SUPPORT DOCUMENT

Building the capacity to innovate: the role of human capital — support document

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Contents

Tables and figures

Tables

Figures

Appendix A: Survey methodology

Survey design and measurement

Development of the survey took place in late 2009 and early 2010. A scan of existing measures from the extant human resource management and innovation literature was used as the basis for the design, with additional measures drawn from prior workplace surveys conducted in Britain (Chaplin et al. 2005) and Australia (Smith, Oczkowski & Selby Smith 2008). Details of particular items and measures are considered later in this appendix.

Approval for the conduct of the survey was provided by the Statistical Clearing House, who provided additional requests with regard to sampling and survey design.

The target population for the survey was the set of human resource managers in medium to large private enterprises (defined as those companies with 50 or more employees) across Australia. The population was limited to private sector organisations with 200 or more employees. The estimated size of this population is 5876 companies (ABS 8165.0, 2007). The sample frame for the study was drawn from the Dun and Bradstreet company database. Information on this database is available at: http://dnb.com.au/Sales_and_Marketing/ Sales_and_marketing_lists/index.aspx

Details of the organisation's human resource manager/director are also included in the Dun and Bradstreet database (where known), with approximately 10 per cent of the listed firms in the database with a listed human resource manager. Given the potential for response bias and respondent burden, at the request of Statistical Clearing House the drawn sample was proportionally stratified on the basis of the availability of this information. In total, specific details of 354 human resource managers were available in the sample frame, from a total sample of 3,427 organisations.

A stratified sample of 1,875 organisations was drawn from this sample frame for the purposes of the study, including 194 organisations with specific contact details for the senior human resource manager. Sample information included mail contact details for the organisation, along with information on the number of employees in the organisation and the human resource manager's contact information if available.

Data collection for the survey was via a paper-based self-completion survey, with return via pre-paid envelope. This method was chosen primarily to minimise respondent burden, enabling respondents to complete in their own time, and to target the responses to the senior human resource managers within the companies in the sample. Consideration was given by the research team to providing a web-based completion alternative to respondents; however this option was declined due to potential method bias and technical feasibility.

Development of the survey took place in late 2009 and early 2010. A scan of existing measures from the extant human resource management and innovation literature was used as the basis for the design, with additional measures drawn from prior workplace surveys conducted in Britain (Chaplin et al. 2005) and Australia (Smith, Oczkowski, & Selby Smith 2008). The survey instrument was piloted in December 2009 with a group of human resource managers and industry experts. The testing resulted in minor changes to questionnaire wording to ensure consistency with current Australian business and educational practices. The Australian Bureau of Statistics (ABS) Statistical Clearing House provided advice on survey design and sampling. The sample frame of private sector organisations with 200 or more employees for the study was drawn from the Dun and Bradstreet database of Australian

organisations. A stratified sample of 1875 organisations was drawn from this sample frame for the purposes of the study, at the request of the Statistical Clearing House, of which 194 organisations had specific contact details for the senior human resource manager.

The survey was administered in April to June 2010. In order to maximise response rates, three waves of mail-outs were completed, in April, May and June 2010. The first and third mail-outs included a full copy of the survey, and return envelope and cover letter, while the second mail-out included a reminder letter only. The Centre for Regional Innovation and Competitiveness (CRIC) at the University of Ballarat managed the survey printing and mail distribution.

Of the 1875 surveys distributed, there were 143 responses returned, 313 distributed surveys were returned to CRIC marked 'return to sender', while there was no response from the remaining 1419 distributed surveys. Excluding the 'return to sender' returns, which were deemed to be out of sample, this results in a final response rate of 9.15 per cent.

Returned questionnaires were entered into a database by CRIC using 'Remark' optical character recognition software. This data entry process also incorporates data validation and logic checks for unexpected and out-of-range responses. The data were then reviewed by Steve McEachern prior to commencement of analysis. Of particular note was the return of responses by nine organisations with less than 50 staff members on the payroll, which were excluded from the final analysis (see further details in next section), resulting in a final sample for analysis of 134 responses.

Measures and summary statistics

This section summarises the measures used in the survey, and the basic distributional statistics for each measure. The measures are broken down by the various segments of the conceptual mode (innovation stimulus, innovation capacity and innovation performance), along with some organisational contextual information.

It should be noted that a number of the measures are based on multi-item scales. A copy of the questions used to generate the measures in this report is included in appendix D. Two basic methods were used to develop the multi-item scales used in this analysis — principal component analysis (PCA) and cluster analysis. All analyses were conducted in the Predictive Analytics Software (PASW) Statistics package version 17. A summary of analyses used for the development of scales for composite measures used in the report concludes this appendix.

Principal component analysis is a subset of the larger family of factor analysis methods, that seeks to identify and distinguish underlying latent variables from a set of correlated variables (in this case, the latent measure underlying a multi-item scale). Principal component analysis is used to reduce the dimensionality of multi-item data into a small number of measures which represent the major elements of variance within the set of variables. In the measures created below, the PASW factor analysis procedure was used to conduct the analysis. The principal components method was the factoring method used, with no rotation of components. The measures derived were identified on either the first or second principal components derived through the principal component analysis, and then subjected to reliability analysis to assess the Cronbach alpha reliability of the scale produced.

The other dimension reduction method used in the analysis was cluster analysis, again using the PASW cluster analysis procedures. Cluster analysis is commonly used in disciplines such as marketing to identify subsets of respondents in a study who exhibit similar profiles or characteristics. For

marketers, this is primarily to determine market segments that may be then targeted with specific marketing campaigns.

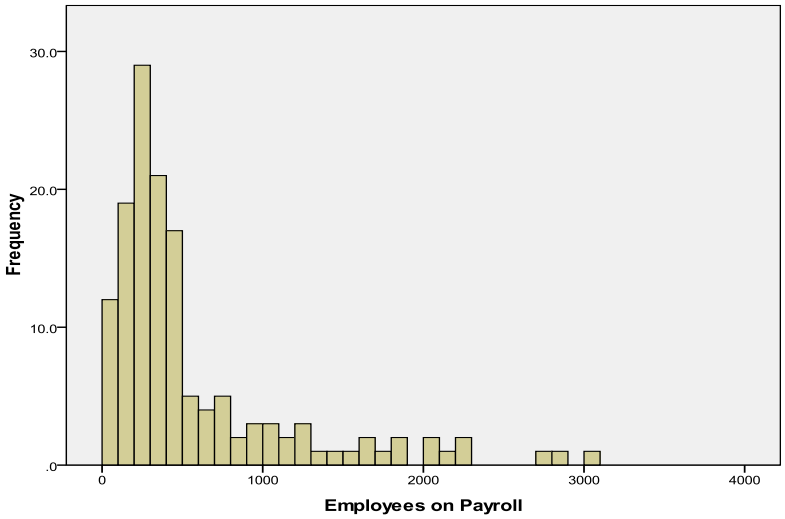
In this study, the PASW two-step clustering procedure was used to conduct the analysis. This procedure begins by allocating a 'pre-clustering' to identify the likely cluster solution, and then a second stage of hierarchical cluster analysis to finalise the cluster membership of cases. In each analysis presented here, the possible cluster solutions was assessed iteratively by reviewing the solution produced and then evaluating against solutions with higher and lower numbers of clusters on the basis of interpretability.

Contextual measures

Employee profile

Several measures of the distribution of employees within the organisation were included in the questionnaire. The primary measure used here was the number of employees in the organisation. Figure A1 shows the distribution of the 143 organisations within the sample by number of employees.

Figure A1 Distribution of organisations by number of employees



Note: Two organisations of more than 3500 employees are not represented here.

There were a total of nine organisations of less than 50 employees which were excluded from subsequent analyses due to their size, as there is strong evidence to suggest that small organisations have qualitatively different human resource and innovation practices (Mayson & Barrett 2006). This resulted in a final sample for analysis of 134 organisations. These organisations had a mean of 818 employees and a median of 350 employees, with the number of employees ranging in size from 79 to 25000. Other notable characteristics of these organisations were:

75 per cent of organisations had at least 68 per cent of their staff working fulltime

90 per cent had fewer than 17.5 per cent part-time staff

75 per cent had fewer than 15 per cent casual staff

90 per cent had fewer than 7 per cent temporary or fixed term staff

Firms in the sample varied significantly in terms of the type of occupation of employees. Table A1 shows the distribution of employment by occupation, including minimum, median and maximum

percentages of employment by occupation. Most occupations were represented within the sample, although there were very few community and personal service workers employed by firms in the sample (which may be partly explained by the exclusion of public and non-profit sector organisations). Other notable characteristics of the employee profiles were:

In 75 per cent of organisations, fewer than 40 per cent of staff held a TAFE or VET qualification

The median percentage of staff holding a university qualification was 10 per cent

The median percentage of female staff employed was 30 per cent.

The median level of union membership was 10 per cent.

Table A1 Distribution of staff by occupation (per cent)

		Managers	Professionals	Technicians and Trade Workers	Community & Personal Service Workers	Clerical and Admin Workers	Sales Workers	Machinery Operators and Drivers	Labourers
Mean		11.02%	17.71%	17.44%	.93%	12.91%	10.86%	12.24%	13.78%
Std. Deviation		8.990%	23.822%	24.052%	6.253%	15.269%	19.455%	21.043%	23.190%
Median		10.00%	8.00%	8.00%	.00%	9.50%	2.00%	.00%	.00%
Minimum		0%	0%	0%	0%	0%	0%	0%	0%
Maximum		55%	99%	95%	50%	98%	85%	85%	95%
Percentiles	10	2.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	25	5.00%	1.75%	0.00%	0.00%	4.38%	0.00%	0.00%	0.00%
	50	10.00%	8.00%	8.00%	0.00%	9.50%	2.00%	0.00%	0.00%
	75	15.00%	23.00%	26.75%	0.00%	15.50%	10.00%	15.25%	18.50%
	90	20.00%	66.00%	59.00%	0.00%	30.00%	34.50%	50.00%	50.00%

Organisational structures

Table A2 shows the distribution of organisations by industry, broken down by number of employees. The largest proportion of organisations in the sample was from the manufacturing industry, followed by retail trade and construction.

In terms of organisational characteristics, most of the organisations in the sample were large with a median of 818 staff and a mean of 350. Most of the organisations were privately owned with over 70 per cent private limited companies. Over 70 per cent of the organisations were either Australian owned or subsidiaries of an Australian parent company. The majority of organisations were involved in manufacturing, retail or construction.

Most of the organisations in this sample employed predominantly full-time, permanent staff. The use of part-time and casual staff was quite limited with 90 per cent of the organisations employing fewer than 17.5 per cent of their workforce on a part-time basis and 75 per cent of organisations employing fewer than 15 per cent of staff casually.

The level of tertiary qualifications held by staff in the sample organisations was relatively low. In 75 per cent of the organisations fewer than 40 per cent of staff held VET qualifications and, on average, only 10 per cent of staff in the sample organisations held a higher education qualification.

Table A2 Distribution of organisations by ANZSIC industry classifications and number of employees

		Number of Employees			
		1–99	100–199	200 or more	Total
ANZSIC	Agriculture, Forestry and Fishing		1	1	2
	Mining			4	4
	Manufacturing	1	4	31	36
	Electricity, Gas, Water and Waste Services			8	8
	Construction		3	9	12
	Wholesale Trade			1	1
	Retail Trade		1	12	13
	Accommodation and Food Services		2	7	9
	Transport, Postal and Warehousing			8	8
	Information Media and Telecommunications		2	3	5
	Financial and Insurance Services		1	3	4
	Rental, Hiring and Real Estate Services				
	Professional, Scientific and Technical Services		2	8	10
	Administrative and Support Services	1	1	4	6
	Public Administration and Safety			1	1
	Education and Training			3	3
	Health Care and Social Assistance	1		2	3
	Arts and Recreation Services				
	Other Services			7	7
	No response		2		2

Innovation stimulus

The innovation stimulus measures in the model comprise three elements: the human resource management system, the learning and development system and the creativity management system.

