KNOWLEDGE WORK, ORGANISATIONAL COMMITMENT AND HRM PERFORMANCE

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The growth in the importance and use of information has led to the emergence of new forms of knowledge work and a restructuring of jobs and work processes. At the same time there is a growing realisation that organisations will only achieve a competitive advantage if they possess a highly skilled and committed workforce. The growing body of research on knowledge workers and on organisational commitment has, in the main, not examined and analysed the potential links between the two. This paper aims to fill this void. Using a survey of 3,335 employees of a large public sector research organisation the paper shows that the commitment of knowledge workers is lower than for other employees and that a different combination of factors effected the overall level of commitment for these workers. The implications of these findings are then considered for job satisfaction, hours of unpaid overtime worked, absenteeism and intentions to leave the organisation.

1. INTRODUCTION

The nature of work is changing. More emphasis is now placed on jobs that rely on information processing, problem solving and the production of knowledge. A variety of labels have been used to convey these changes including intellectual capital, the information society, and knowledge work. At the same time there is a realisation that organisations will only achieve a competitive advantage if they possess a highly skilled and committed workforce. The drive for a competitive advantage has led to a greater emphasis being placed on training and intellectual development. This knowledge if levered so as to improve work processes, technology, product quality and customer satisfaction will improve the enterprises' competitive advantage. This will mean that knowledge work will increasingly become highly valued and that more attention will be given to the management and retention of knowledge workers.

The growing body of research on knowledge workers has, in the main, not analysed the links between type of work and organisational commitment. In turn, the effect of this relationship on human resource management (HRM) outcomes has not been systematically explored. This paper aims to fill this void. After reviewing the literature on knowledge work and organisational commitment the paper tests three propositions using a survey of 3,335 employees of a large public sector research organisation (PSR). The research shows that

commitment of knowledge workers is lower than for other employees, that different factors effected the overall level of commitment and that this dichotomy has implications for HRM performance.

2. KNOWLEDGE WORKERS AND ORGANISATIONAL COMMITMENT

Knowledge Workers

The term knowledge worker is increasingly found in the management literature. This literature points out that the trend is towards knowledge work (Helton, 1987; Barley, 1996) and that this term is a useful way to characterise important changes in the nature of work (Scarbrough, 1999). Re-occurring themes in the literature are the need to enhance knowledge worker's learning (Gaimon, 1997; Webber, 1993), that the motivation of these workers represents a major managerial challenge (Nomikos, 1989; Tampoe, 1993; Sulek and Marucheck, 1994; Barner, 1996) and that new structures for the management of knowledge workers will be required (Fojt, 1995; Maccoby, 1996; Yovovich, 1996). Knowledge workers, it has been argued, are the last bastion of competitive advantage (Harrigan and Dalmia, 1991).

The literature is difficult to critique and compare as, in most cases, a clear definition of knowledge work is not presented. Where such definitions are provided they are generally expressed in terms of complex tasks that require increasing amounts of knowledge and problem solving abilities (Gordon, 1997), where the main tool and output is knowledge (Barner, 1996; Parker, 1994) and where the core task is thinking (Fisher and Fisher, 1998). In short, according to Horibe (1999: xi), knowledge workers are 'people who use their heads more than their hands to produce value'.

Who then are knowledge workers? Scarbrough (1999: 5) makes a distinction 'between *knowing* as part of the work experience and *knowledge* as an economic commodity'. This distinction is important as it distinguishes between the use of knowledge and the value of that knowledge. Thus, while Cortada (1998: xiii) is undoubtedly correct in claiming 'increasingly everyone is a knowledge worker' the focus on knowledge as an economic commodity will place the emphasis on the creation of knowledge and the tasks associated with this role. As Hamel and Prahalad (1994) argued, the key to future economic success lay in creating new opportunities. In short, understanding the value of knowledge is an important factor in achieving a competitive advantage.

