USING ANALYTICS TO MEASURE EMPLOYERS' ATTITUDES TO APPRENTICES

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Abstract

There is a growing body of VET research into the attitudes and approaches of employers of apprentices. In 2008 and 2009 the Australian Chamber of Commerce and Industry (ACCI) commissioned John Mitchell & Associates to undertake two investigations into the retention of apprentices from an employer perspective. Both projects involved the use of a pragmatic, mixed-methods approach including the collection and analysis of qualitative and quantitative data. In both research projects, psychometric techniques were used to analyse the perceptions of employers. In particular, the analysis of the survey data involved the use of a structural equation model, a sophisticated statistical technique that uses survey data to map the cognitive process though which groups of individuals approach or perceive a broad set of issues. Structural equation modelling is growing in popularity in the emerging field of analytics, defined as "the extensive use of data, statistical and quantitative analysis, explanatory and predictive models" (Davenport and Harris 2007, p.7). This paper focuses on the structural equation model developed in the first of the two projects undertaken with ACCI and shows how the model provided pivotal insights in understanding employer attitudes to apprentices. Subsequent interviews and case studies validated and deepened these insights.

Introduction

There is a growing body of VET research into the attitudes and approaches of employers of apprentices (e.g. Cully & Curtain 2001, Harris et al. 2001, Karmel & Virk 2006, Callan 2008, Huntly Consulting Group 2008). This focus on employers' attitudes is especially important given that there are nearly 300,000 apprenticeship commencements each year and apprentices represent approximately 25% of enrolments in the VET sector. No matter how turbulent the economy, employers of apprentices are vitally important in and to VET.

In 2008 and 2009 the Australian Chamber of Commerce and Industry (ACCI) commissioned John Mitchell & Associates to undertake two investigations into the retention of apprentices from an employer perspective. The projects were funded by

the Department of Education, Employment and Workplace Relations (DEEWR) and project managed by ACCI. The first project was conducted from Feb-Dec 2008 and focused on how employers could better attract and retain apprentices. The second project was conducted from Feb-June 2009 and focused on the attraction and retention of previously disengaged apprentices.

The research in the first project showed that it is possible for employers to take a systematic approach to retaining apprentices (Mitchell, Dobbs & Ward 2008). The identification of the importance of a systematic approach is in contrast to most approaches advocated in the literature which mostly list all the possible strategies available to employers, but don't prioritise those strategies. A major finding from the research for the second project is that employers believe it is worth the effort implementing a positive and systematic approach to attracting and retaining disengaged apprentices, moving beyond any preconceived negativity towards this cohort (Mitchell, Dobbs & Ward 2009).

A pivotal feature of both research projects, and a focus of this paper, was the analysis of the survey data using a structural equation model (SEM), a sophisticated statistical technique that uses survey data to map the cognitive process though which groups of individuals approach or perceive a broad set of issues. The SEM work was led by research team member and psychometrician John Ward. Structural equation modelling is an example of analytics; and analytics is a sub-set, and at the higher end, of business intelligence – a set of technologies and processes that use data to understand and analyse business performance. In a business setting, analytics means "the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions" (Davenport and Harris 2007, p.7). This paper now focuses on the first of the two ACCI projects, resulting in the report, *A Systematic Approach to Retaining Apprentices* (December 2008) and the pivotal role played by SEM in that project.

Literature review

The purpose of the literature review was to take a first step in an investigation of the factors impacting on the completion and non-completion of Australian Apprenticeships – with a particular focus on 'traditional apprenticeships'.

Completion and non-completion in vocational education and training has been an area of interest and concern for many years (e.g. Cully & Curtain 2001, Harris et al. 2001). This concern was sharpened significantly around 2007-2008 by the industry and economic climate of skill shortages and rates of economic growth significantly in excess of rates of employment growth. As a result, there was a clear need in the 2008 ACCI project to understand the factors underpinning rates of attrition during training and from relevant employment after training. Apart from the obvious impact on the size of the employment pool, in most cases attrition involves wastage of employer and employee resources as well as training provider resources. Further, higher than average levels of attrition can damage the reputations of employers and training providers. In many cases non-completion impacts on the self-confidence, determination and employment prospects of the apprentice or trainee.

