

UNDERSTANDING ONE ASPECT OF THE KNOWLEDGE LEAKAGE CONCEPT: PEOPLE

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Abstract

Businesses strive to maintain their competitive advantage in the present tremendously aggressive commercial world. To guarantee the continued success of a commercial organisation, managers need to continually enhance best practice and retain in-house knowledge and experience. Knowledge leaking away from the origin of the knowledge or experience may lead to a loss of competitive advantage for an organisation. The forms of 'knowledge leakage' and its positive and negative impacts over time have been neglected in the literature. Research described here explores if organisations appreciate the full range of knowledge leakage routes via people and the positive and negative consequences. As the concept of knowledge leakage is not well understood and the nature of research is exploratory, a Grounded Theory research strategy has been employed to develop an initial taxonomy of knowledge leakage. This paper discusses the findings of in-depth-interviews carried out with employees of Small and Medium sized Enterprises (SMEs) involved in manufacturing and design. As a result, a taxonomy of knowledge leakage via people with an integrated approach to knowledge 'loss' and 'gain' is proposed here.

Keywords: knowledge leakage, positive leakage, negative leakage, taxonomy.

1 INTRODUCTION

Businesses involved in manufacturing or service provisions are increasingly dependent on the skills, experience, and knowledge held by their employees with the more formal business organisation (systems, documentation and structure) being a complementary resource, not a defining one. There is a trend for business organisations to outsource non-core or low value adding activities. Emphasis is shifting to retaining and building upon high-value adding activities such as design, brand management, and business solutions. Thus, in linking the retained in-house activities to the outsourced activities there is a considerable knowledge and information flow within an organisation and across an organisation's borders. Very little is known in terms of scope and consequence of these flows. These flows signify new challenges and opportunities for business organisations with respect to exploiting fully their knowledge resources. Hence, the aim of the scoping work presented here is to explore how knowledge flows via people, affects an organisation. From this, a taxonomy of knowledge leakage types that flow via people, and the associated positive and negative consequences, will be produced.

2 KNOWLEDGE

Two classifications of knowledge are explicit and tacit; the former being easily codified and the latter being embedded in the human brain and not easily expressed (Grover and Davenport, 2001). The concept of tacit knowledge (Polanyi, 1958) has previously found fascination among organisational and management theorists and the knowledge management research community. Styhre (2004) highlighted some of Boisot's (1998) tacit knowledge distinctions: a) matters that are said because everybody understands them and takes them for granted; and b) matters that are not said because nobody fully understands them, and thus they remain elusive and inarticulate. Economists often consider, knowledge to manifest itself in two basic forms: embodied and disembodied. Embodied knowledge resides in devices, equipment, machinery, and materials, as well as in human beings in the form of ideas, expertise, skills and routines. It is not, therefore codified or even amenable to codification, and hence is vulnerable to loss or neglect. By contrast, disembodied knowledge is accessible through databases, manuals, patents, specifications, scientific books and journals. The present study is addressing embodied knowledge and the above stated Boisot's distinctions.

3 INTRODUCING THE CONCEPT OF KNOWLEDGE LEAKAGE

There are different terms used in the literature to refer to the concept of knowledge leakage. Terms mentioned include knowledge seepage (some use e.g. Kingston, 2004; DiRomualdo, 2004; MacDougall and Hurst, 2005); knowledge transfer (commonly used e.g. Bhattacharya and Guriev 2004; Huang, 2004; Marti and Fallery, 2005; Kingston 2004; MacDougall and Hurst, 2005); knowledge loss (some use, e.g., Huang, 2004; MacDougall and Hurst, 2005); knowledge disclosure (rare use Bhattacharya and Guriev, 2004) and knowledge leakage (some use e.g. Bhattacharya and Guriev 2004; Vohinger *et al.*, (2004)). In the references cited above, consideration is given to the movement of people. The term 'knowledge leakage' will be used throughout this paper as the metaphor for 'gaining' or 'losing' knowledge. Hence, knowledge leakage can take a positive or negative form. Annansingh *et al.*, (2005) defines knowledge leakage as "the possibility of information or knowledge that is critical to the organisation being lost or leaked – whether deliberately or unintentionally to a competitor or unauthorised personnel". This is perceived as negative knowledge leakage, as knowledge leaks away from the origin and may lead to a loss of competitive advantage. Vohinger *et al.*, (2004) defines knowledge leakage in positive terms when it occurs in the form of information spillovers. A case would be if a non-commercial high profile project is successful, for example a development project, and the know-how about the project was transmitted to other parties and successfully implemented then the knowledge leakage is positive. Both forms of knowledge leakage are considered in this paper.