The literature points to the changing nature of work and the increasing emphasis on using information in many occupations and fields (Barley, 1996). Yet, as pointed out by Sewell (2000: 9) this 'belies a degradation in the nature of some knowledge work' while simultaneously 'ignoring the increasing cognitive demands placed on many employees in traditional employment'. Rather than attempting to define knowledge work in terms of particular occupations, knowledge workers are more appropriately defined as those who undertake complex tasks that require the assimilation of increasing amounts of knowledge and problem solving abilities (Gordon, 1997). In short, they add value to the enterprise through their ideas, their analyses, their judgement, their syntheses, and their design' (Horibe, 1999: xi).

The research to date only provides a partial and superficial picture of the HRM dimensions of knowledge workers. Much of the literature is based on case studies or simplistic projections

of key work trends. Knowledge workers, it is claimed, are likely to have more allegiance to their area of expertise than to their employer (Bentley, 1990), that new forms of management (Scarbrough, 1999; Fojt, 1995; Yovovich, 1996) and work structures (Maccoby, 1996) are required, and that there will be a need to pay for knowledge acquisition (Ledford, 1995). Knowledge worker productivity, according to Drucker (1999), represents the new challenge and that attracting and retaining knowledge workers will not improve until enterprises learn to measure the cost and return on human capital (Drucker, 2000; Thornburg, 1994).

Organisational Commitment

How are knowledge workers motivated and retained? A number of writers have argued that workers are more likely to remain with the enterprise and increase work effort where management adopt strategies that enhance employee commitment (Porter, 1990; Walton, 1985; Womack *et al.*, 1991). Commitment can have a variety of meanings (Morris *et al.*, 1993) but most frequently refers to 'the strength of an individual's identification with and involvement in a particular organization' (Porter *et al.*, 1974, p. 604). Commitment can be characterised by three factors: a belief in and an acceptance of the organisations' goals and values; a willingness to exert considerable effort; and a desire to maintain organisational membership (Porter *et al.*, 1974, p. 604).

To date the commitment of knowledge workers has not been the subject of sustained research. Little is known about their level of commitment and the factors that may influence this commitment? It has, however, been long suspected that workers such as skilled tradespersons and professionals may be more committed to their occupation or field of work than to their employer (Cook, 1996). As Cook (1996: 25) argued 'occupational commitment may easily provide points of conflict with the value and goals of employers and non-professional colleagues'. Can such an argument be extended to knowledge workers as suggested by Bentley (1990)? This is an important question given the trend towards more knowledge-based employment. If workers do not identify with the objectives and actions of their employer they are unlikely to cooperatively work towards improving job processes and productivity. This cooperative behaviour is critical to organisational success and lower commitment represents a severe constraint on the effective management of these workers. Attempts to develop a competitive advantage may thus be jeopardised.

3. RESEARCH PROPOSITIONS AND EXPLANATORY MODEL

Research Propositions

Overall knowledge workers have reported lower levels of commitment than that of other employees (Cook, 1996). While the literature has established many of the factors influencing commitment (Morris *et al.*, 1993; Mottaz, 1988) and what are the organisational consequences of different levels of commitment (Angle and Perry, 1981; Farrell and Rusbult, 1981; Iverson, 1996; Mowday *et al.*, 1974; Steers, 1977; Stumpf and Hartman, 1984; Porter *et al.*, 1974; Williams and Hazer, 1986) it has not considered whether these factors are applicable to all workers. This is an important issue for management as policies designed to enhance commitment (Becker *et al.*, 1996; Deery *et al.*, 1994, Guest, 1995; Iverson, 1996) may need to be tailored to the needs of different groups of workers. The nature of knowledge work, the

different work processes and the education level of these employees would suggest different factors would influence the level of organisational commitment. It is therefore proposed that:

Proposition 1:Knowledge workers will have lower levels of organisational commitment compared to other workers in the organisation.

Proposition 2:Organisational commitment of knowledge workers will be associated with different personal characteristics and work-setting variables compared to other workers in the organisation.

Proposition 3: The lower level of organisational commitment of knowledge workers will have a negative effect on organisational HRM outcomes.