Human resource management system

There are a number of measures in the literature which have been considered when exploring the elements of a human resource management system, particularly in regard to a high-performance work system, which have been summarised in the earlier literature review of this project (Smith et al. 2011).

The questionnaire included items focussing on five basic areas of human resource practices. Each of these measures was based on previously established scales within the literature, as follows:

Compensation systems (Smith, Oczkowski & Selby Smith 2008)

Performance management (including appraisals and performance-based payment) (Chaplin et al. 2005)

Work organisation (Gjerding 1996)

Recruitment and selection practices (Collins & Smith 2006)

Flexible work practices (Chaplin et al. 2005).

Very few of these measures of human resource practices were related to innovation capacity or innovation performance directly. The only measures that showed a relationship to innovation were

measures of work organisation and flexible work practices. These measures were used to develop a summative scale of human resource systems for the statistical analysis.

Summative scales were derived for work organisation and flexible work practices using principal components analysis and reliability analysis. Summary measures for the other three items were developed, but further analysis of correlations between these measures and innovation measures displayed no significant relationships, and they were subsequently excluded from any further analyses.

Knowledge system and learning and development

Measures of learning and development were primarily derived from two sources, the British Workplace Employment Relations Survey 2004, and items from a questionnaire completed previously by Smith and colleagues (Smith, Oczkowski & Selby Smith 2008). The basic areas covered in this section included:

Hours of training

Areas of training covered

Types of employees trained

Attitudes to training

Training providers used

Few measures of training and development were related to innovation capacity or performance. The only measures that showed any relationship were the areas covered by areas of training and company attitudes to training. These two measures were used to construct a summative measure for learning and development.

Summary measures of the areas of training covered and attitudes to training were derived based on principal component analysis and reliability analysis, with both measures demonstrating adequate reliability (alpha > 0.7). Measures of hours of training, types of employees and training providers were also developed, but these again showed no significant relationship to innovation practices or performance and were excluded from further analysis.

In addition to specific training measures, two measures of knowledge exchange were included. The first, based on Collins and Smith (2006), included questions that asked respondents to rate employees in their organisation on various elements of knowledge exchange in daily work practices. This measure did not however show adequate reliability (alpha = 0.511) and was excluded from further analyses.

The second measure of knowledge exchange was derived from Tidd and Bessant (2009)'s learning subscale of their innovation capacity instrument. Questions in this instrument ask respondents to indicate whether various learning practices are true of their organisation, on a scale from 1—7. This measure was shown to be highly reliable (alpha = 0.868).

High performance work practices

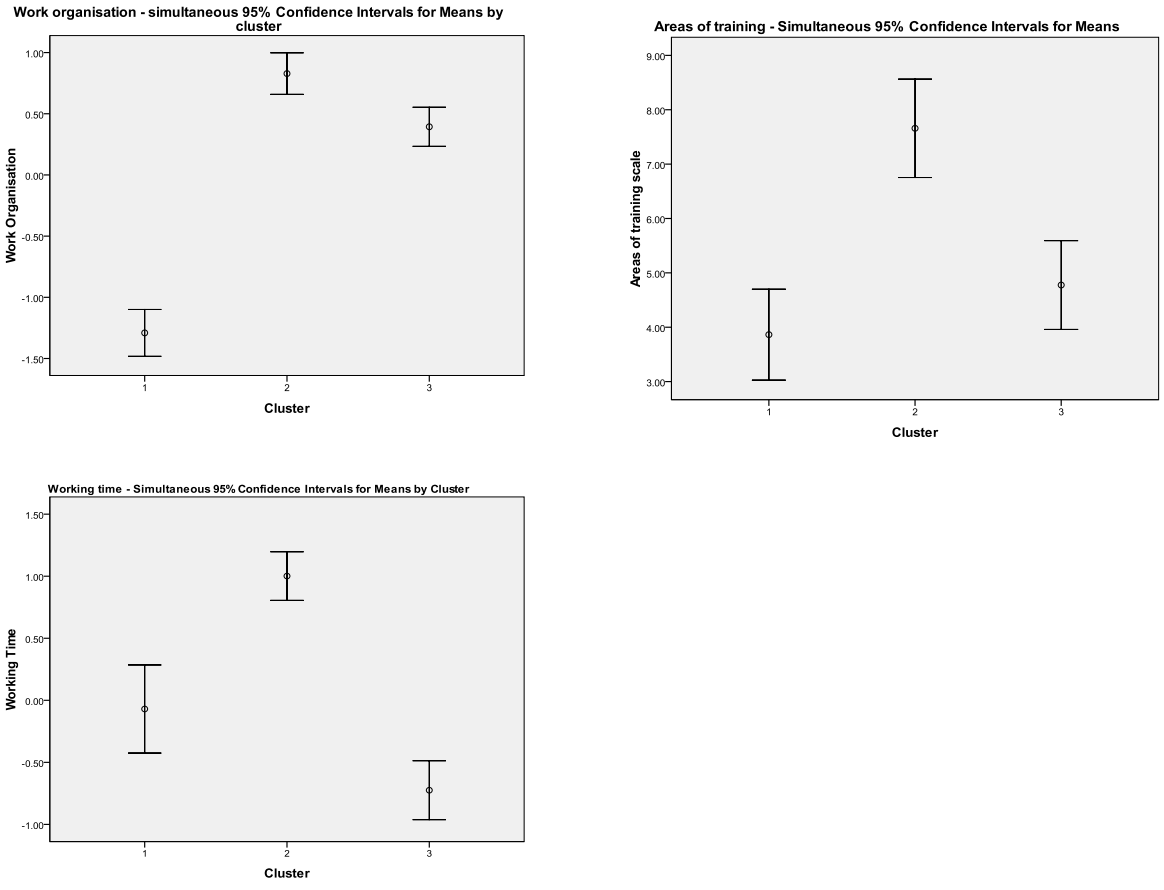
A major debate within the human resource management literature is the question of whether it is particular human resource practices, or a more general cluster of high-performance work practices (HPWP), which is more important in influencing organisational performance outcomes such as innovation performance. The clustering of human resource management practices into high performance work patterns has long been associated with higher organisation performance on a range

of measures. In terms of innovation, the following analysis suggests that organisations tend to use one of three possible clusters of high performance work practices — the use of flexible working time, the issue of team-based work organisation and a combination of a larger number of practices.

Two methods were used to determine whether a common performance work practice measure could be developed. Firstly, a second principal component analysis was conducted with the four retained measures — work organisation, flexible work practices, areas of training covered and attitudes to training. This measure had relatively low reliability (alpha = 0.44), and even when the attitudes to training measure was excluded, the summative measure did not function effectively.

Given the absence of a reliable composite measure, a second method of cluster analysis was then also applied. Two stage cluster analysis was used to identify clusters of organisations with similar patterns of adoption of human resource and learning practices (maximising differences between organisations between each cluster, and minimising differences within cluster). A three-cluster solution was identified, and the means of each cluster for each of the three measures included in the analysis (work organisation, working time and areas of training) are shown in figure A2.

Figure A2 Cluster analysis means



The distribution of practices illustrated in figure A2 indicates that there are three broad patterns in terms of use of these practices:

Cluster one: use of flexible working time only

Cluster two: use of all high performance work practices

Cluster three: use of work organisation only

While this classification is only indicative given the size of the sample, it does provide useful guidance as to the profile of potential adoption patterns for high performance work practices. Further analysis of the relationship of these cluster profiles also indicated that these patterns were not specific to a particular industry or to the size of the organisation. This classification is therefore used in combination with the individual measures of high performance work practices in further analysis below.

Creativity management

Two measures addressing creativity management were included in the survey. The first measure of creativity management was based on Prajogo and Ahmed (2006). Questions in this measure asked respondents to rate their organisation on knowledge exchange and support for creativity. This measure was found to be highly reliable (alpha = 0.845).

The second measure of knowledge exchange was derived from Tidd and Bessant (2009)'s linkages subscale of their innovation capacity instrument. Questions in this instrument ask respondents to indicate whether various learning practices are true of their organisation, on a scale from 1—7. This measure was shown to be highly reliable (alpha = 0.815).

Innovation capacity

Innovation capacity measures were derived from Subramaniam and Youndt (2005). The original measure there focussed on product innovation, asking the respondent to rate their organisation on six measures of innovative capacity relative to their competitors. This measure was extended in this study to include process innovation as well. The scales derived from principal component analysis showed significant differences between perceptions of 'incremental' and 'radical' items, and thus distinct summative measures were derived for each of these types, resulting in two product/service innovation measures and two process innovation measures. All measures were considered reliable (alpha > 0.864).

Performance measures

Overall firm performance measures were based on two areas — innovation performance, and 'functional' performance on human resource management and learning and development outcomes.

Innovation performance

Measures of innovation performance were drawn from Prajogo and Ahmed (2006). Two measures were again developed, based on process and product/service innovation. Respondents were asked to rate their firm based on the firm's position relative to competitors in regard to five aspects of product innovation (newness, speed of new development, number of new products, first-to-market activity and use of technological innovations) and four aspects of process innovation (adoption of innovations, currency of technology, speed of adoption, and changes in processes). Both product and process measures were subjected to principal component analysis, and produced highly reliable composite measures (alpha = 0.799 and 0.845).

Human resource performance

In addition to the outcome measure of innovation performance, two measures of 'procedural' performance were included, to assess the perceived performance of human resource systems.

The first measure of 'people management' was drawn from Prajogo and Ahmed (2006). Respondents were asked to rate their organisations on issues such as regular assessment of employee satisfaction, communication processes and health and safety. This measure included five items and showed adequate reliability (alpha = 0.797).

The second measure of human resource performance assessed the organisation's level of human capital, based on a measure drawn from Subramaniam and Youndt (2005). Five items were included in this measure rating employees' level of creativity and knowledge. Principal component analysis was used to derive the scale, with a high level of reliability (alpha = 0.920).

Knowledge performance

In addition to these core measures two final measures of the performance of organisational knowledge management systems were included — social capital and organisational capital — based on Subramaniam and Youndt (2005). The measure of social capital included five items assessing employees' capacity to share knowledge within and outside the organisation, while the organisational capital measure assessed the organisation's capacity to capture knowledge explicitly in systems, patents and processes. Both measures were found to be reliable (alpha > 0.78).

Generation of composite measures by topic area

The following section provides a summary of principal component analyses used for the development of scales for composite measures used in the report.

For each of the principal component analyses conducted, the following summary tables are presented (produced from the SPSS Factor Analysis — Principal component analysis standard output tables):

1 Total variance explained — eigenvalues and extraction sums of squared loadings

2 Component matrix for each of the measures in the analysis

3 Reliability analysis table (Cronbach's alpha and alpha based on standardised items)

For multiple correspondence analyses, used with ordinal categorical items, the following summary tables are presented (again produced from the SPSS Multiple Correspondence Analysis output tables):

1 Model summary — eigenvalues and total variance explained

2 Discrimination measures — major contributors to variance on a dimension of the multiple correspondence analysis

Human resource management systems

Work organisation

Table A3 Work organisation — Model summary

Dimension	Variance Accounted For			
	Cronbach's Alpha	*Total (Eigenvalue)*	*Inertia*	*% of Variance*
1	.704	2.521	.360	36.012
2	.141	1.138	.163	16.252
Total		3.658	.523	
Mean	.529[a]	1.829	.261	26.132

Notes: a. Mean Cronbach's Alpha is based on the mean Eigenvalue.