DiRomualdo (2004) believes that outsourcing does not facilitate a complete transfer of knowledge and know-how, particularly when the workers requested to transfer their knowledge face redundancy. In addition, the expert staff may also seek jobs elsewhere as they see their colleagues being made redundant and therefore feel expendable. Similarly, Treleven and Sykes (2005) state that as a social process, knowledge sharing within and across organisational networks support spontaneous practices, which consecutively enhance organisational capability; such organisational knowledge is reported to be lost rapidly where staff turnover is high or where demoralised staff withdraw their organisational loyalty. Knowledge leakage is also reported to happen when all human expertise in an area is steadily lost as the specialists and users become reliant upon electronic systems (Kingston, 2004).

Treleven and Sykes (2005) also report that restructuring around an organisation's management without consideration to differential appraisal of worth, results in losses of organisational knowledge. For example, when skilled practitioners are made redundant and new management positions are introduced, it results in the organisation losing personal knowledge developed through the application of professional training and experience in specific fields. Treleven and Sykes (2005) argue that losing a knowledgeable workforce (particularly in client services) may not merely influence important activities with clients, but also greatly affect the competence of the organisation to give efficient services in various conditions.

MacDougall and Hurst (2005) state that the deployment of contingent knowledge workers (people who use their heads more than their hands to produce value) could be an effective way of investing in an organisation's intellectual capital. This is because these individuals convey public domain knowledge (which resides in the external environment) and optimal practices into the organisation. Nevertheless, Matusik and Hill (1998) declare that revealing private, key competitive knowledge (e.g. an organisation's unique routines, processes, documentation and trade secrets) to contingent workers is risky, as they become a competitive threat and can be a medium through which the private knowledge is leaked into a public domain.

Other forms of knowledge leakage have also been reported by Mohr and Sengupta (2002). They report that inter-firm learning can lead to unintended and undesirable skills transfer and dilution of the tacit knowledge that develops the origin of the competitive advantage to a partner. Thus, they propose recommendations to managers for regulating knowledge transfer to minimise risks via corresponding suitable mechanisms to specific conditions depending on the differences in partner's intention, the type of knowledge sought by the focal organisation, and the duration of the partnership. For example, if the partner's intention is to have internalisation of the focal organisation's knowledge, the type of knowledge required by the focal organisation is explicit and the duration of the project is short. They recommend managing the risk of knowledge 'spillover' by confining information sharing by maintaining a safe distance in the relationship that only loosely couples the firms and limits communication.

Many organisations depend on the skills of particular key employees who retain in their heads the knowledge necessary to perform their job. In a report discussing the current state of the UK's Tool, Die and Mould industry (TDM) Mynors *et al.*, (2004) mentioned significant experience-loss mechanisms. Firstly, valuable knowledge is lost through the retirements, and; secondly, the failure to encourage young people into the industry could delimit the passing on of information. The report reveals that the knowledge present in TDM organisations is the base for the design process and their main worry is when key employees retire; the knowledge is lost to the organisation. Likewise, organisations also face the risk of knowledge leakage when they train their staff, as the trained employees may leave (Lamming, 1993). It is unlikely that employees that have received training will stay with an organisation for the whole of their working life (Frank, 2002). However, the organisation they move to gains knowledge and experience.

More recently, Parkin (2006) predicts that as the networked world brings on early ageing in organisations, they will start to unintentionally leak knowledge at an increasingly alarming rate as their employee's network outside the organisation to attain insights to complete their jobs.

Although several routes by which knowledge is leaked via people with some negative end results are reported in the literature, there are however not any attempts to understand holistically the nature of the leakage and its consequences. Thus, there is a pressing need to both understand the knowledge leakage routes through people and identify its impacts, both positive and negative.

