Ageing Workforce Knowledge Management and Transactional & Transformational Leadership: A Socio-technical Systems Framework and a Norwegian Case Study

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Abstract

This study explores the relationship between leadership style and knowledge management in the context of a post-merger downsizing with an ageing workforce. We focused on the Statoil and Hydro merger in Norway. A socio-technical systems approach was utilised, emphasising the interrelatedness of social and technological subsystems within organisations and those subsystems' relationships to their environments. A qualitative approach was used to collect and analyse the data.

The results support the existence of relationships between leadership style and post-merger knowledge management in the context of an ageing workforce. A positive link between transformational leadership and tacit knowledge transfer was found. Transformational leaders had a strong tendency to view and to act on knowledge management from a social perspective. A positive link was also found between transactional leadership and explicit knowledge transfer. Transactional leaders had a strong tendency to view and to act on knowledge management from a technical perspective.

Key words: knowledge management, socio-technical systems, systems thinking, transformational leadership, transactional leadership, post-merger, ageing workforce, Norway, case study

1. Introduction

This study explores the key question: What are the relationships between the social subsystems of leadership and their relationship to knowledge management? The study builds on socio-technical systems theory (STS) and leadership theories on transactional and transformational leadership. We developed a refined "*Socio-technical systems framework for knowledge management and leadership*", by adding a *management sub-system* in the analysis, compare to the STS. The refined integrated socio-technical systems perspective emphasises the interrelatedness of the management, social and technological subsystems within organisations and those subsystems' relationship to the environment in which they operate (Trist & Bamforth, 1951). The research is based on the Norwegian case study, the merger between Statoil and Norsk Hydro, with data from 2007-2010.

1.1 Leadership Style and Knowledge Management

This study views organisational knowledge as a socially constructed product. Therefore, knowledge is shaped by the interplay and social understandings between technological factors, e.g. KM tools, organisational factors, e.g. leadership styles, and external factors from the environment, e.g. ageing workforce. In this research context, we propose that knowledge management activities are multi-layered systems, where in an aging workforce, leadership styles may result in certain leadership choices of technology and, consequently, the type of knowledge being managed.

This assumption of a relationship between leadership and KM has been supported theoretically and empirically to a certain extent. Theoretically, the traits-based perspective of leadership suggests that leaders have innate and heritable qualities (Zaccaro, 2007). Traits identified in the earlier literature (Bird, 1940; Stogdill, 1948) include speech fluency, decisiveness, interpersonal skills, and moral habits.

Recent literature has elaborated much on the strategic traits that leaders possess, such as the ability to see the big picture and to foster a knowledge-sharing culture (Srivastava, Bartol, & Locke, 2006). This supports the theoretical assumption that leadership and knowledge management are inherently linked, as leaders have a responsibility to promote knowledge management and culture, and understand the strategic impact of KM.

Empirically, some studies have found a relationship between leadership style and knowledge management. Politis's (2001) study supported the notion that leadership that encourages human interaction and participation is positively related to knowledge acquisition. Similarly, Fullan (2002) suggested that leadership is linked to organisational sustainability and is positively linked to knowledge management, as leaders' effort in capturing and transferring knowledge will enable the organisation to continuously regenerate itself in an ever-improving direction. Srivastava, Bartol and Locke (2006) also concluded that empowering leadership is positively related to knowledge sharing and team efficiency. Some authors have further argued that transformational leadership is a process by which organisational wisdom can be acquired (Bierly, Kessler, & Christensen, 2000).

1.2 Socio-Technical Systems Theory

A classical socio-technical theory provides a framework for organisational success by the successful combination of technology and work design for regulated work groups (Appelbaum, 1997). The socio-technical systems theory (STS theory) is an extension of the classical socio-technical perspective on organisations, with an additional systems approach, where organisational design is based on the premise that an organisation is a combination of social and technical parts that are open to its environments (Appelbaum, 1997). Within an STS-designed organisation, social systems aim to design work structures that respond to employees' psychological needs, such as meaningfulness of the work and sense of responsibility and belonging, which can be experienced through organisational networks, culture and general social interactions (Appelbaum, 1997; Egan, Yang, & Barlett, 2004), whilst the technological system comprise the tools employed to support the production of organisational goals, ranging from simple desks and PCs to complex production tools.