Table A4 Work organisation – Discrimination measures

	Dimension		
	1	*2*	*Mean*
Delegation of responsibility	.185	.148	.166
Systems for the collection of proposals from employees (e.g. suggestion box, intranet)	.630	.069	.349
Quality circles/groups	.654	.085	.369
Wages based upon quality or results (not piece work)	.158	.425	.292
Integration of functions (e.g. sales production/service finance)	.200	.248	.224
Cross occupational working groups	.392	.157	.275
Planned job rotation	.302	.007	.154
Active Total	2.521	1.138	1.829
% of Variance	36.012	16.252	26.132

Flexible work practices

Table A5 Flexible work practices – Model summary

Dimension		Variance Accounted For		
	Cronbach's Alpha	*Total (Eigenvalue)*	*Inertia*	*% of Variance*
1	.779	3.010	.430	43.0
2	.588	2.016	.288	28.8
Total		5.025	.718	
Mean	.702[a]	2.513	.359	35.9

Notes: a. Mean Cronbach's Alpha is based on the mean Eigenvalue.

Table A6 Flexible work practices – Discrimination measures

	Dimension		
	1	*2*	*Mean*
Flexitime (where an employee has no set start or finish time, but has an agreement to work a set number of hours per week or month)	.444	.191	.317
Ability to change shift patterns	.392	.483	.438
Ability to increase working hours (e.g., switching from part-time to full-time)	.420	.296	.358
Working at or from home in normal working hours	.456	.290	.373
Job sharing schemes (sharing a full-time job with another employee)	.283	.246	.264
Working compressed hours (e.g., a 9 day fortnight)	.633	.358	.496
The ability to reduce working hours (e.g., switching from full-time to part-time)	.382	.153	.267
Active Total	3.010	2.016	2.513
% of Variance	43.0	28.8	35.9

Knowledge system and learning and development

Attitudes to training

Table A7 Attitudes to training – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.283	41.039	41.039	3.283	41.039	41.039
2	1.128	14.097	55.136	1.128	14.097	55.136
3	.885	11.057	66.193			
4	.755	9.435	75.628			
5	.649	8.118	83.747			
6	.583	7.287	91.033			
7	.459	5.739	96.772			
8	.258	3.228	100.000			

Notes: Extraction method – Principal component analysis.

Table A8 Attitudes to training – Component matrix

	Component	
	1	2
We provide career path opportunities for employees to move across functional areas of the company.	.746	.055
We provide training focused on team-building and teamwork skills training.	.758	.094
We sponsor company social events for employees to get to know one another.	.553	.362
We offer an orientation program that trains employees on the history and processes of the company.	.639	.239
We use job rotation to expand the skills of employees.	.479	.236
We have a mentoring system to help develop employees.	.542	.400
Performance appraisals are used primarily to set goals for personal development.	.615	-.649
Performance appraisals are used to plan skill development and training for future advancement within the company	.733	-.540

Notes: Extraction method – Principal component analysis, 2 components extracted.

Table A9 Attitudes to training – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.786	.790	8

Knowledge exchange – Collins and Smith (2006)

Table A10 Knowledge exchange (Collins and Smith 2006) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.408	55.105	55.105	4.408	55.105	55.105
2	.989	12.367	67.471			
3	.861	10.767	78.238			
4	.632	7.899	86.137			
5	.343	4.282	90.419			
6	.309	3.861	94.280			
7	.279	3.487	97.767			
8	.179	2.233	100.000			

Notes: Extraction method – Principal component analysis.

Table A11 Knowledge exchange (Collins and Smith 2006) – Component matrix

	Component
	1
Employees see benefits from exchanging and combining ideas with one another.	.786
Employees believe that by exchanging and combining ideas they can move new projects or initiatives forward more quickly than by working alone.	.837
At the end of each day our employees feel that they have learned from each other by exchanging and combining ideas.	.775
Employees in our company are proficient at combining and exchanging ideas to solve problems or create opportunities.	.767
Employees in our company do not do a good job of sharing their individual ideas to come up with new ideas products or services.	-.627
Employees here are capable of sharing their expertise to bring new projects or initiatives to fruition.	.745
The employees in our company are willing to exchange and combine ideas with their co-workers.	.765
It is rare for employees to exchange and combine ideas to find solutions to problems.	-.606

Notes: Extraction method: Principal component analysis, 1 component extracted.

Table A12 Knowledge exchange (Collins and Smith 2006) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.511	.601	8

Knowledge Exchange – Tidd and Bessant (2009)

Table A13 Knowledge exchange (Tidd and Bessant 2009) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.229	52.869	52.869	4.229	52.869	52.869
2	.905	11.310	64.179			
3	.830	10.369	74.548			
4	.597	7.459	82.007			
5	.512	6.395	88.401			
6	.378	4.727	93.128			
7	.302	3.772	96.900			
8	.248	3.100	100.000			

Notes: Extraction method – Principal component analysis.

Table A14 Knowledge exchange (Tidd and Bessant 2009) – Component matrix

	Component
	1
We learn from our mistakes	.726
We systematically compare our products and processes with other firms	.606
We meet and share experiences with other firms to help us learn	.651
We are good at capturing what we have learned so that others in the organisation can make use of it	.852
We are good at learning from other organisations	.828
We use measurements to help identify where and when we can improve our innovation management	.747
There is a strong commitment to training and development of people	.572
We take time to review our projects to improve our performance next time	.784

Notes: Extraction method: Principal component analysis, 1 component extracted.

Table A15 Knowledge exchange (Tidd and Bessant 2009) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.865	.868	8

High performance work practices

High performance work practices measure one

Table A16 High performance work practices (measure 1) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.590	53.001	53.001	1.590	53.001	53.001
2	.836	27.865	80.866			
3	.574	19.134	100.000			

Notes: Extraction method – Principal component analysis.

Table A17 High performance work practices (measure 1) – Component matrix

	Component
	1
HPWP–Work Organisation	.778
Working time HPWP	.591
Areas of training scale	.797

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A18 High performance work practices (measure 1) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.444	.549	3

High performance work practices measure two

Table A19 High performance work practices (measure 2) – Cluster distribution

Cluster	N	% of Combined	% of Total
1	44	30.8%	30.8%
2	41	28.7%	28.7%
3	58	40.6%	40.6%
Combined	143	100.0%	100.0%
Total	44	30.8%	30.8%

Table A20 High performance work practices (measure 2) – Cluster profile/centroids

	HPWP–Work organisation		Working Time HPWP		Areas of training scale	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
1	-1.2907	.50960	-.0700	.94493	3.8636	2.22659
2	.8284	.43459	1.0012	.50139	7.6585	2.31959
3	.3936	.49308	-.7247	.73330	4.7759	2.52039
Combined	.0000	1.00351	-.0284	1.03037	5.3217	2.81495

Creativity

Creativity management

Table A21 Creativity management (Prajogo and Ahmed 2006) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.730	68.256	68.256	2.730	68.256	68.256
2	.479	11.987	80.243			
3	.414	10.361	90.604			
4	.376	9.396	100.000			

Notes: Extraction method – Principal component analysis.

Table A22 Creativity management (Prajogo and Ahmed 2006) – Component matrix

	Component
	1
We provide time and resources for employees to generate share/exchange and experiment innovative ideas/solutions.	.820
Employees are working in diversely skilled work groups where there is free and open communication among the group members.	.847
In our company employees frequently encounter non-routine and challenging work that stimulates creativity.	.808
Employees are recognised and rewarded for their creativity and innovative ideas.	.829

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A23 Creativity management (Prajogo and Ahmed 2006) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.844	.845	4

Linkages – Tidd and Bessant (2009)

Table A24 Linkages (Tidd and Bessant 2009) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.566	44.579	44.579	3.566	44.579	44.579
2	1.212	15.151	59.730	1.212	15.151	59.730
3	.723	9.042	68.772			
4	.658	8.225	76.997			
5	.539	6.736	83.733			
6	.466	5.830	89.563			
7	.437	5.466	95.029			
8	.398	4.971	100.000			

Notes: Extraction method – Principal component analysis.

Table A25 Linkages (Tidd and Bessant 2009) – Component matrix

	Component	
	1	2
We have good 'win-win' relationships with our suppliers	.555	.483
We are good at understanding the needs of our customers/end users	.574	.535
We work well with universities and other research centres to help us develop our knowledge	.553	-.549
We work closely with our customers in exploring and developing new concepts	.760	.309
We collaborate with other firms to develop new products or processes	.741	.054
We try to develop external networks of people who can help us – for example with specialist knowledge	.713	-.218
We work closely with the local and national education system to communicate our needs for skills	.633	-.482
We work closely with 'lead users' to develop innovative new products and services	.768	-.111

Notes: Extraction method – Principal component analysis, 2 components extracted.

Table A26 Linkages (Tidd and Bessant 2009) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.813	.815	8

Innovation capacity

Incremental Product Innovation Capacity

Table A27 Incremental product innovation capacity – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.636	87.856	87.856	2.636	87.856	87.856
2	.230	7.672	95.529			
3	.134	4.471	100.000			

Notes: Extraction method – Principal component analysis.

Table A28 Incremental product innovation capacity – Component matrix

	Component
	1
Innovations that reinforce your product/service lines.	.928
Innovations that reinforce your existing expertise in your products/services.	.955
Innovations that reinforce how you currently compete.	.928

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A29 Incremental product innovation capacity – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.933	.934	3

Radical product innovation capacity

Table A30 Radical product innovation capacity – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.599	86.621	86.621	2.599	86.621	86.621
2	.247	8.239	94.860			
3	.154	5.140	100.000			

Notes: Extraction method – Principal component analysis.

Table A31 Radical product innovation capacity – Component matrix

	Component
	1
Innovations that make your product/service lines obsolete.	.940
Innovations that fundamentally change your products/services.	.912
Innovations that make your existing expertise in your products/services obsolete.	.940

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A32 Radical product innovation capacity – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.928	.929	3

Incremental process innovation capacity

Table A33 Incremental process innovation capacity – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.662	88.733	88.733	2.662	88.733	88.733
2	.213	7.104	95.837			
3	.125	4.163	100.000			

Notes: Extraction method – Principal component analysis.

Table A34 Incremental process innovation capacity – Component matrix

	Component
	1
Innovations that reinforce your processes	.934
Innovations that reinforce your existing expertise in your processes.	.958
Innovations that reinforce the processes you currently use to compete.	.934

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A35 Incremental process innovation capacity – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.938	.938	3

Radical process innovation capacity

Table A36 Radical process innovation capacity – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.347	78.237	78.237	2.347	78.237	78.237
2	.412	13.729	91.966			
3	.241	8.034	100.000			

Notes: Extraction method – Principal component analysis.

Table A37 Radical process innovation capacity – Component matrix

	Component
	1
Innovations that make your processes obsolete.	.919
Innovations that fundamentally change your processes.	.861
Innovations that make your existing expertise in your processes obsolete	.872

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A38 Radical process innovation capacity – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.864	3

Innovation performance

Product innovation performance

Table A39 Product innovation performance – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.098	61.955	61.955	3.098	61.955	61.955
2	.609	12.174	74.129			
3	.565	11.304	85.433			
4	.445	8.899	94.333			
5	.283	5.667	100.000			

Notes: Extraction method – Principal component analysis.

Table A40 Product innovation performance – Component matrix

	Component
	1
The level of newness (novelty) of our company's new products and services.	.758
The use of latest technological innovations in our new products and services.	.718
The speed of our new product and service development.	.746
The number of new products and services our company has introduced to the market.	.872
The number of our new products and services that are first-to-market.	.831

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A41 Product innovation performance – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.845	.845	5

Process innovation performance

Table A42 Process innovation performance – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.493	62.334	62.334	2.493	62.334	62.334
2	.647	16.176	78.509			
3	.461	11.525	90.034			
4	.399	9.966	100.000			

Notes: Extraction method – Principal component analysis.

Table A43 Process innovation performance – Component matrix

	Component
	1
The technological competitiveness of our company	.715
The speed with which we adopt the latest technological innovations in our processes.	.838
The updatedness or novelty of the technology used in our processes.	.817
The rate of change in our processes, techniques and technology.	.782

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A44 Process innovation performance – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.800	.799	4

Human resource performance

People management – Prajogo and Ahmed (2006)

Table A45 People management (Prajogo and Ahmed 2006) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.019	50.309	50.309	3.019	50.309	50.309
2	.827	13.787	64.096			
3	.705	11.750	75.846			
4	.642	10.704	86.550			
5	.473	7.885	94.435			
6	.334	5.565	100.000			

Notes: Extraction method – Principal component analysis.