4 RESEARCH METHODOLOGY

As the concept of knowledge leakage is not well understood and the nature of this research is exploratory, a Grounded Theory approach has been selected as a research strategy. Grounded Theory, is beneficial when conducting research that aims to generate a descriptive and explanatory theory about a specific concept that is not understood, or for which there is not much information, as in the case of knowledge leakage. The Grounded Theory process of theory building is closely tied to evidence. Consequently, the resultant theory tends to be consistent with empirical observation. Thus, theory is discovered through an inductive method allowing the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data (Martin and Turner, 1986).

The Grounded Theory methodology is iterative, requiring a steady flow between concept and data; it is also comparative, involving constant comparisons across different types of evidence to control the conceptual level and scope of the emerging theory. Thus in the present study, research was undertaken with no prior assumptions, and available data collected by using loosely directed open-ended questions.

4.1 Sample of the study

The focus of the present study was on Small and Medium sized Enterprises (SMEs) involved in manufacturing and design. Employees of six knowledge-intensive design and manufacturing organisations were interviewed. The interviewees included the Technical Director, Managing Director, Group Manufacturing Manager, Research Engineer, Organisation Director, Junior Architect, Chief Executive Officer and Operations Director.

4.2 Data collection and analysis

As the study presented here was of an exploratory nature, face-to-face interviews of up to two hours and thirty minutes were used as the main instrument of data collection. Guided by a loose agenda (see Appendix A) open-ended questions addressed: assessing the different routes by which knowledge can leak; how dependant organisations were on individuals for certain knowledge and experience; what might happen if these individuals left; whether organisations have knowledge capture procedures or strategies to compensate for employee turnover; procedures organisations have in place to ensure knowledge is retained; what steps are taken to ensure employees cease to have access to the organisation's systems when they leave. Hence, it was possible to determine whether the organisation understood the concept of knowledge leakage and appreciated its potential impact. The interviews were all recorded and transcribed. Telephone calls and e-mail were used to clarify issues and the final transcripts were sent to the interviewees to ensure accuracy of extracted data and to avoid researcher bias. The open-ended questions gave interviewees an opportunity to introduce their own thoughts and views. Supplementary factual information was as also collected.

Once data collection was complete, data was analysed and coded using an element of Grounded Theory (Glaser and Strauss, 1967). The analysis element was specifically selected as it enables the researcher to identify key points or themes and cluster them into broad themes, thus allowing the summarising, coding and categorising the emerging knowledge leakage factors in a more meaningful way. As the research undertaken was to establish an explanation of the knowledge leakage concept and the relationship with the consequences, special attention was given to the internal validity of the

data. Thus, throughout the research there was an ongoing interaction between theory (codes and categories that started to emerge from the literature analysis and the first interviews) and the data collected (in subsequent interactions). Data were re-examined and re-coded to determine the categories and concepts that include as much of the data as possible. This repeated continuous inspection of the data resulted in a set of two categories, intentional and unintentional, of knowledge leakage and two associated consequences, positive and negative.

The results obtained were scrutinised and knowledge leakage factors were organised by recurring theme; the associated categories were then linked, resulting in the taxonomy illustrated in Figure 1.