Explanatory Model

To test proposition 2, whether different factors effect the commitment of knowledge workers when compared to other employees, an explanatory model was developed. The determinants of commitment can be broken into personal characteristics and work- setting variables, although there is little agreement on the relative impact of these variables (Mottaz, 1988). Five personal characteristics were chosen in this study[2]. These were age, education, union membership, negative affectivity and motivation. Age has been found to be positively related to commitment (Mathieu and Zajac, 1990; Benson, 1998) as has tenure (Mathieu and Zajac, 1990). Due to the high correlation between tenure and age in this group of respondents ($r=.66$) tenure was excluded from the model. Education would be expected to be negatively related to commitment as educated employees are more mobile and tend to have a greater choice of jobs (Mowday *et al.*, 1982; Benson, 1998). Three other personal characteristics were added to the model following discussions with PSR staff and union personnel. The first of these was union membership. Union membership, for at least some employees, may represent a loyalty to their occupation or the wider union movement. For these employees, commitment to their employer would be expected to be lower than for non-members (Iverson, 1996).

Little research exists on the effect of negative affectivity, or aversive emotional states, and commitment. Such employees are probably less likely to display an attachment to an organisation, although they are also probably less likely to leave due to perceived fewer alternatives (Iverson and Buttigieg, 1999). Highly motivated employees tend to exert more effort (Mowday *et al.*, 1979) and if such efforts are rewarded by the organisation then their level of commitment would rise. Iverson (1996) and Iverson and Buttigieg (1999) found a strong link between work motivation and affective and normative commitment.

A number of work-setting variables were included in the model. Role ambiguity and role conflict have been found to correlate negatively with job satisfaction and positively with propensity to leave the organisation (Rizzo *et al.*, 1970). Given the relationship of job satisfaction and propensity to leave to employee commitment (Iverson and Roy, 1994; Michaels and Spector, 1982; Williams and Hazer, 1986) it is expected that role ambiguity and conflict will be negatively related to organisational commitment. Benson (1998) found that for contract workers there was a significant negative relationship between role ambiguity and commitment to the host enterprise. A friendly and supportive work environment has been found to be instrumental in developing commitment (Benson, 1998; Iverson and Buttigieg, 1999; Mottaz, 1988; Reichers, 1985). Two aspects of this type of environment have been included in this model: co-worker and supervisor support. It is expected that where employees receive help and support from their co-workers and their supervisor they will have higher

levels of organisational commitment. Iverson and Buttigieg (1999) found strong support for this proposition, although Benson (1998) found that only supervisor support had a significant relationship to contractors' level of organisational commitment. In a similar vein job security has been found to be positively related to commitment (Iverson, 1996; Iverson and Buttigieg, 1999). Where employees can perceive a long-term relationship they are prepared to invest more effort into their work (Myer and Allen, 1997).

Work autonomy has been found to have a positive relationship to commitment (Deery, *et al.*, 1994; Mathieu and Zajac, 1990; Mottaz, 1988). Employees who are not supervised closely and can make decisions concerning their work life would be expected to express more commitment to the organisation. This would be particularly the case where workers are involved in creative activities. Little research has been conducted on the relationship between commitment and pay level satisfaction and satisfaction with benefits. In one of the few studies Morris *et al.* (1993) found that good salaries were important to those who stayed. This was only significant just after they had started. Conversely, Mottaz (1988) found pay had a significant positive relationship to commitment. Mottaz (1988) also found satisfaction with non-pay benefits was not related to commitment. In this study satisfaction with benefits is included as both management and the union at PSR had identified this issue as an important factor in improving commitment and retention. This was partly related to the restrictions placed on the organisation in terms of pay improvements. It also, however, related to the nature of a research institution and the feedback from employees.

Employees are concerned with both the processes that determine rewards and benefits as well as the distribution of those rewards. Commitment has been found to positively relate to distributive justive (Iverson and Roy, 1994; Iverson, Mcleod and Erwin, 1995) and to procedural justice (Morris *et al.*, 1993). In this latter case fair policies were important determinants of commitment for those who had left the organisation. Similarly, promotional opportunities were found to be positively related to commitment (Mottaz, 1988). This relationship may not be consistent across cultures as found by Lincoln and Kalleberg (1985) in their study of US and Japanese workers.