Table A46 People management (Prajogo and Ahmed 2006) – Component matrix

	Component
	1
We have an organisation-wide training and development process including career path planning for all our employees.	.668
Our company has maintained both 'top-down' and 'bottom-up' communication processes.	.792
Employee satisfaction is formally and regularly measured.	.722
Employee flexibility, multi-skilling and training are actively used to support performance improvement.	.684
We always maintain a work environment that contributes to the health, safety and well-being of all employees.	.597
We use bottom-up communication processes that allow for innovative ideas to be implemented.	.773

Notes: Extraction method - Principal component analysis, 1 component extracted.

Table A47 People management (Prajogo and Ahmed 2006) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.797	.800	6

Human capital – Subramaniam and Youndt (2005)

Table A48 Human capital (Subramaniam and Youndt 2005) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.767	75.342	75.342	3.767	75.342	75.342
2	.445	8.895	84.237			
3	.370	7.409	91.647			
4	.231	4.615	96.262			
5	.187	3.738	100.000			

Notes: Extraction method – Principal component analysis.

Table A49 Human capital (Subramaniam and Youndt 2005) – Component matrix

	Component
	1
Our employees are highly skilled.	.821
Our employees are widely considered the best in our industry.	.841
Our employees are creative and bright.	.907
Our employees are experts in their particular jobs and functions.	.906
Our employees develop new ideas and knowledge.	.861

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A50 Human capital (Subramaniam and Youndt 2005) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.919	.920	5

Knowledge performance

Social capital – Subramaniam and Youndt (2005)

Table A51 Social capital (Subramaniam and Youndt 2005) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.863	77.261	77.261	3.863	77.261	77.261
2	.628	12.553	89.814			
3	.212	4.234	94.048			
4	.187	3.733	97.781			
5	.111	2.219	100.000			

Notes: Extraction method – Principal component analysis.

Table A52 Social capital (Subramaniam and Youndt 2005) – Component matrix

	Component
	1
Our employees are skilled at collaborating with each other to diagnose and solve problems.	.890
Our employees share information and learn from one another.	.923
Our employees interact and exchange ideas with people from different areas of the company.	.911
Our employees partner with customers, suppliers, alliance partners, etc. to develop solutions.	.772
Our employees apply knowledge from one area of the company to problems and opportunities that arise in another.	.891

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A53 Social capital (Subramaniam and Youndt 2005) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.924	.926	5

Organisational capital – Subramaniam and Youndt (2005)

Table A54 Organisational capital (Subramaniam and Youndt 2005) – Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.440	61.009	61.009	2.440	61.009	61.009
2	.709	17.732	78.742			
3	.500	12.510	91.252			
4	.350	8.748	100.000			

Notes: Extraction method – Principal component analysis.

Table A55 Organisational capital (Subramaniam and Youndt 2005) – Component matrix

	Component
	1
Much of our company's knowledge is contained in manuals, databases, etc.	.851
Our company's culture (stories, rituals) contains valuable ideas and ways of doing business.	.773
Our company uses patents and licenses as a way to store knowledge.	.649
Our company embeds much of its knowledge and information in structures, systems and processes.	.836

Notes: Extraction method – Principal component analysis, 1 component extracted.

Table A56 Organisational capital (Subramaniam and Youndt 2005) – Reliability analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.775	.781	4

Appendix B: Synopsis of the literature

The conceptual model (or framework) used in this project takes the view that a range of stimulus factors (human and technological) affect the capacity of enterprises to innovate. The model posits that innovation capacity when effectively utilised will lead to increased 'innovation performance'. Whilst acknowledging the critical role of technology in innovation, the review of the literature (Smith et al. 2011), synthesised here, is concerned with the human factors. These human factors within enterprises appear in the form of human resource management (HRM) systems and practices, including the learning and development (L&D) system, and their links to the tertiary education system.

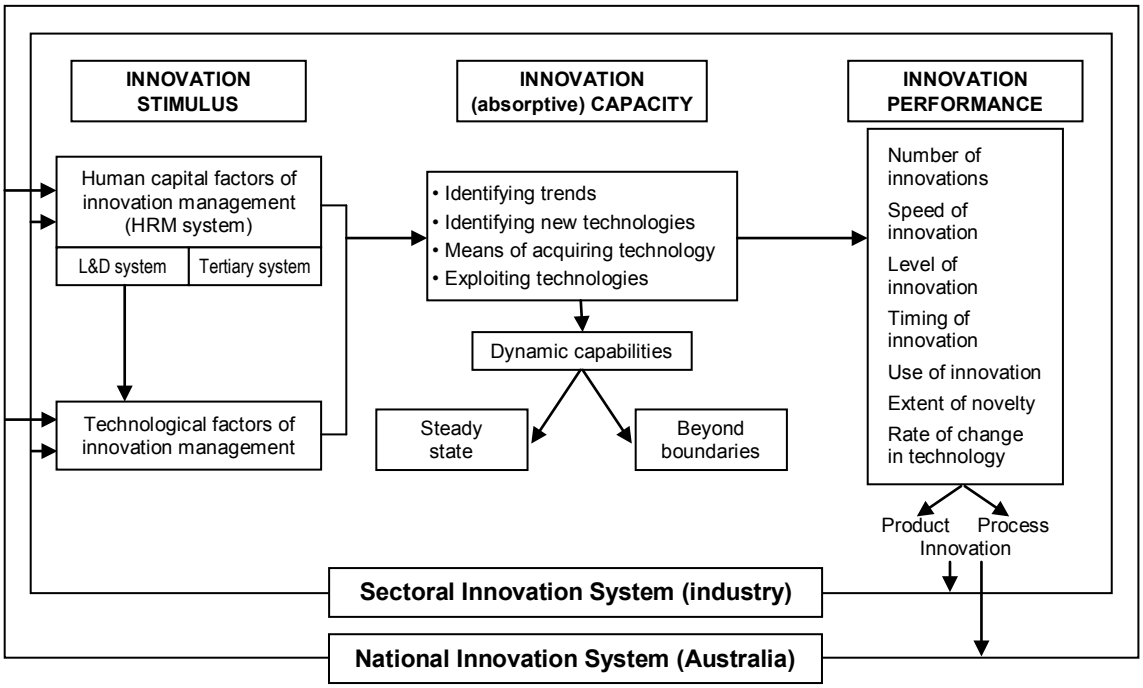
Much research has examined the various human resource management aspects of innovation capacity; however, no study has brought these components into an overall approach for building innovation capacity for improved innovation performance. In addition, there has been limited research in the Australian context. This chapter provides the macro framework of innovation in enterprises, identifying the technological and human stimuli necessary to build innovation capacity. It provides a brief overview of the literature on human resource management and innovation, with particular consideration of the role of people management, knowledge management and creativity management.

Macro framework of innovation

Innovation 'capacity', the ability of enterprises to identify trends and new technologies as well as to acquire and exploit this knowledge and information, needs to be clearly distinguished from innovation 'capability', the enterprise's ability to continuously transform knowledge and ideas into profitable innovations. This investigation develops a framework to examine the prior capacity-building function and role of employees, through the human resource management function, to acquire the ability to innovate within a strategic innovation model of the type developed by Terziovski (2007).

Figure B1 represents a macro framework of the enterprise innovation process, incorporating internal factors (technological and human) and external factors (for example, the industry, government policies to stimulate innovation etc) based on the research literature on innovation in business enterprises. This model is an adaptation and extension of Prajogo and Ahmed's (2006) Stimulus-Capacity-Performance approach. In this framework, technological and human capital stimulates the development of innovation capacity and the role of learning in the innovation process is highlighted. Figure B1 shows that innovation capacity builds dynamic capabilities in both steady state (leading to incremental innovation) and beyond boundaries (leading to radical innovation), thus creating ambidextrous innovative capacity in the enterprise (Tidd, Bessant & Pavitt 2005). This innovation capacity in turn determines the effectiveness of the innovation commercialisation process.

Figure B1 Macro framework of innovation



Source: Smith et al. 2011, p.9.

Many studies support the macro framework of managing capital formation, both technological and human, to build innovation capacity and confirm that such capacity building leads to stronger innovation performance. In addition, Christiansen (2000) highlights the need to integrate the human factors into technology management in order to deliver effective innovation performance from enterprises. A range of studies indicate that human factors are critical to innovation within the enterprise (for example, Gupta & Singhal 1993; Hauser 1998). Thus, the ability to innovate depends on the effective management of human resources and, in particular, the learning and development practices of enterprises (Jiménez-Jiménez & Sanz-Valle 2008). These studies specifically identify the human capital formation practices that enterprises need to implement to improve their 'innovation capacity'.

In figure B1, the human capital factors are underpinned by the internal learning and development system and the external tertiary education system that supports the internal learning and development system. However, studies to date have usually examined how the public tertiary system can support enterprises' learning and development systems (for example, Garlick, Taylor & Plummer 2007), rather than exploring the holistic development of enterprises' innovation capacity through their internal human resource management and learning and development systems in concert with the external tertiary education system. In contrast to previous studies, the principal focus of this study is to examine the learning and development systems, the tertiary education system supporting learning and development, and their interaction with enterprises' human resource management systems and practices.

Human resource management, training and innovation

Traditionally human resource management functions were limited to the minutiae of managing people in the workplace, however, in the 1980s a broader view of human resource management emerged. Enterprises began to focus on the skills and abilities of their employees as a source of future

competitive advantage. From this emerged the recognition that human resource management is vital to create an organisational climate or culture in which employees' skills and abilities can be harnessed for building innovation capacity. This led to the development of two types of models of human resource management in the literature.

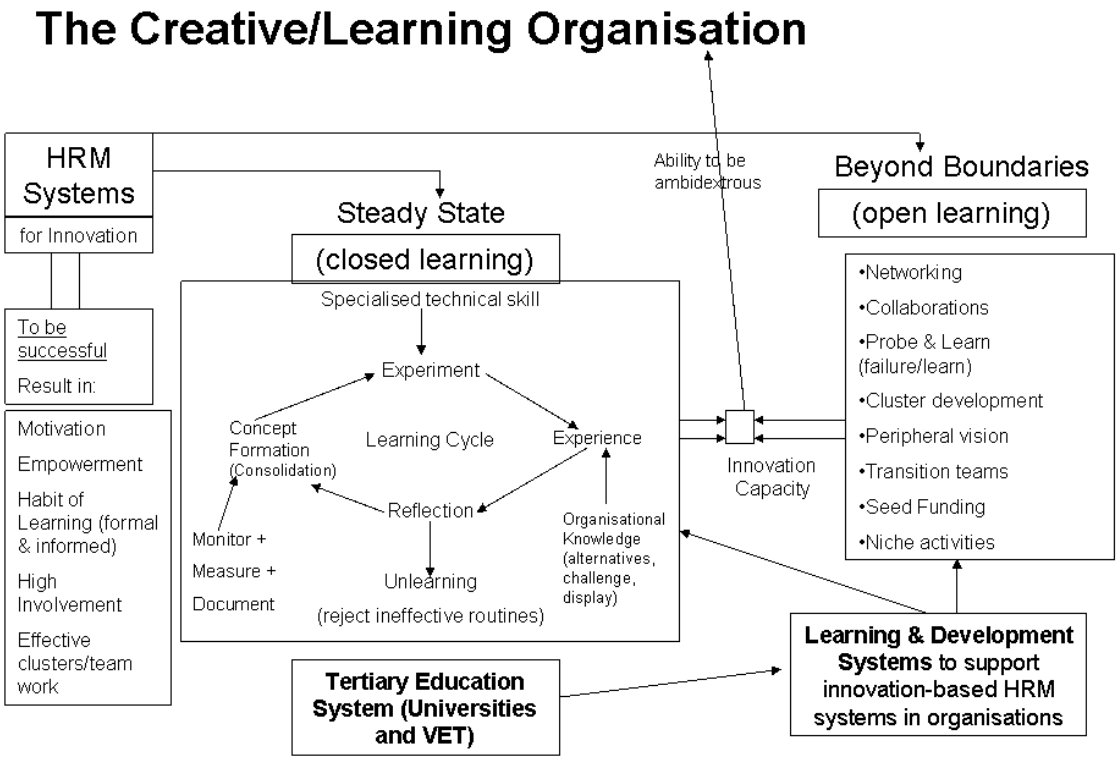
One group of human resource management models, known as 'soft' models, emphasise the importance of training employees to secure their commitment to the enterprise, and thus improve business outcomes (for example, Rainbird 1994). The other group of models link human resource management directly to business strategy (for example, Legge 1995), known as the 'hard' approach to human resource management. The 'soft' approach can be summarised as moving from control to commitment through better human resource management practices, for example, careful selection and recruitment, rewards and training, performance management, giving employees more control and thus facilitating a greater commitment and contribution to the enterprise.