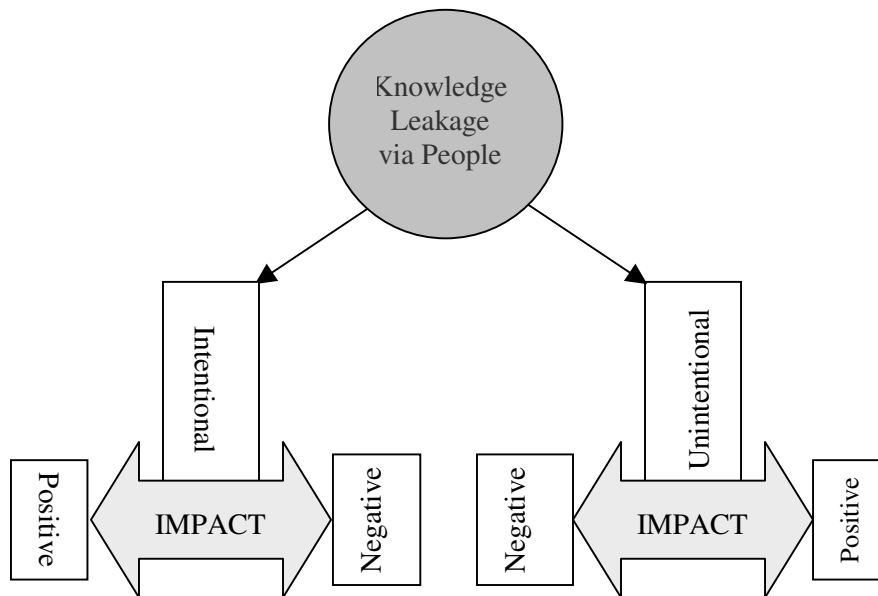


Figure 1. Taxonomy of knowledge leakage through people inflow and outflow

5 FINDINGS

Two categories of knowledge leakage via people are identified in Figure 1. *Intentional* refers to the deliberate and strategic transmission of knowledge via people for example involving people in business strategies. While *unintentional* refers to the transmission or loss of knowledge through, for example, the use of temporary workers, whose next employer might be a direct competitor to their present employer.

The knowledge leakage has been identified as positive when an organisation benefits, or negative when the leakage is detrimental to the organisation. The results obtained from each organisation were analysed with respect to the overview in Figure 1 and the results shown in Table 1 were obtained.

All of the respondents were aware of the inflow of knowledge leakage via trainees. When employees attend external courses, it is the organisation's intention that the employee brings back knowledge that has been learned through the training programmes and hence benefits the organisation. This is coded as an intentional knowledge leakage that has a positive consequence. The unintentional negative impact in this occasion would be if the trained employee were to leave the organisation and seek employment somewhere else. Nevertheless, this negative impact of such knowledge leakage was reported by Frank (2002) in the literature but was not evident in the scoping study and hence not included in the taxonomy.

Organisations have also been found to intentionally share (leak) knowledge with people by involving them in their business strategies. This is intended to have several positive consequences, as it would make them feel they have a stake in/own the direction of the organisation's strategy. Knowledge about the strategy will inform people of the rationale of specific changes and what can be done to improve the organisation, i.e. it facilitates, continuous improvement methods. This is also perceived as a preventative measure, as people will be less likely to resist any changes being implemented within the organisation.

Form of knowledge leakage	Source of knowledge leakage via people inflows and outflows	Knowledge leakage impact	
		Positive	Negative
Intentional	Training courses (inflow)	Attending external courses brings back training ideas (inflow) and creates future capacity	
	Involving people in business strategies (outflow)	People feel they have a share in the business and that they own direction of organisation	
	Collaborations with universities including Knowledge Transfer Partnerships (outflow and inflow)	Gain new insights and information from external sources	Divulging company practices and information to external organisations
	People who come from other organisations (inflow and outflow)	Gaining other people's knowledge (inflow)	Transmitting important knowledge or information to external organisations (outflow)
	Knowledge leakage via multi-disciplinary teams (inflow and outflow)	Learning between disciplines (inflow and outflow)	Teams may be beyond the boundaries of the firm, or between subsidiaries (outflow)
	Temporary workers (inflow and outflow)	Knowledge benefits accumulate from inflow of new people (inflow)	Temporary workers can leave with knowledge of firm, processes, and strategy (outflow)
	Temporary and anticipated loss of staff (outflow)		Disruption to work processes (e.g. holidays and maternity leave)
Unintentional			
	Temporary and unanticipated loss of staff (outflow)		Disruption to work processes (e.g. maternity leave and sickness)
	People leaving (outflow)		Expertise leaving (outflow)

Table 1. Forms of knowledge leakage through people and its consequences

Knowledge leakage has also been found to occur through organisations involvement in collaborations with universities. This knowledge leakage is intended to enable the organisation to build up future competencies and capacity through benefiting from universities' know-how and thus foster new talent of employee inflow. Nevertheless, it has a negative consequence in that the organisation's practices and information may be divulged to external organisations.