Huntly Consulting Group (2008) documented the outcomes of research by Callan (2005), Simm et al. (2007) and others in relation to the reasons for non-completion in the VET sector generally. The most common reasons identified were associated with aspects of the course itself; for example:

- unhappy with the course choice or with the quality of the teacher training (Simm et al. 2007)
- the inflexibility of the course in terms of its time of delivery, the content of the course did not match the student's needs, the poor quality of the teaching staff, the workload of the course, teachers did not have relevant industry experience (Callan 2005).

When focused more specifically on apprentices, Huntly's review indicates that the reasons for non-completion appear to shift from the course itself (though this remains significant) to factors clearly linked to all the components of the apprenticeship. Huntly notes that a variety of sources including the WA Skills Formations Taskforce (2006), Cully (2001) and Deborah Wilson Consulting Services (2007) repeatedly identify factors such as:

- lack of support or mentoring/coaching, dissatisfaction in the workplace, low wages, training not meeting expectations (WA Skills Formation Taskforce 2006)
- no longer wanted to work in that job, dislike of the employer or his/her management style, being treated as cheap labour, level of pressure and the prevalence of bullying, were dismissed or made redundant (Cully 2001)
- received a better job offer, could not do the job, moved location, health concerns (Wilson 2007).

Huntly review points out that many of the reasons given for apprentice attrition are common to employment generally and that there has not been an in-depth study of how these factors, and an organisation's normal retention policies and procedures, impact on apprentices. Nor has there been any substantial research on the interventions that employers are using to enhance retention of apprentices in particular.

The literature review for the 2008 ACCI research project suggests that strategies to reduce non-completion, within the context of institution based provision, are most effective when aimed at the recruitment, transition and 'student support' stages of a course. In the ACCI study, these findings from the literature review underpinned the design and implementation of the survey of employers that was intended to elicit an employer perspective on the issues.

Methods

The 2008 ACCI research project involved the use of a pragmatic, mixed-methods approach including the collection and analysis of both qualitative and quantitative data. The data collection methods were a literature review, survey, interviews and case studies. This use of multiple data sources, or 'triangulation', underpins the validity of the findings.

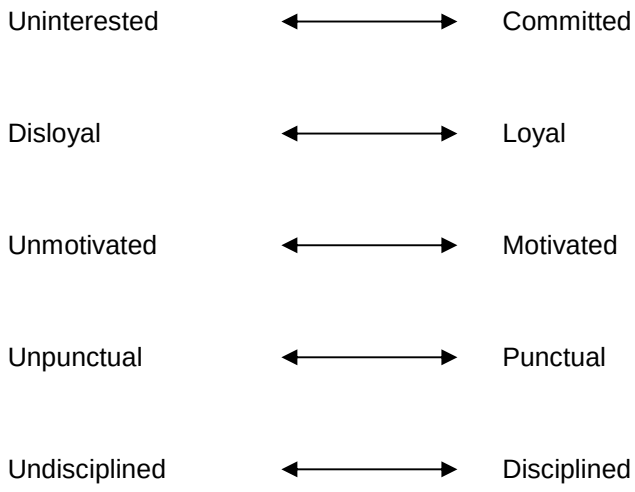
Following the finalising of the review of the literature which identified likely factors affecting attraction and retention of apprentices, the survey instrument was designed so that employers would better understand the factors that encourage the retention of apprentices and newly qualified tradespeople. The survey sought to collect data from employers about each of the following topics:

- the employment of apprentices
- the pre-selection and selection of apprentices
- the daily working life of apprentices
- employers' attitudes towards the apprentices' training provider
- the transition from apprentice to newly qualified tradesperson
- the working life of a tradesperson.

The survey of employers' attitudes regarding the attraction and retention of apprentices was conducted in mid-2008. Sixty five employers completed the survey of 43 questions, most of which were Likert scale questions, and psychometric techniques were used to analyse the perceptions of employers. Some key findings emerged from the survey and these findings were validated, modified and enriched through the case studies and interviews, as discussed in the full report and now available on the ACCI website.

Survey respondents were asked to describe their apprentices in terms of five bi-polar attitudinal scales, as follows in Figure 1.

Figure 1: Attitudinal scales



Statistical techniques (linear regression) were applied to this data, with the aim of revealing the extent to which such attitudes impacted upon employers' ability to attract and retain apprentices. Only one significant relationship was found between employer attitudes and employer ability to attract and retain apprentices: the more committed employers are to their apprentices, the easier it is for them to attract and retain apprentices.

