within Burwood were representative of the populations of disability and non-disability workers at this particular call centre – not beyond it. Accordingly, Burwood provides a quantitatively analysed case study rather than a quantitative basis for extrapolation to any larger populations.
of disability/non-disability workers. Further research from a larger sampling frame would be required for claims of greater generality to be valid.

- People classified as 'with a disability' were not sub-divided by degree or type of disability.

**Measurement Framework – Six Variables**

There was one variable of experience - *length of service*. This was literally a measure of the amount of time the respondent had been employed at Burwood, irrespective of the category of employment (part or full time). Sample drawn was 200. After data cleaning 192 usable cases remained.

There was one variable of attendance – *absentee days*. This was the number of absentee days the respondent had logged in the calendar year preceding July 8, 1988. Absenteeism was defined as the failure of operators to report for work when they are scheduled for work. This did not include operators who were away on recognised holiday, vacation, or approved leave of absences. Unplanned absences in the context of this research refer to absences that are recorded as unplanned by Telstra, these were consistent with the above definition. The most common explanations for absenteeism were sick leave with or without a doctor’s certificate and sick leave taken for a family member but excluding maternity leave. Sample drawn was 200. After data cleaning x usable cases remained.

The final sample was of 65 cases, comprised a ‘work section’ (which in turn consisted of four ‘work groups’) at Burwood, chosen at random from the four work sections which comprised the total Burwood workforce.
Raw data for these cases covered the months of May and June 1998 and included: ‘paid hours’, ‘logged hours’, ‘contacts made’, ‘upgrades per 100 calls’ and ‘new sales per 100 calls’. From this data, four composite variables were constructed.

There was one variable of task engagement - *logon ratio*. This was the subject's total hours spent logged on (i.e. actually making phone calls) for the months of May and June as a percentage of the total paid hours of every worker in all four groups.

There was one variable of efficiency - *contact efficiency*. This was the subject’s percentage of total customer contact hours for the period.

There were two variables of effectiveness. - *upgrade effectiveness index* and *newsale effectiveness index*. An ‘upgrade’ was defined as the sale of additional features of a service to a client already subscribing to that service at a more basic level. A ‘newsale’ was defined as the sale of a completely new service or product to someone not currently using it. Each index consisted of the subject’s sales-per-100-calls in May and June, averaged them, and then divided them by the averaged total of sales for May and June of the whole group.

**Hypothesis**

For each of the six variables the competing hypotheses were identical.

The null hypothesis, $H_0$, was $\mu_1 = \mu_2$:

*On this productivity measure, the mean scores of the two populations are the same: there is no difference in the mean scores of workers with a disability and workers without a disability.*
The alternative hypothesis, \( H_1 \), was \( \mu_1 \neq \mu_2 \):

*On this productivity measure, the mean scores of the two populations are not equal: there is a difference in the mean scores of workers with a disability and workers without a disability.*

A significance level of .05 was set, indicating the null hypothesis would be rejected if significance testing yielded p-values less than .05. The alternative hypothesis was deliberately made non-directional since no assumptions about the nature of any differences were hypothesised.

**Analytical regime**

The t-test for independent samples was chosen as the principal analysis method because it can effectively measure whether the differences in the means of two groups are significant, even when the sample sizes are relatively small, providing certain assumptions are met. These include:

- that the subjects used are randomly drawn from the population of interest;
- that the data are normally distributed within each group;
- that the variances of the two groups are equal.

It is also desirable to have similar size samples in each group since this leads to less risk of making incorrect conclusions with any small violations of the assumptions.