It was also evident from the study that there is an inflow of knowledge through people who come from other organisations, particularly where an organisation recruits from competitors, suppliers and customers for their knowledge assets. This is perceived as a positive knowledge leakage, as the organisation will be benefiting from the inflows of the know-how of employees coming in from direct competitors, suppliers and customers. While the opposite is perceived as a negative outflow, for

example if personnel leave for competitors, as the critical knowledge, known by the employee, may be leaked or lost forever if it is not banked while the personnel were still in the organisation.

Knowledge leakage via multi-disciplinary teams (or multi-skill teams) could be both an intentional inflow and outflow of knowledge. In the case of inflow, organisational learning can occur between disciplines, and it is perceived as a positive knowledge leakage. This ensures continuous improvement. However, when teams extend beyond company boundaries or are between subsidiaries then knowledge flows out. For example, if an organisation generates links beyond the boundaries of the organisation by collaborating with research partners then there is a danger of inevitable knowledge leakage that cannot be guaranteed to be entirely positive.

Depending on the knowledge intensity of the business knowledge, leakage through temporary workers has been found to have both positive and negative consequences. It has positive consequences where knowledge benefits accumulate from inflows of new people. On the other hand, depending on where temporary workers are located, temporary workers can leave knowing the knowledge of the firm. For example, in one of the organisations studied an IT consultant was brought in to complete an ex-employee's projects. The consultant had full access to the computer system of the organisation and was able to store and leave with whatever data he required; this confirms what is reported in the literature by Matusik and Hill (1998).

In line with the literature, one of the key knowledge leakage routes was found to be via temporary and anticipated/unanticipated loss of staff. For example, organisations know in advance when their employees will be taking holidays or are going on maternity leave. Yet, it was found that there is a temporary loss of the knowledge held by these employees, which has a negative consequence in terms of work disruption.

“Yes, we do cross training...the real reason that we have tried to capture knowledge in other individuals understanding other individuals' roles is more for sickness than actually people leaving the business. I think that is where it has hit us where somebody has suddenly gone on – even short-term sick leave is significant for this business because we are quite a reactive business by virtue of the fact that it is a fresh product and that customers' orders can change by 70 per cent in a day. So, if somebody leaves from a critical area of the business” Operational Director

Only two organisations had a handover plan that is executed, while the remaining organisations did not seem to have efficient 'succession planning' to cater for the absence of these employees. Replacement staff always seemed to need to re-learn the know-how of the job, particularly if replacement staff could not access the knowledge held by incumbents.

Another key knowledge leakage route (in line with Mynors *et al.*, 2004; Treleaven and Sykes, 2005) was found to be through key individuals or experts leaving the organisation with unique knowledge that cannot be turned to organisational knowledge. It is reported that this is particularly problematic where the critical knowledge is held in a key individual and not documented as there is an outflow of people and knowledge that can be lost forever. For example, a CEO of a medical manufacturing organisation was leaving; his 'know-how' knowledge and all his contacts would go with him and would be lost to his original employer. Another example was evident in a metal component manufacturer, where a director of the organisation was retiring, which would mean an irreplaceable loss of 33 years experience. Only near the time of retirement of this key individual did the organisation think of implementing a system for knowledge banking. This particular negative consequence was evident in all the interviews, particularly where the loss of employees was to competitors.

Having identified that knowledge flows may be either intentional or unintentional; and both forms may have negative and positive impacts on the organisation. There is a need for organisations to implement management information systems to capture knowledge before it leaks. The systems will need to take into account social factors such as the knowledge leakage routes described in this paper. Such a system will enable organisations to be aware of the process of knowledge leakage and to take appropriate actions (e.g. succession planning) maximising the effective flows of knowledge that have

positive consequences. Such systems will be particularly beneficial, for example, where key employees leave organisations, knowledge will be easily traced and managed through the information system without needing to reinvent the wheel by the replacement employee.