Routinisation has been found to be negatively related to commitment (Deery *et al.*, 1995; McLeod *et al.* 1995; Iverson and Buttigieg, 1999). This would be expected as repetitive work usually involves less challenge and lower order cognitive skills. This should not be a key factor for knowledge workers but may explain different levels of commitment between these workers and other employees. Finally, resource adequacy can have a major impact on the ability to competently undertake tasks and to complete work by due deadlines. Benson (1998) found a negative relationship between resource adequacy and commitment to employer for contract workers. This may be related to the nature of the particular group of workers but was also found to be a result of the interactions between age, training and role conflict. With PSR knowledge workers, resources play an integral part of the research process and so a positive relationship would be expected. Definitions for these variables are provided in table 1 while the proposed relationships of these eighteen variables to commitment are indicated in table 5.

4. METHODS

Setting and Subjects

The research was carried out in the period 1998 to 1999 in a large Australian public-sector research organisation. PSR undertakes scientific research and has strong formal and informal links with Australian industry and overseas research organisations. PSR, at the time of the research employed just under 7,000 employees. These employees covered a range of occupation ranging from semi-skilled jobs, tradespersons, technicians, clerical, managerial and research positions. Nearly half the workforce of PSR was unionised and union coverage extended to employees in all salary classifications up to and including corporate employees. The research was timed to coincide with a joint union-management review of the pay and salary classification system operating at PSR. PSR management and union officials provided strong support for the research project.

A questionnaire was sent to all 6,957 PSR employees in the period December 1998 to March 1999. The questionnaire was mailed to each employee's work address and returned directly to the researchers. Most of the items on the questionnaire were derived from established scales, as can be seen from the contents of Appendix A. The survey achieved an overall response rate of 47.9 per cent (3,335). The sample was representative of the union and non-union population by gender and location. The average age of respondents was 42 years (s.d. = 9.96) with about half (50.4 per cent) having completed more than an undergraduate university degree. Nearly one-third of respondents (30.0 per cent) possessed a PhD. The average tenure was 12.0 years (s.d. = 9.3), although 62.3 per cent had been working for PSR for shorter than this period. Most of the respondents (92.3 per cent) were employed on a full-time basis and slightly more than two-thirds (68.5 per cent) were born in Australia. Among the respondents 54.2 per cent were union members.

Measures

(a) Knowledge workers

The definition of knowledge workers adopted in this study involves three distinct but inter-related activities. The first aspect is the initiation of projects. This involves being abreast of current knowledge and the ability to identify key problems for investigation. The second aspect is conducting research. This includes the development of testable hypotheses, designing the experimental designs and physically conducting or supervising the research. The final aspect is the dissemination of the new knowledge acquired from the research in the form of papers, conference presentations, workshops or transferring the knowledge to an industrial application or setting. This classification led to 39.6 per cent of respondents (N=1212) being classified as knowledge workers and 60.4 per cent of respondents (N=1850) being labelled as 'other employees'.

(b) Organisational Commitment`

In this study, the nine-item version of Porter's organisational commitment index (Porter *et al.*, 1974; Mowday *et al.*, 1979) was used because of its reliability and validity (Mowday *et al.*, 1979), and its widespread usage and acceptance (Morris *et al.*, 1993). Responses were recorded on a 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1). These responses were re-coded for the statistical analysis. Commitment scores were

calculated by averaging the responses to the nine items. The reliability of the commitment scale was estimated using the alpha coefficient (Cronbach, 1951). This coefficient was .86 and, together with the summary statistics for the scale, is presented in Table 1.

(c) Independent Variables

Eighteen variables were included in the explanatory model outlined in the previous section. Three of these variables were single-item questions including age, education, and union membership. The remaining fifteen variables were modifications of established scales (see Appendix A). A 5-point Likert scale was used to measure the responses to each item. For each item responses ranged from strongly agree (5) to strongly disagree (1). Again the items making up these scales were re-coded for the statistical analysis. The number of items making up each scale, the Cronbach alpha coefficient and summary statistics for all independent variables are presented in Table 1. In this study the reliability of the scales ranged from .66 for satisfaction with benefits[1] to .95 for distributive justice.