In contrast, the 'hard' approach to the role of human resource management is to enable effective implementation of the core business strategy. In this approach employees are treated as another strategic resource for the enterprise. Unlike the 'soft' approach, the 'hard' approach is contingent on the circumstances of the enterprise, with different human resource management strategies being appropriate for different business strategies. Schuler and Jackson (1987) identify the various human resource management practices to achieve each of Porter's (1980) three basic business strategies of innovation, quality enhancement, and cost-reduction. This contingent approach led to the notion of 'fit' — both external and internal fit — for human resource management practices. The aim is to ensure that innovation occurs within the external strategic setting determined by the enterprise (external fit), while ensuring at the same time that individuals in the enterprise are allowed to innovate (internal fit).

The notion of internal fit also means individual human resource management practices should not invalidate other practices and they need to work together in self-reinforcing 'bundles' to provide maximum benefit to the enterprise. This notion of bundling human resource practices has become very influential in formulating the role of human resource management in enterprises. The resource-based view of the enterprise builds on the notion of human resource 'bundles' to show that employees and their skills, a core competence for enterprises (Hamel and Prahalad 1994), are the only real source of sustainable competitive advantage when other resources such as technology are easily imitated by competitors. This approach emphasises the creation of unique dynamic bundle of capabilities based on the skills and attitudes of employees (Boxall & Purcell 2008).

Recently, the focus of human resource management research has moved from strategy towards 'high performance work' systems (for example, Colombo, Delamastro & Rabbiosi 2007). High performance work systems embrace three concepts: production management; work organisation; and employee relations (Bélanger 2004).

Figure B2 The creative/learning organisation



Source: Smith et al. 2011, p.14.

Figure B2 depicts the bundling of human resource management practices in a creative/learning organisation, portraying the three systems of human capital formation (human resource management practices, learning and development system, tertiary system) responsible for building innovative capacity in order to be ambidextrous across steady state and beyond boundaries innovation.

Empirical research on the links between human resource management and innovation at the enterprise level is limited, with existing research viewing human resource management as a tool to manage innovation rather than to promote innovation. Many studies by innovation scholars examine innovation capability, but do not investigate the role of human resource management in building innovation capacity. An integrated framework, bringing together the work of innovation and human resource management scholars, is beginning to emerge (see, for example, de Leede & Looise 2005, Beugelsdijk 2008).

Recently, human resource management scholars have explored the link between innovation performance and human resource management practices. The importance of the strategic human resource management approach to innovation has been identified (Jiménez-Jiménez and Sanz-Valle 2005). However, this empirical study also revealed the need for the use of 'soft' human resource management practices to create a stable and committed workforce willing to take risks (and learn from them) to further innovation. Thus, in the context of innovation performance, human resource management practice needs to incorporate both soft and hard aspects of human resource management. Another empirical study by Perdomo-Ortiz, González-Benito and Galende (2009) finds a direct link between the use of bundles of high performance work systems practices and innovation

performance, with the strongest links identified being the use of teamwork (work organisation) and measures to increase worker motivation. This study also identified a weaker, direct link between the use of training and innovation. The importance of bundling human resource practices for innovation performance is further supported by Laursen and Foss (2003), whose study explored the links between innovation and human resource management. This study finds that the level of enterprise innovation is linked to the extent of bundling of human resource management/high performance work systems practices.

Other studies provide support for the macro framework (figure B1), they argue that the link between human resource management and innovation performance is not direct, but rather mediated through organisational 'capacity' leading to innovation capability which is strongly associated with innovation performance (see, for example, Prajogo and Ahmed 2006). Lau and Ngo (2004) theorise from their empirical study that human resource practices create an organisational capacity, around a developmental culture (a culture in which individual development is encouraged and rewarded), which leads to improved innovation performance. However, consistent with Perdomo-Ortiz, González-Benito and Galende (2009), Lau and Ngo (2004) also identify a weak direct link between training and innovation.

Freel (2005) identifies training as a key learning and development activity for improving human capital, noting that innovative enterprises tend to train more, however, few empirical studies research the impact of training practices on innovation (Santamaría, Nieto and Barge-Gil 2009). The research evidence shows that training, on its own, has only a weak direct link to innovation. However, extensive employee training has long been linked to the bundles of human resource management practices that constitute the high performance work systems approach to human resource management (Shipton et al. 2006), and it is these bundles of practices that enhance innovation. Training is often seen as an indicator of the existence of high performance work systems and is crucial within a learning and development system as it appears to develop the knowledge and skills required at an individual level, producing higher levels of innovation and feeding into the creation of organisational cultures and management capabilities that sustain innovation. Laursen and Foss (2003)'s study shows that the learning and development system, comprising both internal and external training, has a strong stimulus effect on innovation in service sector enterprises.

Figure B2 illustrates how learning and development systems link to human resource management systems and tertiary education. The emphasis is on learning opportunities that are afforded to individuals and groups in enterprises, referred to as a learning culture or a learning orientation, rather than on the provision of specific training initiatives. Such a learning culture is reflected in Lau and Ngo (2004)'s notion of the developmental culture which creates the innovative capacity identified by Prajogo and Ahmed (2006) and mirrored by the concept of absorptive capacity (Cohen & Levinthal 1990). Vinding (2006) shows that absorptive capacity directly impacts on higher levels of innovation performance. Thus, learning is a critical element in the development of absorptive and innovative capacity. In Australian enterprises, this learning culture is linked to better human resource management outcomes in the form of reduced levels of employee turnover and higher levels of employee satisfaction (Smith, Oczkowski & Selby Smith 2011).

Lichtenthaler (2009) has taken the concept of absorptive capacity further and related it to different forms of learning in an enterprise, involving learning in its broadest sense – individual and organisational learning as well as knowledge management. In Lichenthaler's model three forms of learning exploratory, transformative and exploitative need to be present in the enterprise. These three types of learning work together as a complementary bundle, to ensure the development of

absorptive (innovative) capacity to enable innovation performance. Thus, learning and development systems play a key role in developing innovative capacity.

Recent Australian studies have taken the dominant distributed model of innovation which emphasises the role of employees in innovation and linked it to the role of training and education in innovation systems (see, for example, Pickersgill 2005; Tether et al. 2005). Toner et al. (2004) conclude that training through the VET system plays a key role in innovation in the enterprises and that training for intermediate, trade related skills is particularly important. The new systems of learning and development that have evolved in Australia in recent years are based on the notion of the trainer as a broker rather than an instructor (Smith et al. 2005). Thus, in the new learning and development systems, learning and development intercedes between the public tertiary (university and VET) system and the internal human resource management practices of the enterprise (see figure B2). These new learning and development systems are in reality leading the integration of human resource management and high performance work systems practices in enterprises – a key element in both high performance working and in innovation (Smith & Smith 2007) for both steady-state and beyond boundaries dynamic capabilities. If innovation at the enterprise level depends on the development of the dynamic capabilities and competencies of the enterprise, then the development of new learning and development systems under the stimulus of nationally recognised training will assist in building innovative capacity for dynamic capabilities and successful innovation.

In summary, prior research reveals:

An indirect link between human resource management and innovation performance, mediated through organisational capacity.

In the context of innovation performance, that both soft and hard aspects of human resource management need to be incorporated.

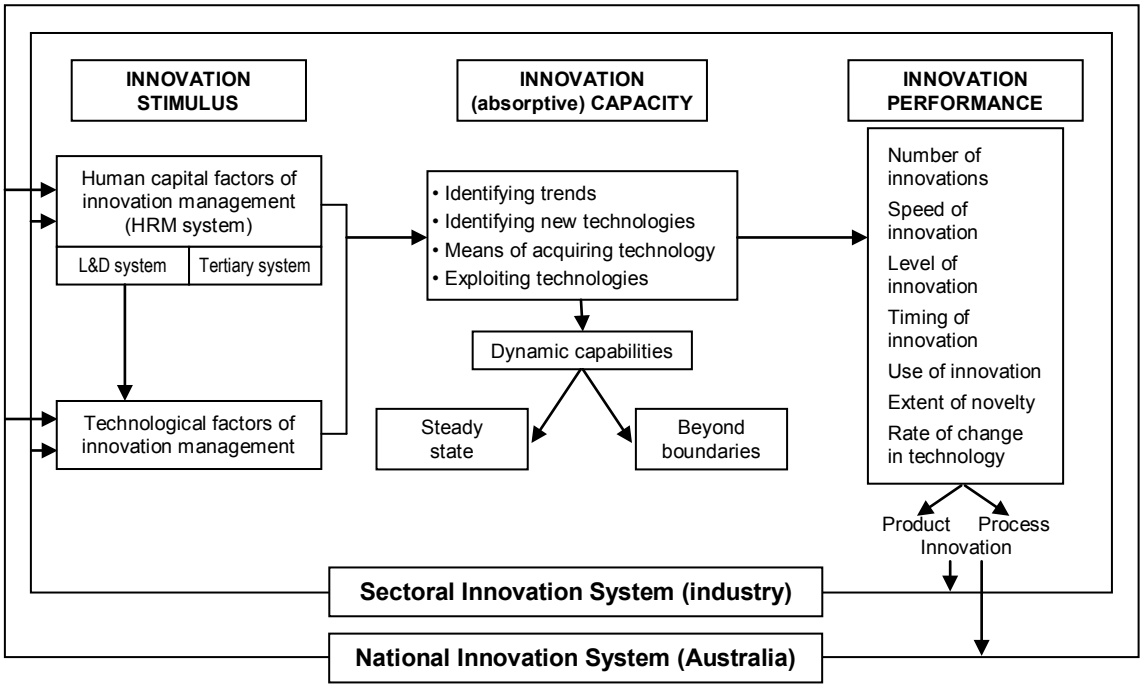
The importance of the bundling of human resource practices for innovation performance.

Training is crucial for innovation — creating organisational cultures and management capabilities which stimulate and sustain innovation

Innovation stimuli

A micro-based research framework (an expansion of the top left-hand box of figure B1) is developed in figure B3 portraying the three human capital factors and their associated stimulus measures that build an enterprise's workforce innovation capacity — people, knowledge and creativity management. The literature on these factors comes from three diverse areas of management. Each is briefly discussed in turn.

Figure B3 Micro-based research framework



Source: Smith et al. 2011, p.20

People

People management practices need to create and maintain an environment that supports innovation, one that motivates employees and provides them with the opportunities to innovate. The innovation literature stresses the importance of organisational culture for innovation performance. Importantly, '… organisations need to create and sustain conditions so that people want to innovate and so that people *can* innovate.' (Angle 2000, p.165, emphasis in original). Key practices aimed at creating such an organisational culture, identified in the literature, include empowerment and involvement (Kanter 1983). It is individuals who play a fundamental role in the development of organisational learning, and evidence suggests that enterprises need to manage, motivate and reward employees to foster creativity and innovation. The management practices (or measures) identified in the literature which stimulate innovation include; human resource planning, teamwork and work organisation, performance appraisal, reward systems, career management and training.