6 CONCLUSION

This paper reports the findings of a scoping study exploring the concept and consequences of knowledge leakage. The study involved six manufacturing and design SMEs. The main channels of knowledge leakage via people were found to be: training courses; involving people in business strategies; Knowledge Transfer Partnerships and other collaborations with universities; recruitment of staff by competitors, customers and suppliers; learning between disciplines; temporary workers, unexpected loss of staff; and experts and key individuals leaving. Experience of the studied organisations demonstrated that knowledge can be leaked intentionally or unintentionally and that the consequence of the leak could be positive or negative. A taxonomy of the forms and the impacts of knowledge leakage via people was developed from exploratory interviews and literature. The main findings of the study indicate that across all organisations, there is a dependency on key employees and there is an insufficient succession planning and knowledge-capture activities. This causes time to be wasted and extra effort to be expended as the successor either 're-invent the wheel' or compensates for knowledge forever lost to the organisation. It is important that organisations are aware these outflow and inflows of knowledge and the different routes by which knowledge leaks from the origin and hence develops an effective strategic approach to compensate. In addition, organisations need to implement and manage information systems to capture the process of knowledge leakage, taking into account social factors such as the knowledge leakage routes described in this paper to ensure an organisation's dynamic competitiveness.

The authors are aware that the validity of the outcomes of the present study is limited as it was carried out only on SMEs in manufacturing and design organisations. Thus, future research will include: a) confirming the proposed taxonomy using additional SMEs; b) completing case studies in large organisations and in other sectors hence testing the findings as a function of size and activity. The findings of the future study at the conceptual level facilitate further categorisation of knowledge leakage as a function of firm and inter-firm activities. At the practical level, it will enable organisations to maximise the benefits of their knowledge and manage people flow; contribute to the understanding of the concept of knowledge leakage; and more importantly assist organisations to assess their knowledge leakage holistically and to understand the risks and benefits associated with the leaks.

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9 APPENDIX A

Knowledge Leakage Question Agenda – first round, January 2006

1. People leave through several routes: retirement, new job (outside the company or within the company but in a different department, site or subsidiary), promotion, or death.
How dependent is your company on a single person for certain knowledge and experience?
What might happen if they left?
Does the company have knowledge capture procedures to anticipate employee turnover? <input type="checkbox"/> yes (If yes, please give examples) <input type="checkbox"/> no
What procedures does the company have in place to ensure knowledge is not lost forever?
What is your view on the impact of the people leaving on the whole organisation?
What steps are taken to ensure that when employees leave they no longer have access to the organisation systems?
Does your Company have a strategy for storage of Knowledge? <input type="checkbox"/> yes (If yes, please say something about it) <input type="checkbox"/> no
Does your Company have a phase of training for the replacement employee?
2. What risk assessments do you undertake when subcontracting/ outsourcing?
What proportion of manufacturing/tooling/product development/ sales, etc. is outsourced?
What are the key outsourcing locations for manufacture/other?
All products/moulds/tools to same subcontractor?
What information (defined as covering everything) is supplied to subcontractors in order for them to fulfil their contracts?
What is the risk of subcontractors becoming competitors arising out of the outsourcing ?
What other risks are associated with subcontracting?
3. What risk assessments do you undertake when dealing with suppliers?
What is your procurement strategy for key components? What is the optimum number of suppliers?
All products/moulds/tools/etc sourced from the same supplier?
What information (defined as covering everything) is sent to suppliers?
Do you feel suppliers could become competitors?
Do you see any other risks associated with dealing with supplies?
4. What risk assessments do you undertake when dealing with customers?
Minimum information about product/component/service development route
All information about product/component/service development route
Do you see any other risks associated with dealing with customers?
5. How does your company maximise the use and/or capture of internal experiences/knowledge?
When a new product/service is developed is there a post completion analysis and experience absorption phase or are experiences and knowledge allowed to fade away?
6. Can you identify any other routes where knowledge flows within or from the company?
Theft?
Indifference?
Electronic system failure?
Conferences?
Consultants?
etc?

7. How high would the impact of knowledge loss within your organisation be, on the whole organisation?

How would you measure the success of knowledge in your organisation?

8. Do you have a risk management procedure or strategy in your organisation? If yes how is knowledge leakage managed?

9. Does the term knowledge leakage mean anything to you and if so, what?