(d) Organisational Outcomes

Four outcome variables were considered in testing proposition 3. Job satisfaction was measured by six items from Price and Mueller (1981). Hours of unpaid overtime worked and absenteeism were based on self-reported measures. Hours was derived from the responses to three questions concerning how many hours were worked, how many hours were meant to be worked and the number of paid overtime hours worked. Absenteeism was based on a single question asking how many days of sick and personal leave was taken in the last year. Intention to Quit was measured by two items from Porter *et al.* (1974). Alpha coefficients for the two scale items were .89 and .68 respectively. Summary statistics for these items are presented in Table 1.

Model Estimation

The dependent variable, commitment, is composed of interval scale data and so the most appropriate estimation method is the ordinary least squares (OLS) regression technique[2]. For the purposes of testing Proposition 2, the sign and size of the coefficient of each of the independent variables was the major concern of the analysis. Predicted signs of each independent variable are provided in parentheses after the name of the variable in Table 3. The presentation of results for each group of subjects will include the regression coefficient and standard error for each independent variable as well as the R-squared, the adjusted R-squared and the overall F-test for the model. The possibility of multicollinearity rendering the estimates unreliable appeared low[3]. First, the problem of common method variance was addressed by ensuring that any inflating of the relationships was minimised by using positive and negative worded items in each multiple scale. Second, the correlations between all variables in the model were relatively small. In addition, the methods outlined by Belsley *et al.* (1980), suggested multicollinearity among predictor variables was not a major problem.

Table 1

Scale Descriptive Statistics and Reliability Measure

Variable	Number of Items	Mean	S.D.	Alpha
Organisational Commitment				
Commitment	9	3.38	0.62	0.86
Personal Characteristics				
Age	1	42.02	9.96	-
Education	1	6.32	2.44	-
Union member	1	0.54	0.50	-
Negative Affectivity	3	2.77	0.89	0.86
Work Motivation	7	2.70	0.78	0.89
Work-Setting Variables				
Role ambiguity	3	3.67	0.66	0.70
Role conflict	3	2.78	0.79	0.74
Co-worker support	3	3.54	0.76	0.86
Supervisor support	3	3.68	0.90	0.90
Job security	3	2.74	0.98	0.85
Work autonomy	4	3.75	0.68	0.71
Pay level satisfaction	2	3.16	0.89	0.75
Satisfaction with benefits	2	3.45	0.75	0.66
Distributive justice	6	3.21	0.92	0.95
Procedural justice	22	3.24	0.72	0.78
Promotional opportunities	3	2.91	0.84	0.70
Routinisation	3	3.80	0.70	0.74
Resource adequacy	3	2.74	0.87	0.80
Organisational Outcomes				
Job satisfaction	3	3.55	0.80	0.89
Hours of unpaid overtime	3	5.90	7.93	-
Absenteeism	1	4.70	8.01	-
Intention to quit	2	2.73	0.85	0.68

5. THE RESULTS

Proposition 1 suggested that knowledge workers will have a lower level of commitment than other employees. This proposition was substantiated. As shown in table 4 this difference, although not substantial (0.072), was statistically significant (t-test) at the one per cent level. What factors can explain this difference? The two groups of employees differed significantly on three personal characteristics. Knowledge workers in PSR were more likely to be male (84.3 per cent compared to all other empoyees), were more highly educated (65.7 per cent possessed PhD's compared to 8.7 per cent for 'other' employees) and were more likely to be union members (60.1 per cent and 50.1 per cent respectively).

Two of these variables, education and union membership, are included in the model to test proposition 2 and so will be discussed later in this section along with a range of work- setting variables. Differences in gender composition between the two groups of employees did not appear to account for the difference in commitment. Commitment between male and female employees was similar (3.37 and 3.39 respectively, $t = 0.73$, $p = .465$), although within each gender group knowledge workers had significantly lower commitment than 'other' employees ($p < .05$). This is consistent with the results provided in Table 2.