All of these bi-polar scales were highly correlated (between r = 0.72 and r = 0.891), yet only one of the scales was found to have a significant relationship with attraction and retention. This would suggest that the personal quality of commitment lies at the core of what an employer expects from an apprentice, and that this quality of commitment has an impact upon loyalty, motivation, punctuality and discipline.

Note that the SEM discussed later in this paper indicated that the use of recruitment and induction procedures to choose appropriate apprentices had the greatest impact upon the ability of an employer to attract and retain apprentices. Given the logic evident in the survey data, recruiting and inducting apprentices with high levels of commitment will add to an employer's ability to attract and retain apprentices.

Employers responding to the survey were also asked to describe their newly qualified tradespeople in terms of the same five bi-polar attitudinal scales. Their responses were distinctly different from their views about apprentices, in that it was not the quality of commitment that impacted upon attraction and retention, but rather the qualities of motivation and punctuality. That is, the more motivated employers regard their tradespeople, the easier it is for employers to attract and retain tradespeople. Similarly, the more punctual employers consider their tradespeople, the easier it is for employers to attract and retain tradespeople.

This indicates that employers have different criteria for judging the personal qualities of apprentices as opposed to newly qualified tradespeople, taking into account the following definitions:

- commitment suggests a desire to learn
- motivation suggests a desire to apply one's learning to the task at hand
- punctuality is the ability to undertake and complete a task in a timely manner.

Clearly, employers seek in apprentices a desire to learn, however, in their newly qualified tradespeople, employers seek a desire to apply this learning to a specific task, and to complete that task in a timely manner.

The resultant survey data was analysed using structural equation model (SEM). In contemporary studies, researchers in all fields of the social sciences use SEM to reveal how groups of people categorise and conceptualise problems and processes. SEM allows researchers to deconstruct the way in which the research population has approached a particular issue, and can therefore provide researchers with clues as to how policy makers might best influence and improve this approach.

The research topic – employer attitudes towards attracting and retaining apprentices – lent itself well to an SEM. Employer attitudes do not materialise in a vacuum. Rather, these attitudes are the result of a complex set of interactions between employers and their apprentices, as well as interactions between employers and other aspects of the apprenticeship system. Using survey data that set out to gather information about these interactions, the researchers developed a SEM to map the way in which these issues come together in the minds of employers. The SEM completed this mapping of

the minds of employers in two distinct phases: identifying the issues of relevance to employers and identifying how these issues interact with each other.

Findings

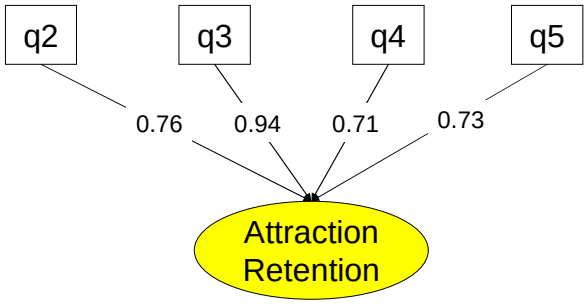
SEM uses a statistical technique called factor analysis to identify issues pertinent to employers. Simply stated, factor analysis shows the extent to which responses to various sets of survey questions display common patterns of responses. In this case, factor analysis indicated that the following four questions in the survey had common response patterns:

- How difficult is it to attract good quality apprentices?
- How successful is your organisation in attracting good quality apprentices?
- How difficult is it to retain good quality apprentices?
- How successful is your company in retaining good quality apprentices through the course of their apprenticeship?

A brief inspection of these four questions shows that there is a common theme running though them – that of attracting and retaining good quality apprentices. Factor analysis has statistically confirmed that employers have responded to these four questions in such a way that they regard these questions as relating to the same underlying issue. In the jargon of SEM, this underlying issue is referred to as a "latent variable", which is diagrammatically displayed in Figure 2 below, where:

q2 = How successful is your organisation in attracting good quality apprentices?
q3 = How difficult is it to retain good quality apprentices?
q4 = How successful is your organisation in retaining good quality apprentices through the course of their apprenticeship?
q5 = How difficult is it to attract newly qualified tradespeople?