The STS approach is a large departure from the well-rooted thinking of scientific management, by advocating the necessity of paying attention to human needs and going beyond the tasks dictated by technology. This approach advocates the need to redesign the technological components of work, and not only attempt to fit people into existing technologies. The systems approach advocates that all subsystems are interrelated and interdependent and that the co-ordination of technology and human activities is critical to supporting the system's functioning (Appelbaum, 1997), also coined as *joint optimisation* (Passmore, 2001). Joint optimisation is the foundation and cornerstone of socio-technical systems theory, which not only focuses on the importance of all subsystems working coherently together, but also emphasises that the optimisation of the whole system tends to require a less than optimum state for each separate subsystem. Classical socio-technical systems theory focused on the applications of work design for routine workers or first-line staff. However, competitive trends of the global business environment call for the rethinking of traditional work designs. Much of the early research emphasises the role of information technology in knowledge management. However, growing numbers of studies are providing arguments for a more holistic approach that combines social and technical factors (Pan & Scarbrough, 1999). This perspective provides a fresh viewpoint on the effectiveness of organisational design and the work process by suggesting that knowledge is bound with human cognition and that effective knowledge management occurs within a structured social context (Thomas, Kellogg, & Erickson, 2001; Drew, 1999).

Another critical element of the STS approach is its emphasis on the external environment and how an organisation as a system is receptive to its influences on organisational successes. Hence, decisions and strategies taken to manage the environmental threats must be congruent and compatible with the internal designs (Appelbaum, 1997). Environment subsystems are important parts of the STS approach, but they are often discussed with much less emphasis in comparison to the social and technical subsystems.

Organisations in a knowledge-intensive economy are considered 'non-routine'. Non-routine organisations face higher numbers of exceptions, where the solutions to problems are often complex and unknown at the outset (Stebbins & Shani, 1995). Knowledge-based organisations are an example of non-routine organisations. From a socio-technical systems theory approach, it may be argued that within a non-routine organisation, the social subsystem contains the most organisational competitiveness (i.e., tacit knowledge).

Thus, in a non-routine organisation, knowledge exchange between the subsystems and within the social system is critical, as tacit knowledge will largely reside within the social subsystems with the people.

1.3 The Environment: The Ageing Workforce and the Shift to a Knowledge-based Economy

The STS approach emphasises the external environment and how an organisation as a system is receptive to its influences. For the purpose of this study and the proposed framework, the two relevant and prominent changes in organisational environments are the ageing workforce and the shift towards a knowledge-based economy (KBE). These two factors will shape organisational decisions, such as downsizing, as well as shape the ways internal organisational systems should be structured in order to respond to the environment.

1.2.1 The Ageing Workforce

Declining birth rates and a continuous rise in life expectancy are leading to considerable changes in the age structure in Europe, US and parts of Asia. This change in structure prevails in the ageing workforce, where the greying baby boomers (people born between 1943 and 1960) will be retiring *en masse* in the next 10-20 years. This population of older workers represent great pools of collective knowledge and unique competences gained over years of experiences at their disposal (Slagter, 2007).

Some studies have indicated a strong positive correlation between adult age and knowledge level (Kanfer & Ackerman, 2004; Kyvik & Olsen, 2008). Contrary to biased perspectives, there is on average no decline in work performance related to age, and older workers may be ahead of their younger colleagues in non-core workplace tasks like organisational citizenship (Ng & Feldman, 2008). This also applies in knowledge-intensive workplaces like universities (Kyvik & Olsen, 2008). Van Ours (2009), and Van Ours and Stoeldraijer (2011) found no indication of a pay-productivity gap of older workers. Hence, there is a call from OECD (2013) to retain older workers in the workplaces and increase their employability throughout the next decades.

Consequently, on an organisational level, the problem of managing this demographic change is more complex than just developing usual organisational coping mechanisms for retirement. The complexities have also resulted in the devaluation and marginalisation of the older workers remaining in the labour market (Walker & Maltby, 1997). Negative, unjustified stereotyping of older workers prevail (Furunes & Mykletun, 2011), and workplace age-discrimination is common (Furunes & Mykletun, 2010). This also has implications for the remaining workers within the organisation after an organisational downsizing project, such as an early retirement downsizing, where the remaining employees feel more like the victims than the survivors (Chen & Mykletun, 2011).