Table 2

Commitment of Knowledge and Other Employees

Employee Type	N	Mean	Std Error	T-statistic	Prob>T
Knowledge workers	1172	3.341	.018	3.13	.0017
All other employees	1807	3.413	.015		

The second proposition was that different factors would affect the level of commitment of knowledge workers when compared to other workers. Results of the analysis are presented in Table 3. The model explained substantial amounts of variance for the commitment of knowledge workers (32 per cent) and all other employees (36 per cent). Moreover, while some factors were important determinants for both groups of workers (education, work motivation, job security, promotional opportunities and resource adequacy), others were not. Negative affectivity, co-worker support and procedural justice were important predictors of commitment of knowledge workers. In contrast, supervisor support, satisfaction with benefits, distributive justice and routinisation were significant predictors of commitment for all other employees. That is, of the eighteen variables included in the model, five variables were significant predictors of commitment for all workers, three variables were important predictors of commitment for knowledge workers and four variables were important determinants of commitment for other workers. Six variables were not statistically important determinants of commitment. In all

cases, the sign of the significant determinants was as predicted. On this basis proposition 2 was partially established.

The final proposition to be tested was that the lower commitment of knowledge workers would have a negative affect on organisational HRM outcomes. On all four HRM outcome variables the opposite case was found. Knowledge workers had higher job satisfaction, worked higher levels of unpaid overtime, had lower levels of absenteeism and were less likely to quit. With the exception of intention to quit, these differences were statistically significant at the one per cent level. Results are presented in Table 4. Proposition 3 was not therefore established. How can this finding be explained? If commitment is found to be positively related to job satisfaction and hours worked and negatively related to absenteeism and intention to quit then clearly other factors have led to the more positive result for knowledge workers. To explore these relationships partial correlational analysis was undertaken. The commitment variable had significant relationships with the four outcome variables in the direction expected. This was also the case for the knowledge worker classification. In this case the commitment variable had been confounding the relationship between knowledge workers and intention to quit. When this is allowed for knowledge workers also had a statistically lower intention to quit ($p<.05$). Results are presented in Table 5. Clearly the positive relationship between knowledge workers and the HRM outcome variables, while affected by the level of organisational commitment, was due to other factors.

Table 3

OLS Regression Coefficients for Organisational Commitment

Variable	Commitment of Knowledge Workers	Commitment of Other Employees
Intercept	1.84	1.20
	(0.28)	(0.19)
Age (+)	0.00	0.00
	(0.00)	(0.00)
Education (-)	-0.04**	-0.03**
	(0.01)	(0.01)
Union member (-)	0.02	-0.04)
	(0.04)	(0.03)
Negative Affectivity (-)	-0.07**	-0.01
	(0.02)	(0.02)
Work Motivation (+)	0.28**	0.33**
	(0.02)	(0.02)
Role ambiguity (-)	0.06	0.03
	(0.03)	(0.03)
Role conflict (-)	-0.01	0.00
	(0.03	(0.02)
Co-worker support (+)	0.07**	0.04
	(0.03)	(0.02)
Supervisor support (+)	0.01	0.07**
	(0.03)	(0.02)
Job security (+)	0.07**	0.03*
	(0.02)	(0.02)
Work autonomy (+)	-0.04	-0.01
	(0.03)	(0.02)
Pay level satisfaction (+)	-0.01	-0.03
	(0.03)	(0.02)
Satisfaction with benefits (+)	0.02	0.09**
	(0.02)	(0.02)
Distributive justice (+)	0.01	0.08**
	(0.03)	(0.02)
Procedural justice (+)	0.12**	0.03
	(0.04)	(0.03)
Promotional opportunities (+)	0.09**	0.04*
	(0.03)	(0.02)
Routinisation (-)	-0.01	-0.09**
	(0.03)	(0.02)
Resource adequacy (+)	0.04*	0.05*
	(0.02)	(0.02)
R^2	.33	.37
R^2 (Adjusted)	.32	.36
F	24.57	42.10
Significance	.000	.000

* p < .05; ** p < .01. Note: standard errors in parentheses.