To foster innovation, enterprises need to recruit, hire and retain the right people, people with a variety of personal characteristics, knowledge, expertise and skills. Selective hiring practices are found to be positively related to organisational learning (Lopez, Peon & Ordas 2006). However, contrary to common belief, extremely low rates of turnover may be counter-productive for innovation as it highly restricts the infusion of new people with different perspectives into the enterprise. On the other hand, high rates of turnover will be dysfunctional. Whereas, moderate rates of turnover can enhance diversity, critical evaluation and creativity (Guidice, Heames & Wang 2009). For innovation, people management practices need to focus upon job satisfaction, to ensure turnover is not excessive.

Perdomo-Ortiz, González-Benito & Galende (2009) argue that enterprises

> … should opt for supporting problem-solving practices in work teams; for designing incentives linked to forming part of these teams; for using methodologies such as quality circles or the

> creation of virtual communities; for including teamwork competencies as a hiring criterion and supporting an organisational design in which participation and delegation of functions are based on teamwork. (p.1211)

Furthermore, it is indicated that cross-functional teams, extensively used by innovative enterprises, are critical for fostering creativity and innovation (Lau & Ngo 2004). Practices relating to job design can also foster innovation, such as; allowing for employee flexibility, job rotation and multi-skilling (see, for example, Beugelsdijk 2008). Lau and Ngo (2004) identify team development as instrumental in the creation of an appropriate culture for innovation. However, the challenge is turning a loose collection of people in a 'group' into a mutually accountable and supportive 'team'

Hoegl and Gemuenden (2001) argue that innovation success is linked to teamwork quality, including team performance and the personal success of team members, indicating the importance of performance appraisal at both individual and team. Importantly, performance appraisal to support innovation needs to evaluate progress in work processes and not outcomes (Mumford 2000) – to focus on behaviours not results. Thus, to capture incremental innovation process-based appraisals need be conducted more frequently than the typical annual appraisal.

To promote innovation, rewards and incentives should reinforce risk taking and stimulate knowledge exchange and sharing among group members. Reward systems identified in innovative enterprises include non-financial rewards – such as freedom and autonomy (Gupta & Singhal 1993) — in addition to traditional financial rewards. It is also suggested that, given the importance of team-based activities for innovation, group-based incentives which reinforce co-operation between members may also be required (Lopez, Peon & Ordas 2006). Incentives can vary in their impacts on radical and incremental innovation, for example, Beugelsdijk (2008) reveals that performance-based pay has a positive effect on incremental innovation but not radical innovation.

Employee development practices which maximise employees' commitment to innovation are recommended, this involves practices such as career management, mentoring and coaching (Lopez-Cabrales, Pérez-Luño & Cabrera 2009). Also recommended for stimulating innovation amongst employees are the establishment of career paths involving variety beyond a single expertise, incentives for ongoing knowledge development, and when combined with other people management practices training — especially on-the-job training (Zeytinoglu & Cooke 2009).

In summary, people management requires commitment-based bundle of practices, which facilitate employee co-operation and involvement and emphasise the valuing and support of employees, creating an innovative and entrepreneurial culture — the first human capital stimulus to building innovation capacity.

Knowledge

Knowledge management is the second human capital stimulus by which enterprises can enhance their capacity to innovate. Importantly, an organisation's knowledge is only an asset if it is used efficiently and continually enhanced. To effectively work through the innovation process, requires harnessing new and unique knowledge — beginning with harnessing knowledge to create the initial innovation idea (imagining), through to incubating and demonstrating the idea. Thus, an enterprise's potential for innovation is dependent upon the prior accumulation of knowledge. Nonaka and Takeuchi (1995) argue that the key to organisational knowledge creation, and thus innovation, is the mobilisation and conversion of tacit knowledge ('know-how') into explicit knowledge ('know-what' and 'know-why').

Three types of knowledge are identified in the intellectual capital literature: human capital (the knowledge, skills, and abilities individuals have and utilise), organisational capital (the institutionalised knowledge and experience encapsulated in, and used through, sources like databases, manuals, systems and patents) and social capital (the knowledge embedded in, accessible through, and utilised by interactions amongst individuals through their networks of interrelationships). Each of these types of knowledge necessitate unique kinds of investment — human capital requires a focus on people management and training, organisational capital requires the establishment of devices and systems for storage and dissemination of knowledge and social capital requires the development of the means to facilitate collaboration, interactions and relationships.

Enterprises need to create synergies between their human and social capital in order to realise the full innovative potential of their employees (Subramaniam & Youndt 2005). Human resource practices need to aim not only at developing employees' skills and expertise, but also at developing employees' abilities to collaborate, network and share knowledge to enhance learning and innovation (Prajogo & Ahmed 2006). Knowledge-based human resource practices which enable innovation include appraisal and compensation practices, as well as incentives for ongoing knowledge development and access to learning, both internal and external (Mumford 2000).

Collaborative human resource management practices for collective thinking, such as training and selection for teamwork skills, communication mechanisms, exchange programs, orientation and socialisation programs, team building activities, group training, mentoring and on-the-job training increase the uniqueness of knowledge and are critical for disseminating knowledge through the enterprise. In order to build innovative capacity, such collaborative practices need to incorporate in their design 'double loop' adaptive learning (Bessant & Caffyn 1996) while mistakes and/or failures need to be tolerated (Nonaka & Takeuchi 1995) to faciliate reflective practice. Knowledge management not only enables creative ideas for innovation to permeate through the organisation, but also facilitates human resource stimuli, practices, and actions that drive innovation.

Creativity

Creativity is the generation of new and useful ideas by individuals, whilst innovation is the successful implementation of such ideas (Amabile 1997). Thus, creativity is a necessary but not sufficient condition for innovation. For human resource management scholars and practitioners the differentiation between creativity and innovation is critical, because it is the management of employees, the individuals, in the enterprise that elicits creativity, whereas, innovation — the implementation of creative ideas — operates at the group and organisational level. Although, the importance of understanding the context in which individual creators function is acknowledged, little empirical work has been undertaken in the area of organisational culture, creativity and innovation. The traditional approach to creativity is to focus on the creative individual. It is now acknowledged that a supportive work environment can influence creative behaviour in employees beyond those so called creative individuals (Amabile et al. 1996).

An enterprise requires managers not only to pay attention to the individuals they hire, but also to attend to the environments they create for employees. Although expertise and creative skills determine creative ability it is the motivational component which determines what an individual will actually do, task motivation is therefore necessary for creativity. However, intrinsic motivation (internal personal desire to create) needs to be differentiated from extrinsic motivation (organisational recognition and rewards to create), because whilst intrinsic motivation enhances

creativity, extrinsic motivation if not supportive of creativity may in fact stifle it (Prajogo & Ahmed 2006).

Creativity requires time for employees to think and the necessary organisational resources for generating new ideas. Employees need space to be creative, both in terms of resources and opportunities. Key practices identified for building innovative behaviours are empowerment and involvement (Prajogo & Ahmed 2006). Empowerment — through respect for individuals in the enterprise, freedom and autonomy and flexible work schedules and involvement — through effective diverse and cross-functional skill teams, and improved information sharing and collective thinking).

Amabile and her colleagues (see, for example Amabile, Hadley & Kramer 2002) have identified six categories of human resource practices which affect creativity these are: challenge, freedom, resources, work-group features, supervisory encouragement and organisational support. Importantly, they also stress how management of these six categories requires a balancing act that maximises creativity without 'overloading' or 'underloading' the creative process. The major organisational factor identified in the literature as an impediment to effective creativity management, and thus innovation, is control (McLean 2005). A culture that supports and encourages control, such as top management isolation, intolerance of differences, short time horizons, overly rational thinking, inappropriate incentives and excessive bureaucracy (Roffe 1999), may place too much emphasis on increasing extrinsic motivation to the detriment of the intrinsic motivation necessary for creativity. Control can also produce tension through overexposure to complex tasks with heightened stress (or distress), such tension has a negative affect on individuals' ability to plan and to commit to work in the long term (Schabracq, Winnubust & Cooper 2003).

Despite the significant body of research on the three human capital stimuli that operate on innovation there is a lack of Australian studies in this area. Australian human resource management research has focussed on training, learning and development systems, and collaborations with universities. Three recent studies of innovation in Australian firms (Jones & Pagan 1999; Matthews 2002: Terzioski 2007) continue this trend with limited focus on the human factors in innovation. Two broad-based management reports for the Australian Government (Karpin 1995; Green 2009) indicate that medium and large enterprises in Australia are not particularly innovative. In particular, Green (2009) identifies that 'Australian businesses must improve their human resource-related practices with a target of attracting, retaining and promoting best talent and more importantly addressing poor performance.'

Conclusions from the literature review

This review of the literature on innovation and human resource management used the Stimulus-Capacity-Performance framework to investigate the factors that impact on innovation in an enterprise (figure B1). In this macro framework we identified human and technological factors as the two major stimuli that enhance (or if poorly performed, inhibit) innovation capacity in enterprises. The focus of this review was on the human factors and, in particular, the role of human capital formation in linking with technological factors to build upon creative ideas to realise the significant innovative outcomes necessary for yielding sustainable competitive advantage for enterprises (Porter 1980). To summarise:

- Since employees are an enterprise's most vital and necessary resource in delivering innovative outcomes, there needs to be careful study of all the human capital formation stimulus factors identified in this paper (people, knowledge, creativity) which in combination build innovation capacity towards innovative performance. There is much detailed research on various aspects of building this capacity. However until now, there has been no study which has attempted to draw

these diverse studies together into one coherent approach to building innovation capacity in enterprises.

- Any analysis of the role of human resource management in innovation needs to identify not only the human resource management practices and systems with the capacity to prompt innovation, but also two ancillary services. One is the learning and development system and the other is the tertiary education system. Figure B2 depicts the interaction of these three systems — the human resource management system, the tertiary education system and the learning and development systems — in building innovative capacity.
- The human resource management stimulus measures encompassed by the people, knowledge and creativity management factors are set out in figure B3, which will guide the research project through an analysis of these three key factors. What is needed is the creation of unique and dynamic bundles of human resource capabilities based on the skills and attitudes of employees; the crucial element here is a human capital formation strategy within the enterprise designed to build innovation capacity.

The theoretical framework developed as a result of this review will form the basis of the empirical investigation on the nature of human capital formation in medium-to-large Australian enterprises in the next phase of this research project. This will then allow a clear course for building innovation capacity with the human resources in these Australian enterprises to be charted.

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Appendix C: Interview questions

Operational Manager

Please provide a short history of the business.

How innovative is this business and what is the reason for this innovative activity?

How would you describe this innovation (new product or service only / incremental / radical / organisational / technological)?

How does the business measure innovation performance? Do you have any documentation of this performance that we can look at?

What tangible way(s) does the business display its commitment to innovation?

Major process innovations in last 3 years and why were they successful

Major product/service innovations in last 3 years and why were they successful

What are the key stimuli for innovation employed by the businesses?

Does the business have HR policies to stimulate innovation? (If not, why not?) How do these HR policies impact on innovation capacity?

Does the business have learning and development policies to stimulate innovation? (If not, why not?) How do these L&D policies impact on innovation capacity?

Does the business have collaborations with TAFE/Universities? (If not, why not?) How do these collaborations affect the business in relation to innovation?

(Distribute a summary of the survey results.) What is your impression of these results in terms of the industry and firm you are involved with? To what extent are these results a reflection of what is going on in this business, and to what extent are they not a reflection of what is going on in this business?

Senior HR Manager

What is the general approach and philosophy of the HR management in the business?

How innovative is this business?

How would you describe this innovation (new product or service only / incremental / radical / organisational / technological)?

To what extent does HR management help to develop innovative capacity?