To support the analysis, the non-parametric Mann-Whitney U test was also applied to each variable as a precaution against any possible violation of the t-test assumptions. Finally, the four variables of efficiency and effectiveness were analysed in combination using a multivariate test.
RESULTS

The data were analysed using both the SPSS (version 9) and the Stata (version 5) packages. The non-directional independent samples t-test using pooled variance estimates was used to test for differences in means. The non-parametric Mann-Whitney U test for independent samples was also used in all cases. The tests for normality were based firstly on skewness then on kurtosis, and finally the two tests combined into an overall test statistic of normality (Stata Reference Manual 1997: 223-4 and D'Agostino, Balanger and D'Agostino, Jr. 1990). Levene's test for equality of variances was used.

Length of Service

The mean length of service for operators without a disability was 3.20 years, standard deviation = 1.400, n = 166 while for those with a disability the mean was 4.11 years with standard deviation 0.927, n = 30. The results from the two groups are summarised in the boxplots in Figure 1.

![Figure 1. Length of service for groups with and without a disability](image)
The means were significantly different, $t = 3.442$ on 224 df, $p = 0.0007$. Testing for normality we see, for skewness $p < 0.0005$, Kurtosis $p = .087$ with a combined index $\chi^2 = 21.34$, $p < 0.00005$. The test for equality of variances indicates a significant difference between the variances of the two groups, F-ratio variances of 2.6503 $p=.0105$. Hence, as the both the normality and equal variance assumptions of the t-test have been violated, a non-parametric test was carried out. The non-parametric results, supported the t-test findings $U = 1,773.5$, $z = 3.516$ $p = 0.00044$

This suggested a significant difference in lengths of service. Operators with a disability are likely to stay significantly longer than operators without a disability.

**Note:** Initial analysis identified two outliers from the operators without a disability (10.6 and 15.9 years) which was longer than the call centre had been established. These were removed from the final analysis of this variable.

**Days Absent**

The mean number of days absent for operators without a disability was 19.24 days, standard deviation = 18.365, $n = 158$ while for those with a disability the mean was 11.8 years with standard deviation 7.536, $n = 30$. The results from the two groups are summarised in the boxplots in Figure 2.
Figure 2. Number of days absent for groups with and without a disability

The means were significantly different, $t = 2.181$ on 186 df, $p = 0.0305$. Testing for normality we see, for skewness $p < 0.0005$, Kurtosis $p < 0.0005$ with a combined index $^2 = 62.31$, $p < 0.0005$. The test for equality of variances indicates a significant difference between the variances of the two groups, F-ratio variances of 11.000 $p=0.0011$. Hence as the both the normality as equal variance assumptions of the t-test have been violated, a non-parametric test was carried out.

The non-parametric results, do not support the t-test findings $U = 1940.5$, $z = 1.573$ $p = 0.116$. This different result may have been due to the t-test assumptions not being satisfied and/or the large differences in sample sizes, 158 and 30. The disagreement in test results means that days absent results are inconclusive. More extensive studies are needed to be statistically rigorous, but from the sample results obtained it is suggested that operators with a disability are likely to have less days absent than operators without a disability.

More conservatively, it is very safe to infer no difference in average performance.
Logon Ratio

The mean logon ratio for operators without a disability was 0.00784, standard deviation = 0.00303, n = 43 while for those with a disability the mean was 0.00688 with standard deviation 0.00324, n = 21. The results from the two groups are summarised in the boxplots in Figure 3.

![Boxplot showing logon ratio for groups with and without a disability](image)

**Figure 3.** Logon ratio for groups with and without a disability

The means were not significantly different, t = 1.164 on 62 df, p = 0.249. Testing for normality we see for skewness p = 0.015, kurtosis p = 0.477 with a combined index $\chi^2 = 6.07$, p = 0.0481 indicating this variable is close to satisfying the normality assumption. The test for equality of variances indicates there is no significant difference between the variances of the two groups, $F= 0.697$ p=.0.407. Hence both the normality as equal variance assumptions of the t-test have been satisfied for this variable. However for consistency with the other analyses, a non-parametric test was also carried out. Its results support the t-test findings $U = 389$, $z = 0.894$, p = 0.372.
This suggests there is no significant differences in the mean logon ratios for operators with a disability compared to operators without a disability.