Table 4

Means for Selected HRM Variables

Variable	Job Satisfaction	Unpaid Overtime Worked (hours)	Absenteeism (days)	Intention to Quit	
Knowledge workers		3.64	8.16	4.10	2.71
		(0.02)	(7.96)	(0.19)	(0.02)
All other employees		3.52	4.51	5.05	2.73
		(0.02)	(7.62)	(0.22)	(0.02)
t-statistic		3.89	12.11	3.26.58	
degrees of freedom		2610	2737	2840	2534
significance		.000	.000	.001	.559

* p < .05; ** p < .01. Note: standard errors in parentheses.

Table 5

Partial Correlation Coefficients for HRM Performance Variables

Variable	Job Satisfaction	Unpaid Overtime Worked	Absenteeism	Intention to Quit
Commitment	0.56**	0.06**	-0.05**	-0.52**
Knowledge work	0.11**	0.22**	-0.06**	-0.05*

* p < .05; ** p < .01.

6. DISCUSSION AND CONCLUSION

This paper explored the relationship between knowledge work, organisational commitment and HRM performance in a large public sector research organisation. Knowledge workers were defined as those employees whose prime job responsibilities included the initiation of projects, conducting research and the dissemination of the resultant knowledge. Knowledge workers were found to have significantly lower commitment than other workers, that their commitment was partially determined by different factors, and that this lower commitment did not result in a more negative outcome for the organisation. How can this last finding be understood? Commitment was positively related to organisational outcomes. Thus the lower commitment of knowledge workers should have had a negative affect on the selected HRM factors. Discussions with union and management personnel suggested that these workers had a higher commitment to their occupation or colleagues, their work had greater variety and challenges, and that their status and recognition depended on their peers both in PSR and elsewhere. It thus appears that a number of factors intervened in the commitment-performance relationship to lower the organisational commitment of knowledge workers while simultaneously improving their HRM performance.

This research has established that simple linkages between commitment and organisational HRM performance cannot be assumed in the case of knowledge workers. Management must be aware of the variety of factors that impact on knowledge workers and hence on their performance. This is well illustrated by the finding that intentions to quit were the same for both groups of workers despite knowledge workers having lower commitment. Part of the explanation is that a strong commitment to their occupation, and the nature and prestige of their work have combined, in the case of knowledge workers, to overcome the influence of lower organisational commitment. In addition, knowledge workers in PSR operate in a different labour market than the majority of other PSR employees. Employment elsewhere is limited as PSR is one of the few research institutions in Australia, outside universities, offering opportunities to undertake fundamental research These factors mean that the results of this research may not be applicable to other knowledge workers.

The relative independence of knowledge work from management control means that the management of these workers will require a different managerial approach to that of other workers. Moreover, the nature of the work performed by knowledge workers in PSR means that the major management task involves assessment of long-term outcomes rather than the day-to-day supervision of work. While there is some doubt as to whether commitment can be managed (Guest, 1992) the research points to some of the key issues that will need to be addressed by management. The building of strong systems of co-worker support and the provision of fair and just procedures for determining pay and resolving grievances will be important for building stronger organisational commitment. In contrast, concentration on remuneration issues or improving supervisor support systems will be unlikely to have an appreciable effect. This is a very different scenario than for the other employees in PSR.

The above findings suggest one approach to the management of knowledge workers is to implement systems that recognise the different nature of the work performed and needs of this group of employees. Putting to one side the question of whether it is possible or desirable to have different management systems for different groups of workers, it is clear that in a more demand-driven labour market the issue of retaining knowledge may become a major problem for the organisation. This research has provided some pointers for management, however, further research will be necessary before a clear pattern emerges. In addition to addressing the limitations of this study the research will need to be conducted in a variety of settings

involving various categories of knowledge workers. Only by doing so will the managerial implications of the increasing numbers of knowledge workers be understood.