Does the business have learning and development policies to stimulate innovation? (If not, why not?) How do these L&D policies help to develop innovative capacity?

Is the development of innovative capacity a key aim of HR and how does this work in practice?

Are the various HR practices aligned in order to instil innovation? What HR practices are aligned and does this work effectively for innovation?

How is creativity fostered in this business?

How is knowledge shared and managed?

(Distribute a summary of the survey results.) What is your impression of these results in terms of the industry and firm you are involved with? To what extent are these results a reflection of what is going on in this business, and to what extent are they not a reflection of what is going on in this business?

Learning and Development Manager

What is the overall philosophy and approach to learning and development/training in this business?

How much training do employees receive and has this increased, decreased or remained the same over the last five years?

What are the key areas for training in the business?

Does training emphasise the development of innovative capacity amongst employees? How?

How innovative is this business?

How would you describe this innovation (new product or service only / incremental / radical / organisational / technological)?

To what extent does the business collaborate with TAFE/Universities and how?

How does this collaboration impact on innovation capacity?

(Distribute a summary of the survey results.) What is your impression of these results in terms of the industry and firm you are involved with? To what extent are these results a reflection of what is going on in this business, and to what extent are they not a reflection of what is going on in this business?

R&D/Innovation Manager

What is the general approach to R&D/Innovation in this business?

How innovative is this business? — Recent examples

What have been the key process and product/service innovations in the last 3 years?

Why have they been successful?

What are the reasons for any failures in innovation?

What are the key stimuli for R&D/Innovation in the business?

What role does the development of people (through HR practices, as well as learning and development systems) play in creating innovative capacity in the business?

How does this work in practice?

What is the role of creativity in R&D/Innovation?

What is the role of knowledge management in R&D/Innovation?

(Distribute a summary of the survey results.) What is your impression of these results in terms of the industry and firm you are involved with? To what extent are these results a reflection of what is going on in this business, and to what extent are they not a reflection of what is going on in this business?

Operational level employees (all groups)

What new products/services have been introduced in the last 3 years?

What new process has been introduced in the last 3 years?

Has there been any organisational change in the business in the last 3years? Was it effective?

Do you think that this an innovative business? Why or why not?

In what ways does the business allow/encourage you to have an influence on innovation in your daily activities?

What training have you been given in the last 3 years?

To what extent is knowledge free and shared in this business?

To what extent can people exercise creativity at work here?

Does training focus on developing innovation and what are the ways of doing things? How?

What are the barriers to innovation that you can see and experience?

(Distribute a summary of the survey results.) What is your impression of these results in terms of the industry and firm you are involved with? As an employee at the operational level, how do these results reflect on this business?

Appendix D: Survey questionnaire

10001

Australian Government Statistical Clearing House Approval Number 02072 – 01

Selecting answers:

When selecting an answer from the categories provided, please mark:

Like this: ● Not like this: ✓ ✗ /

Corrections:

If you make a mistake or need to change your answer please cross out the incorrect response like this:

■

START HERE:

Section A - Organisational characteristics

A1. How many employees do you currently have on the payroll in your company?

A2. Approximately what percentage of these work ...

The total of these categories should add up to 100%.

Full-time (30 hours or more per week)?		%
Part-time (less than 30 hours per week)?		%
As casual staff?		%
On temporary or fixed-term contracts?		%

NOTE: This is a DOUBLE SIDED survey. Please Turn Over

A3. Approximately how many temporary agency staff are presently working at your company?

A4. Approximately what percentage of your employees belong to each of the following occupational groups…?

The total of these categories should add up to 100%.

Managers		%
Professionals		%
Technicians and Trade Workers		%
Community and Personal Service Workers		%
Clerical and Administrative Workers		%
Sales Workers		%
Machinery Operators and Drivers		%
Labourers		%

A5. Approximately what percentage of the employees in your company…

Please indicate a figure between 0 and 100 percent for each question

hold a TAFE/VET qualification (e.g. Cert III, Diploma)?		%
hold a university qualification (e.g. undergraduate or masters degree)?		%

A6. Approximately what percentage of your staff are female?

Please indicate a figure between 0 and 100 percent

		%

A7. Approximately what percentage of the employees in your company are members of a trade union?

Please indicate a figure between 0 and 100 percent for each question.

	%

A8. What is the main business activity of your company?

A9. Which of the following best describes your company's strategy?

(Mark ● one box only)

- Operating in niche markets for new products/services ○
- Aiming to gain critical mass for mainstream product/service ○

A10. How would you describe the legal status of your company?

(Mark ● one box only)

- Listed public company (Ltd) ○
- Unlisted public company (Ltd) ○
- Private limited company (Pty Ltd) ○
- Company limited by guarantee ○
- No liability company (NL) ○
- Sole trader ○
- Other ○

A11. How would you describe the ownership structure of your company? Is it....

(Mark ● one box only)

- one of a number of different companies in Australia belonging to the same Australian parent company ○
- a single Australian-owned independent company not belonging to another body ○
- one of a number of different companies in Australia belonging to a foreign company ○
- a sole Australian subsidiary of a foreign company ○

A12. For how many years has your company been in operation?

Please include time spent at other addresses

Overall ☐☐☐

In Australia (if operating overseas prior to operations in Australia) ☐☐☐

A13. Could you please indicate your job title?

Section B – Innovation

This section of the survey examines various aspects of innovation within your company. By innovation we mean the introduction of new products and services, processes or organisational practices.

B1. Thinking about your company's PROCESSES, please tick the number that best reflects how your company has been doing so far, relative to the major competitors in your industry.

(Mark ● the appropriate response for each item)

	1 - Worst in industry ▼	2 ▼	3 ▼	4 - Best in industry ▼
The technological competitiveness of our company	①	②	③	④
The speed with which we adopt the latest technological innovations in our processes.	①	②	③	④
The updatedness or novelty of the technology used in our processes.	①	②	③	④
The rate of change in our processes, techniques and technology.	①	②	③	④

B2. How would you rate your company's capability to generate the following types of innovations in the PROCESSES you have introduced in the last five years?

(Mark ● the appropriate response for each item)

	1- Weaker than competition ▼	2 ▼	3 ▼	4- Similar to competition ▼	5 ▼	6 ▼	7- Stronger than competition ▼
Innovations that reinforce your processes	①	②	③	④	⑤	⑥	⑦
Innovations that reinforce your existing expertise in your processes.	①	②	③	④	⑤	⑥	⑦
Innovations that reinforce the processes you currently use to compete.	①	②	③	④	⑤	⑥	⑦
Innovations that make your processes obsolete.	①	②	③	④	⑤	⑥	⑦
Innovations that fundamentally change your processes.	①	②	③	④	⑤	⑥	⑦
Innovations that make your existing expertise in your processes obsolete	①	②	③	④	⑤	⑥	⑦

B3. Thinking now about your company's PRODUCTS & SERVICES, please tick the number that best reflects how your company has been doing so far, relative to the major competitors in your industry.

(Mark ● the appropriate response for each item)

	1 - Worst in industry ▼	2 ▼	3 ▼	4 - Best in industry ▼
The level of newness (novelty) of our company's new products and services.	①	②	③	④
The use of latest technological innovations in our new products and services.	①	②	③	④
The speed of our new product and service development.	①	②	③	④
The number of new products and services our company has introduced to the market.	①	②	③	④
The number of our new products and services that are first-to-market.	①	②	③	④

B4. How would you rate your company's capability to generate the following types of innovations in the PRODUCTS AND SERVICES you have introduced in the last five years?

(Mark ● the appropriate response for each item)

	1- Weaker than competition	2	3	4- Similar to competition	5	6	7- Stronger than competition
Innovations that reinforce your product/service lines.	①	②	③	④	⑤	⑥	⑦
Innovations that reinforce your existing expertise in your products/services.	①	②	③	④	⑤	⑥	⑦
Innovations that reinforce how you currently compete.	①	②	③	④	⑤	⑥	⑦
Innovations that make your product/service lines obsolete.	①	②	③	④	⑤	⑥	⑦
Innovations that fundamentally change your products/services.	①	②	③	④	⑤	⑥	⑦
Innovations that make your existing expertise in your products/services obsolete.	①	②	③	④	⑤	⑥	⑦

B5. To what extent does your company have close co-operation with the following groups?

(Mark ● the appropriate response for each item)

	High extent	Some extent	Small extent	Not at all	Not relevant	Don't know
Customers	○	○	○	○	○	○
Suppliers	○	○	○	○	○	○
Subcontractors	○	○	○	○	○	○
Consultants' firms	○	○	○	○	○	○
Universities	○	○	○	○	○	○
TAFE Institutes	○	○	○	○	○	○
Other educational institutions	○	○	○	○	○	○
Research institutes and cooperative research centres (CRCs)	○	○	○	○	○	○
Other government authorities	○	○	○	○	○	○

B6. Please mark the number that best reflects what your company has been practicing so far. (1-strongly disagree 5-strongly agree)

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5- Strongly agree ▼
We provide time and resources for employees to generate share/exchange and experiment innovative ideas/solutions.	①	②	③	④	⑤
Employees are working in diversely skilled work groups where there is free and open communication among the group members.	①	②	③	④	⑤
In our company employees frequently encounter non-routine and challenging work that stimulates creativity.	①	②	③	④	⑤
Employees are recognised and rewarded for their creativity and innovative ideas.	①	②	③	④	⑤

Section C – Human resource practices

C1. The following statements relate to the human resource management practices in your company. Please indicate the extent to which you agree or disagree with each statement.

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5 ▼	6 ▼	**7**- Strongly agree ▼
Individuals in this company have clear career paths.	①	②	③	④	⑤	⑥	⑦
The compensation for all employees is directly linked to performance.	①	②	③	④	⑤	⑥	⑦
Employees in our company have more than one potential position for promotion.	①	②	③	④	⑤	⑥	⑦
Our company prefers to recruit an internal employee in the first instance whenever a vacancy exists.	①	②	③	④	⑤	⑥	⑦
Job performance is an important factor in determining the incentive compensation of employees.	①	②	③	④	⑤	⑥	⑦
In our company, salaries we pay are comparable to the market.	①	②	③	④	⑤	⑥	⑦
Our company plans for the career development of employees.	①	②	③	④	⑤	⑥	⑦

C1. The following statements relate to the human resource management practices in your company. Please indicate the extent to which you agree or disagree with each statement.

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5 ▼	6 ▼	**7**- Strongly agree ▼
In our company, compensation is decided on the basis of the ability of the employee.	①	②	③	④	⑤	⑥	⑦
Internal candidates are given consideration over external candidates for job openings.	①	②	③	④	⑤	⑥	⑦
We select employees based on an overall fit to the company.	①	②	③	④	⑤	⑥	⑦
Our selection system focuses on the potential of the candidate to learn and grow with the company.	①	②	③	④	⑤	⑥	⑦
We ensure that all employees in relevant positions are made aware of internal promotion opportunities.	①	②	③	④	⑤	⑥	⑦

C2. To what extent would you say individual employees in your company have...

(Mark ● the appropriate response for each item)

	1- Not at all ▼	2 ▼	3 ▼	**4**- Moderate extent ▼	5 ▼	6 ▼	7- Great extent ▼
variety in their work?	①	②	③	④	⑤	⑥	⑦
discretion over how they work?	①	②	③	④	⑤	⑥	⑦
control over the pace at which they work?	①	②	③	④	⑤	⑥	⑦
involvement in decisions over how their work is organised?	①	②	③	④	⑤	⑥	⑦

C3. Does your company use any of the following ways of organising work? If YES, please indicate the proportion of staff to whom the method applies.

(Mark ● the appropriate response for each item)

	a. Does you company use the following?				b. What proportion of staff does the method apply to?		
	Yes ▼	No ▼	Don't Know ▼		Below 25%	25-50%	More than 50%
Cross occupational working groups	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Quality circles/groups	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Systems for the collection of proposals from employees (e.g. suggestion box, intranet)	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Planned job rotation	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Delegation of responsibility	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Integration of functions (e.g. sales production/service finance)	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Wages based upon quality or results (not piece work)	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯
Cross occupational working groups	Ⓨ	Ⓝ	◯	If yes →	◯	◯	◯

C4. Do you have any of the following working time arrangements in your company?