Figure 2: The strength of the impact of different factors on attraction and retention, from an employer's perspective



By convention, the latent variable is diagrammatically displayed as an ellipse. The survey questions that make up the latent variable are contained in boxes outside the ellipse, each with an arrow pointing to the latent variable. Each of these questions has a different level of impact upon the latent variable. Factor analysis quantifies these different impacts with "impact scores" (technically referred to as a regression coefficient), each of which is located on the arrow between the question and the latent

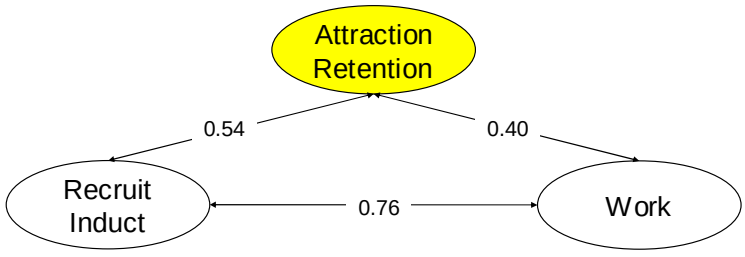
variable. The diagram above shows that employers' responses to question three (How difficult is it to retain good quality apprentices?) had the greatest impact upon the latent variable.

In the survey of employers' attitudes towards attracting and retaining good quality apprentices, factor analysis confirmed the existence of six latent variables. These latent variables represent the broad issues of concern to employees when dealing with the problem of attracting and retaining quality apprentices. They are:

1. Attraction and Retention: The ability of an employer to attract and retain good quality apprentices
2. Recruitment and Induction: The extent to which an employer uses recruitment and induction procedures to attract and retain good quality apprentices
3. Work: The extent to which employers provide apprentices with meaningful work that improves the skill levels of apprentices
4. Training: The rating an employer gives to the quality of both an apprentice's training and the training provider
5. Personal and Professional Support: The level of personal and professional support provided to an apprentice by an employer
6. Government Information: The extent to which an employer is aware and uses government information about attracting and retaining apprentices

Having identified the issues as defined by the employers, a SEM was used to examine how these issues interact with each other within the collective consciousness of the employers. To do this, SEM incorporates a statistical procedure known as path analysis. Simply stated, path analysis maps the relationship between latent variables, as well as the extent to which changes in one latent variable brings about changes in another latent variable. Figure 3 below indicates the relationship between three latent variables in the study, as calculated though SEM path analysis: 1) Attraction and Retention, 2) Recruitment and Induction, and 3) Meaningful Work.

Figure 3: The relationship between three latent variables



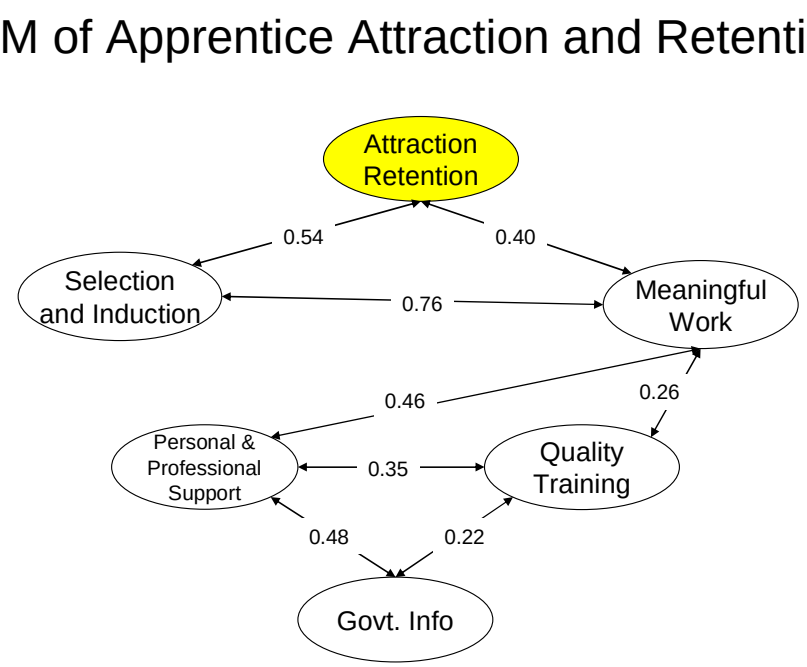
The Attraction and Retention latent variable (shaded above) measures the difficulty an employer has in attracting and retaining quality apprentices. The Recruitment and Induction latent variable measures the extent to which employers use recruitment and induction techniques to ensure that the skills of an apprentice are well matched to the job requirements. The Work latent variable measures the extent to which employers provide their apprentices with meaningful work that adds to their professional skills.