**Contact Efficiency**

The mean contact efficiency index for operators without a disability was 0.0142, standard deviation = 0.0054, n = 43 while for those with a disability the mean was 0.0141 with standard deviation 0.00696, n = 21. The results from the two groups are summarised in the boxplots in Figure 4.

![Boxplot of Contact Efficiency](image)

Figure 4. Contact Index for groups with and without a disability

The means were not significantly different, \( t = 0.0664 \) on 62 df, \( p = 0.947 \). Testing for normality we see for skewness \( p = 0.516 \), kurtosis \( p = 0.042 \) with a combined index \( \chi^2 = 4.58 \), \( p = 0.101 \), indicating this variable satisfies the normality assumption. The test for equality of variances indicates a no significant difference between the variances of the two groups, \( F = 0.697 \), \( p= 0.416 \).
Hence both the normality and equal variance assumptions of the t-test have been met for this variable. However for consistency with the other analyses a non-parametric test was also carried out. Its results supports the t-test findings \( U = 446, z = 0.0787, p = 0.937 \).

This suggests there is no significant differences in the mean contact efficiency index for operators with a disability compared to operators without a disability.

**Upgrade Sales Effectiveness**

The mean Upgrade Sales Productivity Index for operators without a disability was 0.0150, standard deviation = 0.00544, \( n = 43 \) while for those with a disability the mean was 0.0155 with standard deviation 0.00353, \( n = 21 \). The results from the two groups are summarised in the boxplots in Figure 5.

![Boxplot of Upgrade Index for groups with and without a disability](image)

Figure 5. Upgrade Index for groups with and without a disability

The means were not significantly different, \( t = 0.376 \) on 62 df, \( p = 0.7086 \). Testing for normality we see for skewness \( p = 0.004 \), kurtosis \( p < 0.0005 \) with a combined index \( \chi^2 = 16.03 \), \( p = 0.0003 \), indicating this
variable does not satisfy the normality assumption. The test for equality of variances indicates no significant difference between the variances of the two groups, $F = 2.781, p = 0.1004$. Hence the normality assumption of the t-test has not been met for this variable and a non-parametric test was also carried out. Its results support the t-test findings $U = 427.5, z = 0.3432, p = 0.731$.

This suggests there is no significant difference in the mean Upgrade Sales Productivity Service for operators with a disability compared to operators without a disability.

**New Sales Effectiveness**

The mean new sales index for operators without a disability was 0.0148, standard deviation = 0.00755, $n = 43$ while for those with a disability the mean was 0.01650 with standard deviation 0.00610, $n = 21$. The results from the two groups are summarised in the boxplots in Figure 6.

![Boxplot](image)

Figure 6. New sale index for groups with and without a disability.

The means were not significantly different, $t = 0.873$ on 62 df, $p = 0.3861$. Testing for normality we see for skewness $p = 0.814$, kurtosis $p = \ldots$
0.154 with a combined index $\chi^2 = 2.17$, $p = 0.3373$, indicating this variable satisfies the normality assumption. The test for equality of variances indicates a no significant difference between the variances of the two groups, $F = 1.899$, $p = 0.173$. Hence the normality assumption of the t-test have been met. However for consistency with the other analyses a non-parametric test was also carried out. Its results supports the t-test findings $U = 378.5$, $z = 1.044$, $p = 0.297$.

This suggests there is no significant differences in the mean new sales index for operators with a disability compared to operators without a disability.

**Multivariate test**

On grounds of prudence and completeness it was considered useful to look at the four efficiency-effectiveness variables in combination using a multivariate technique. Before doing this the inter-correlations between the four performance variables were examined. See Figures 7 and 8.

![Figure 7. Plots of the four performance variables](image-url)
Figure 8. Intercorrelations between the four performance variables

The only significant relationships found were a weak correlation between Contact and Logon, $r = 0.264$, $p = 0.035$ and a moderate correlation between Newsale and Upgrade, $r = 0.558$, $p < 0.0005$.