(Mark ● all that apply)

Working at or from home in normal working hours	◯
The ability to reduce working hours (e.g., switching from full-time to part-time)	◯
Ability to increase working hours (e.g., switching from part-time to full-time)	◯
Job sharing schemes (sharing a full-time job with another employee)	◯
Flexitime (where an employee has no set start or finish time, but has an agreement to work a set number of hours per week or month)	◯
Ability to change shift patterns	◯
Working compressed hours (e.g., a 9 day fortnight)	◯
None of the above	◯

C5. In which of the following occupational skill groups are there employees that have their performance formally appraised?

(Mark ● all groups which are appraised)

- Managers ◯
- Professionals ◯
- Technicians and Trade Workers ◯
- Community and Personal Service Workers ◯
- Clerical and Administrative Workers ◯
- Sales Workers ◯
- Machinery Operators and Drivers ◯
- Labourers ◯

C6. Approximately, what percentage of non-managerial employees in your company have their performance formally appraised?

Please indicate a figure between 0 and 100 percent

[ ] %

C7. How frequently are appraisals conducted?

(Mark ● one box only)

- Quarterly ◯
- Half-yearly ◯
- Annually ◯
- Every 2 years ◯
- No fixed pattern ◯

C8. Does performance appraisal result in an evaluation of training needs?

(Mark ● one box only)

- Yes ◯
- Uncertain ◯
- No ◯

C9. What are the factors below that explain the differences in the level of pay of full-time staff in your company?

(Mark ● the appropriate response for each item)

	Yes	Uncertain	No
Hours worked (e.g. basic hours worked, overtime, shift work)	◯	◯	◯
Seniority (e.g. employee age, career experience, years of service)	◯	◯	◯
Skills (e.g. core skills and competencies, formal qualifications, job grade/classification)	◯	◯	◯
Performance (e.g. incentive/performance pay, performance appraisals)	◯	◯	◯
Other factors	◯	◯	◯

C10. Thinking just about payment by results, what measures of performance are used to determine the amount that employees receive?

(Mark ● all that apply)

- Individual performance/output ◯
- Group or team performance/output ◯
- Workplace-based measures ◯
- Organisation-based measures ◯
- Not applicable - do not vary staff salaries on the basis of performance ◯

C11. Are individual employees' pay linked to the outcome of performance appraisal?

(Mark ● one box only)

- Yes ◯
- No ◯
- Don't know ◯

Section D - Learning and development

D1. How many days and/or hours are spent on induction activities for a new employee in your company?

If there is no induction conducted, please write"0"

Days ☐☐☐

Hours ☐☐☐

D2. Approximately, what percentage of experienced employees (who have been employed for at least 12 months) have been given time off from their normal daily work duties to undertake training over the past 12 months?

Please indicate a figure between 0 and 100 percent

			%

D3. On average, how many days of training did each experienced employee undertake over the past 12 months?

			days

D4. Does this training (for experienced employees) have any of the following objectives?

(Mark ● all groups which are appraised)

- Provide the skills needed for employees to move to different jobs ◯
- Obtain a quality standard ◯
- Extend the range of skills used by employees in their current jobs ◯
- Improve the skills already used by employees in their current jobs ◯
- Increase employees' understanding of, or commitment to, the organisation ◯

D5. Which of the following areas does this training cover?

(Mark ● all the areas covered)

- Computing skills ◯
- Team work ◯
- Communication skills ◯
- Leadership skills ◯
- Operation of new equipment ◯
- Customer service/liaison ◯
- Health and safety ◯
- Problem-solving methods ◯
- Equal opportunities ◯
- Reliability and working to deadlines ◯
- Quality control procedures ◯

D6. How frequently do you use the following sources for training in enhancing innovation?

(Mark ● the appropriate response for each item)

	Never	Occasionally	Frequently	Always
In-house training	○	○	○	○
TAFE institutes	○	○	○	○
Other private VET providers (registered training organisations)	○	○	○	○
Universities	○	○	○	○
Consultants and other non-formal providers	○	○	○	○

D7. Approximately what percentage of the employees in your company...

are formally trained to be able to do jobs other than their own?		%
actually do jobs other than their own at least once a week?		%
have received nationally recognised training (based on Training Package qualifications)?		%

D8. Is your company an Enterprise Registered Training Organisation?

(Mark ● one box only)

- Yes ○
- No ○
- Don't know ○

D9. Please tick the number that best reflects what your company has been practicing so far. (1-strongly disagree 5-strongly agree)

(Mark ● the appropriate response for each item)

	1-Strongly disagree	2	3	4	5-Strongly agree
We provide career path opportunities for employees to move across functional areas of the company.	①	②	③	④	⑤
We provide training focused on team-building and teamwork skills training.	①	②	③	④	⑤
We sponsor company social events for employees to get to know one another.	①	②	③	④	⑤
We offer an orientation program that trains employees on the history and processes of the company.	①	②	③	④	⑤
We use job rotation to expand the skills of employees.	①	②	③	④	⑤

D9. Please tick the number that best reflects what your company has been practicing so far. (1-strongly disagree 5-strongly agree)

(Mark ● the appropriate response for each item)

	1-Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5-Strongly agree ▼
We have a mentoring system to help develop employees.	①	②	③	④	⑤
Performance appraisals are used primarily to set goals for personal development.	①	②	③	④	⑤
Performance appraisals are used to plan skill development and training for future advancement within the company.	①	②	③	④	⑤

D10. Please indicate the extent to which you agree with the following statements.

(Mark ● the appropriate response for each item)

	1-Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5-Strongly agree ▼
Employees see benefits from exchanging and combining ideas with one another.	①	②	③	④	⑤
Employees believe that by exchanging and combining ideas they can move new projects or initiatives forward more quickly than by working alone.	①	②	③	④	⑤
At the end of each day our employees feel that they have learned from each other by exchanging and combining ideas.	①	②	③	④	⑤
Employees in our company are proficient at combining and exchanging ideas to solve problems or create opportunities.	①	②	③	④	⑤
Employees in our company do not do a good job of sharing their individual ideas to come up with new ideas products or services.	①	②	③	④	⑤
Employees here are capable of sharing their expertise to bring new projects or initiatives to fruition.	①	②	③	④	⑤
The employees in our company are willing to exchange and combine ideas with their co-workers.	①	②	③	④	⑤
It is rare for employees to exchange and combine ideas to find solutions to problems.	①	②	③	④	⑤

D11. Below you will find statements which describe 'the way we do things around here' – how your company handles aspects of innovation. For each statement please provide a score between 1 and 7 reflecting the extent to which you think this reflects your company.

(Mark ● the appropriate response for each item)

	1-Not at all true ▼	2 ▼	3 ▼	4 ▼	5 ▼	6 ▼	**7**-Very true ▼
We have good 'win-win' relationships with our suppliers	1	2	3	4	5	6	7
We are good at understanding the needs of our customers/end users	1	2	3	4	5	6	7
We learn from our mistakes	1	2	3	4	5	6	7
We systematically compare our products and processes with other firms	1	2	3	4	5	6	7
We meet and share experiences with other firms to help us learn	1	2	3	4	5	6	7
We are good at capturing what we have learned so that others in the organisation can make use of it	1	2	3	4	5	6	7
We are good at learning from other organisations	1	2	3	4	5	6	7
We use measurements to help identify where and when we can improve our innovation management	1	2	3	4	5	6	7
There is a strong commitment to training and development of people	1	2	3	4	5	6	7
Our employees work well together across departmental boundaries	1	2	3	4	5	6	7
We take time to review our projects to improve our performance next time	1	2	3	4	5	6	7
We work well with universities and other research centres to help us develop our knowledge	1	2	3	4	5	6	7
We work closely with our customers in exploring and developing new concepts	1	2	3	4	5	6	7
We collaborate with other firms to develop new products or processes	1	2	3	4	5	6	7
We try to develop external networks of people who can help us – for example with specialist knowledge	1	2	3	4	5	6	7
We work closely with the local and national education system to communicate our needs for skills	1	2	3	4	5	6	7
We work closely with 'lead users' to develop innovative new products and services	1	2	3	4	5	6	7
Our employees have a clear idea of how innovation can help us compete	1	2	3	4	5	6	7
Our company structure does not stifle innovation but helps it to happen	1	2	3	4	5	6	7
Our innovation strategy is clearly communicated so everyone knows the targets for improvement	1	2	3	4	5	6	7

10001

Section E - Human resource outcomes

E1. For each of the following statements, please tick the number that best reflects what your company has been practicing so far.

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5- Strongly agree ▼
We have an organisation-wide training and development process including career path planning for all our employees.	①	②	③	④	⑤
Our company has maintained both 'top–down' and 'bottom–up' communication processes.	①	②	③	④	⑤
Employee satisfaction is formally and regularly measured.	①	②	③	④	⑤
Employee flexibility, multi-skilling and training are actively used to support performance improvement.	①	②	③	④	⑤
We always maintain a work environment that contributes to the health, safety and well-being of all employees.	①	②	③	④	⑤
We use bottom-up communication processes that allow for innovative ideas to be implemented.	①	②	③	④	⑤

E2. Has your company or a third party conducted a formal survey of your employees' views or opinions during the past two years?

(Mark ● one box only)

Yes ◯

No ◯

Uncertain ◯

E3. To what extent do you agree with the following items describing your company?

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5 ▼	6 ▼	**7**- Strongly agree ▼
Our employees are highly skilled.	①	②	③	④	⑤	⑥	⑦
Our employees are widely considered the best in our industry.	①	②	③	④	⑤	⑥	⑦
Our employees are creative and bright.	①	②	③	④	⑤	⑥	⑦
Our employees are experts in their particular jobs and functions.	①	②	③	④	⑤	⑥	⑦
Our employees develop new ideas and knowledge.	①	②	③	④	⑤	⑥	⑦

Section F - Organisational context

F1. To what extent do you agree with the following items describing your company?

(Mark ● the appropriate response for each item)

	1- Strongly disagree ▼	2 ▼	3 ▼	4 ▼	5 ▼	6 ▼	**7**- Strongly agree ▼
Our employees are skilled at collaborating with each other to diagnose and solve problems.	①	②	③	④	⑤	⑥	⑦
Our employees share information and learn from one another.	①	②	③	④	⑤	⑥	⑦
Our employees interact and exchange ideas with people from different areas of the company.	①	②	③	④	⑤	⑥	⑦
Our employees partner with customers, suppliers, alliance partners, etc. to develop solutions.	①	②	③	④	⑤	⑥	⑦
Our employees apply knowledge from one area of the company to problems and opportunities that arise in another.	①	②	③	④	⑤	⑥	⑦
Much of our company's knowledge is contained in manuals, databases, etc.	①	②	③	④	⑤	⑥	⑦
Our company's culture (stories, rituals) contains valuable ideas and ways of doing business.	①	②	③	④	⑤	⑥	⑦
Our company uses patents and licenses as a way to store knowledge.	①	②	③	④	⑤	⑥	⑦
Our company embeds much of its knowledge and information in structures, systems and processes.	①	②	③	④	⑤	⑥	⑦

10001

Section G - Conclusion

That concludes the questions for the survey. The research team would like to thank you for your participation.

The following space is provided for you to include any additional comments you might have about the issues covered within the survey. You can also include your name and contact details if you are interested in being involved in later phases of this project.

G1. Could you please indicate how many minutes this survey took you to complete?

			mins

G2. Please add any comments you may have, and then return the completed survey to the University of Ballarat via the reply-paid envelope provided.

Please return your completed questionnaire in the envelope provided to:
Centre for Regional Innovation & Competitiveness
Reply Paid 663
Ballarat, VIC 3353