While the research was limited in its generalisability due to the methodology utilised, the particular definitions adopted and the type of workers surveyed, it is likely that similar findings with respect to commitment will be found elsewhere. It is, however, unlikely that such positive HRM organisational outcomes will be found. If this is the case management will need to consider a variety of issues relating to the management of knowledge workers if their real value to the organisation is to be realised. This will involve a reconsideration of the requirements of knowledge workers, a cost-benefit analysis of the value of these workers to an organisation and the factors affecting the performance of knowledge workers. This is the challenge for management personnel and academic researchers.

NOTES

The alpha coefficient for the scale 'benefits' was less than .7 (.66). Although this is generally considered the lower bounds for inclusion of a scale it was included in the analysis. Following the method outlined by Cortina (1993) the inter-item and item-total correlations were examined for the two variables making up this scale. The inter-item correlation was .51 and the item-total correlations in both cases exceeded .84. This finding suggests that the scale benefits displays acceptable reliability.

The dependent variable, organisational commitment, was composed of nine items where the individual score for each item ranged from 1 to 5. When the nine items were summated and divided by 9 commitment scores ranged from 1 to 5 with 36 different values. As these scores are approximating interval data, OLS was selected as this technique is sufficiently robust to handle this type of data (Berry and Feldman, 1985). It should be noted that multinomial logit can also be used with data of this
nature.

Multicollinearity is caused by a strong correlation between the predictor variables in a model or by common method variance. In survey work, common method variance may arise if the dependent variable and some or all of the independent variables are composed of self report attitude measures (Campbell and Friske, 1959; Friske, 1982).

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Appendix A: Variable Definitions

Variable	*Definition*
Organisational Commitment	
Commitment	The extent to which an employee believes in, and accepts an organisations' goals and values, together with a willingness to exert considerable effort for that organisation (Porter *et al.*, 1974).
Personal Characteristics	
Age	Age in years.
Education	Nine levels of education ranging from Year10 or lower to PhD/doctorate.
Union member	Whether employee is a union member (yes = 1, no = 0).
Negative affectivity	The extent to which an employee experiences aversive emotional states over time and across situations (Watson *et al.*, 1987).
Work motivation	An employee's normative belief in the importance of work in general (Kanungo, 1982).
Work-Setting Variables	
Role ambiguity	The degree to which an employee understands clearly their role expectations (Rizzo *et al.*, 1970).
Role conflict	Degree to which an employee's role expectations are incompatible (Kahn *et al.*, 1964).
Co-worker support	Degree of consideration expressed by co-workers (three items House, 1981).
Supervisor support	Degree of consideration expressed by the employee's immediate supervisor (Micaels and Spector, 1982).
Job security	The extent to which an employee perceives long-term, stable employment with the organisation (Oldman *et al.*, 1986).
Work autonomy	Degree to which an employee has influence over his or her job (Tetrick and LaRocco, 1987).
Pay level satisfaction	An employee's general satisfaction with pay level (Heneman and Schwab, 1985).
Satisfaction with benefits	An employee's general satisfaction with non-pay benefits (Heneman and Schwab, 1985).

Appendix A (cont.)

Distributive justice	Fairness of performance appraisal outcomes (Curry *et al.*, 1986).

Procedural justice	The degree of clarity, understanding, two-way communications, trust and fairness of the evaluation system (Tang and Sarsfield-Brown, 1996).
Promotional opportunities	An employee's perception of promotional opportunities within the organisation (Price and Mueller, 1981).
Routinisation	The degree to which an employee's job is repetitive (Price and Mueller, 1981).
Resource adequacy	*The degree to which an employee perceives resources are adequate to perform their job (Iverson, 1992).*
Organisational Outcomes	
Job satisfaction	The degree to which an employee is satisfied with their job (Price and Mueller, 1981).
Hours	Hours of unpaid overtime worked per week.
Absent	Days of sick and personal leave taken in past year.
Intention to quit	An employee's intention to quit (Porter *et al.*, 1974).