Using four t-tests of performance may have increased (though only slightly) the chance of making a Type 1 error, So. Hotelling's multivariate test was also carried out. This test aims to compare the
four performance variables in combination across the two groups. The results were H = 0.35, F = 0.514, (df = 4, 59), p = 0.726. The result added further strong support to the proposition that there was no difference in the performance of the two groups. Furthermore, the SPSS output from multivariate test provided results from each dependent variable used in the test. These also supported the earlier results that none of the indices were significantly different between the groups (Logon p = 0.249, Contact p = 0.947, Upgrade p = 0.709, Newsale p = 0.386).

In summary, there was no difference between the measured productivity of workers in efficiency, effectiveness or absenteeism. Workers with a disability provided significantly longer length of service.

DISCUSSION

What is a typical call centre?

The current picture of a typical Australian call centre emerges from a 1997 survey of 100 call centre operations (ref) 2:

- 75% have operated over 4 years but less than 6 years
- On average, call centre’s had 67 work stations
- Full-time call centre agents took an average of 72 calls per day with an average talk time of 2.7 minutes.
- The average span of control for team leaders to agents is 1:11
- Average length of full-time employment is 3.3 years. Some firms have estimated that turnover rates in the first 12 months can be as high as 30%.
- Absenteeism averages 7 days per year
Each ‘agent’ (as an operator is called) is given an average of 21 days training in the first year and 9 days per year in the second and third years.

- The average remuneration for a call centre operator is $29,779.
- Two thirds of the average call centre’s operating budget is labour.
- The most important measure of performance in call centres is productivity as measured by revenue generation as a percentage of cost and service delivery.

**Length of service**

This is an extremely significant cost to call centres. Anecdotal information suggests that in some call centres staff turnover can be as high as 300% per annum. The all industry benchmark for average turnover for Australian call centres is 27%\(^4\). This contrasts with Australian Human Resources Institute data that has calculated the average turnover for 'all occupational groupings' is 19%. This indicates that the average turnover in the call centre Industry is over 40% higher than the average turnover of staff.

According to the Hallis 'Staff Turnover in call centre’s Study', the average cost of turnover per separation is between $10510 and $12046. These figures include Separation Costs, Replacement Costs and Training Costs however they do not allow for losses of intellectual capital, the cost of maintaining training facilities or additional costs incurred prior to replacement, such as overtime for other staff or opportunity costs.

**Variable 2: Absent Days**

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\(^4\) 1998 Staff Turnover in call centres Study; Hallis August 1998
Unplanned absences are a significant cost to any business. In addition to the direct cost of lost hours, productivity suffers indirectly as attending operators must carry extra workload or train or support replacement staff. This can also result in poor staff moral and inferior customer service. There may also be financial costs. Overtime may need to be paid to existing call centre operators or additional operators hired. There are also likely to be increased administrative costs relating to the hiring, reassigning and maintaining records of absenteeism and payment.

It is common for organisations to set aside a budget of 3% for absenteeism that equates to an average of about eight days per year per employee. There are some difficulties in benchmarking call centre absenteeism rates, because approximately 75% of call centres offer permanent part time work to operators and 53% of organisations offer casual hours. Employing part time and casual operators may result in benefits, however they create problems with rostering, training, and information flows. Optus Communications 1997 report on call centre benchmarks, calculated the average absenteeism for full-time call centre operators at 6.9 days per annum. The range was from 5.2 days for those engaged in manufacturing call centres, through 6.8 for those in the communications industry, and up to a maximum of 7.8 days for those engaged in the personal service and finance areas.

REFERENCES

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5 Hallis call centre Staff Survey 1998 pp12
6 Optus Communications Ltd., Australian call centres, Changing the Face of Business July 1997
Figure 7b. Box & Whisker Plot Positioned Staff Occupancy

Mean

1. Disabled
2. Non-Disabled

±1.00*Std. Err.
±1.96*Std. Err.