The two-way arrow connecting the latent variables indicate the existence of a relationship between the latent variables, in that a rise or fall in the measure of one latent variable will result in a rise or fall in the other variable. The "correlation" scores indicate the relative size of that relationship.

As indicated in Figure 3 above, the extent to which an employer can attract and retain quality apprentices is dependent upon two issues: 1) the extent to which employers use recruitment and induction techniques to ensure that apprentices are well chosen and prepared for the job at hand, and 2) the extent to which apprentices are given meaningful work that adds to their professional skills.

Note that the correlation scores suggest that Recruitment and Induction has a slightly bigger impact upon an employers' ability to attract and retain quality apprentices than does the Work given an apprentice. Note also the high correlation between Recruitment and Induction and Work, suggesting that employers that apply rigorous recruitment and induction procedures also provide their apprentices with meaningful work. Figure 4 below shows the full SEM of employer attitudes towards the attraction and retention of quality apprentices.

Figure 4: Summary of the pathway of factors affecting attraction and retention



The above SEM pathway model shows that two factors have the most impact on attraction and retention: selection and induction and the provision of meaningful work. The other three factors – personal and professional support, quality training and government information – have an indirect impact on attraction and retention, via the provision of meaningful work for the apprentice. This means that employers focused on attracting and retaining apprentices are encouraged to put their priority effort into selection and induction and the provision of meaningful work. They and their partners

(e.g. parents, communities, schools, training provider, government, industry bodies) can also seek to do more to strengthen the impact of the other three factors.

Continuing from the above analysis, it is evident that only two latent variables have a direct impact upon employers' ability to attract and retain quality apprentices – Recruitment and Induction, and Meaningful Work. All other latent variables have a secondary or tertiary impact upon employers' ability to attract and retain quality apprentices. This and other findings from the SEM, which were validated by the interviews and case studies, resulted in the following set of key findings.

1. An effective strategy for assisting employers to attract and retain good quality apprentices should focus first on:
    a. the recruitment and induction processes, and/or
    b. the planning and provision of meaningful work that adds to an apprentice's skill levels.
2. In relation to 1(a), recruitment processes ideally could focus upon choosing apprentices who have sufficient interest and skills to do the job and, most importantly, a strong level of commitment to the career that they are undertaking.
3. In relation to 1(b), assisting an employer to provide meaningful work that adds to an apprentice's skill level can be achieved by:
    a. assisting the employer in the provision of greater personal and professional support for their apprentices, and/or
    b. engaging the employer in the off-the-job training of the apprentice, so the employer has a greater understanding of both the training content and the training provider.
4. The personal quality of commitment lies at the core of what an employer expects from an apprentice, and this quality of commitment has an impact upon the apprentice's loyalty, motivation, punctuality and discipline.
5. Employers view newly qualified tradespeople quite differently from the way they view apprentices. While the quality of commitment impacts most upon the retention of apprentices, the qualities of motivation and punctuality impact most upon the retention of newly qualified tradespeople.
6. The survey results indicate that the ability of an employer to retain newly qualified tradespeople is dependent primarily upon the extent to which the employer provides personal and professional support to these newly qualified tradespeople.

Conclusions

The research in this 2008 ACCI project showed that it is possible and important for employers to take a systematic approach to retaining apprentices. A systematic approach is defined – in this instance – as one that is evidence-based, logical, rigorous, thorough, targeted, engaging, interventionist, customised, benchmarked and continuously improved. The identification of the importance of a systematic approach is in contrast to most approaches advocated in the literature, which generally

recommend that employers give equal attention to all the factors that might affect the retention of apprentices, without attempting to prioritise those factors or indicate how they are inter-connected.

The benefits of using a systematic approach are many and include the following:

- the recruitment of appropriate apprentices can be planned in detail
- the working lives of apprentices can be enhanced and the risks of apprentices leaving can be minimised
- all stakeholders can be made aware of why specific retention strategies are being used and how they can contribute to assisting and retaining apprentices.

The structural equation model used in the 2008 ACCI research project was pivotal in identifying the specific elements of this systematic approach. SEM is an example of the emerging field of analytics; a field that potentially can provide new insights to long-standing and crucial issues such as employers' attitudes to apprentices.

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