Mean
### PARADIGM BOUNDARIES

<table>
<thead>
<tr>
<th>COMMUNICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Receivers in general</strong> (total audience).</td>
</tr>
<tr>
<td>Investors – defined as potential providers of the funds or resources not currently controlled but needed to achieve identified plan objectives.</td>
</tr>
<tr>
<td><strong>Receivers in particular</strong> (sub-audiences).</td>
</tr>
<tr>
<td>A tailored version of the plan should be targeted to each sub-audience distinct enough to warrant a separate investment offer.</td>
</tr>
<tr>
<td><strong>Definition of the sender</strong> (business plan writer).</td>
</tr>
<tr>
<td>6. An entrepreneurial individual or team seeking resources required to overcome the factors impeding growth.</td>
</tr>
<tr>
<td>(2) Sophisticated; i.e. Having both depth and breadth of generic business skills as well as all required venture specific skills.</td>
</tr>
</tbody>
</table>

### PARADIGM LAWS

| **Encoding laws.** |
| 1. Codify the selected strategy as a multi-disciplinary continuum. |
| 2. Integrate the codified strategy as a ‘base case’ scenario. |
| (Note, obeying this law is intimately linked with the simulation success rule). |
| **Message Content laws.** |
| 3. Nominate the intended audience. |
| 4. Identify all major plan objectives, primarily as financial targets. |
| 5. Define the investment offer(s) as an expected ROI. |
| 6. Distinguish the venture’s business concept, distinctive competencies and sustainable competitive advantages. |
| 7. Provide comprehensive statements of opportunities and risks. |
| **Feedback Law.** |
| 8. Seek and respond to feedback. |
| (Note, obeying this law is intimately linked with the simulation success rule). |

### PARADIGM SUCCESS RULES

**Fundamental Communications Success Rules.**

1. Adapt plan length and depth of detail to the interest level and stage of involvement of the target audience. |
2. Empower the plan reader. |
3. Create investor confidence by providing flexible credibility. |

### INSTRUMENTATION REQUIREMENTS

**Fundamental Communications Instrument.**

A unique, purpose-designed document – embodying high standards of literacy and numeracy – of the minimum length appropriate to the subject matter and the target audience’s information needs.

### CONTROL

| **The fundamental defining circumstance.** |
| Impeded growth. |
| **Entrepreneurship process boundaries.** |
| The nine entrepreneurial process parameters (identified by Bygrave and Hofer) must apply. |
| **Defined limits of planning as a process.** |
| Planning is strategic programming – not strategy formulation – (Mintzberg’s definition). |

| **Elaboration Law.** |
| 1. Elaborate the selected strategy as a set of sub-plans. |
| **Conversion Law.** |
| 2. Convert the selected strategy into a differentiated suite of financial budgets. |
| 3. Re-combine the differentiated budgets into an integrated suite of financial projections. |

| **Fundamental Control Success Rules.** |
| 1. **Anticipate and address the target audience’s due diligence requirements.** |
| 2. **Create a value-adding deal structure.** |

**Fundamental Coordinating and Control instrument.**

A comprehensive financial projection model capable of enumerating the financial implications of alternative scenarios.
<table>
<thead>
<tr>
<th>SIMULATION</th>
<th>(Simulation possibilities are unbounded)</th>
<th>Adaptive Capacity Law.</th>
<th>Fundamental Simulation Success Rule.</th>
<th>Fundamental Simulation Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Be able to answer the audience’s ‘what if’ questions in financial terms. (Note, obeying this law is intimately linked with the simulation success rule)</td>
<td>6. Employ simulation techniques to obtain the most plausible ‘base case’ scenario which can withstand rigorous due diligence investigation.</td>
<td>The same financial projection model.</td>
<td></td>
</tr>
</tbody>
</table>