1.2.2 The Shift Towards a Knowledge-based Economy

A knowledge-based economy refers to an economy of knowledge focused on the production and management of knowledge in a frame of economic constraints. The key characteristics of a knowledge-based economy are greater reliance on intellectual capabilities than on physical inputs or natural resources, an accelerated pace of technical and scientific advance, and rapid obsolescence (Powell & Snellman, 2004). In a knowledge-based economy, effectively developing and applying intellectual capital are the keys to value creation (DeLong, 2004).

Knowledge is both explicit and tacit (Nonaka & Takeuchi, 1995); thus, in a knowledge economy, knowledge is a product, while in a knowledge-based economy, knowledge is a tool. Moreover, knowledge management is a highly political undertaking, especially when it is associated with power, money and success (Davenport, 1997). Despite the generalised use of the term ‘knowledge’, the diagnosis of lost knowledge and its consequences are more complicated than at face value, as knowledge is a multi-dimensional concept, and its value is determined by its context (DeLong, 2004). Furthermore, the phenomenal development of information technologies such as wikis, Facebook and LinkedIn further complicates the operational and strategic impacts of knowledge management. However, in an economy that is largely based on the deliveries of an ageing workforce, a well-planned and effective knowledge transfer between the aging generations to the next may be of greater importance than creating new knowledge.

2. Transactional and Transformational Leadership Theories

Burns's (1978) conceptualisation of the differences between Transactional and Transformational leadership is by what the leaders and followers offer one another: Transformational leaders offer a purpose to their followers, which transcends short-term organisational goals and focuses on the followers' greater needs in intrinsic rewards, while Transactional leaders offer clear expectations of input from followers and rewards that are clearly dependent on the outcomes. According to Burns (1978), while transactional leadership is more often observed, it results in less impact on organisations, and the two leadership styles represent the opposite ends of the continuum.

However, the relative weakness of this school of thought is not so much in its conceptualisation, but in its relevant application given the changes in the marketplace and workplaces, which call for leaders to become more transformational and less transactional to remain effective and competitive (Bass, 1999).

Transformational and transactional leadership are not the opposites of each other, but rather, complementary, as a good leader should be both transformational and transactional (Bass, 1985). Key descriptions of transactional leaders are: *contingent rewards, management by exception (active), management by exception (passive), and laissez-faire leadership,* while four dimensions of transformational leadership are: *charisma/idealised influence, inspirational motivation, intellectual stimulation and individualised consideration* (Bass, 1985; 1999). However, transformational leaders can be directive or participative, authoritarian or democratic. Thus, it would be a misconception that all transformational leaders lift morale and attain goals simply by participation and involvement. Therefore, relative weakness of the transformational leadership theory lies within its almost idealised interpretation of effective leadership, suggesting that all transformational leaders have the ability to lead their followers to transcend their own self-interest, beyond self-actualisation (Bass, 1999).

3. The refine Socio-Technical Systems Framework of Knowledge Management and Leadership

The refine socio-technical framework for knowledge management and leadership, presented in figure 1, takes a holistic approach that highlights the interweaving social and technical factors in the way knowledge is managed, as well as the complexity of employees' subjective perceptions of leadership and the objective characteristics of knowledge management processes. The shift towards a knowledge-based economy also implies that there is a need to revise the role of leadership and its effectiveness in the increasingly challenging environments. Furthermore, there is shift in the attention from traditional vertical leadership, where leadership is envisioned as shared horizontally within a team (Pearce, 2004).

This refine framework builds upon the concepts of the Open Systems and the Classic Socio-Technical systems approach to organisational studies. The formal approach views organisations as systems, and the effectiveness of the system depends on its internal systems and its interactions with the environment (Bertalanffy, 1968), while the latter focuses on the interrelationship between people/social aspects and technology/technical aspects within the systems. This refined framework advocates that a socio-technical system is structurally composed of three different subsystems: *the management subsystem, the technical subsystem and the social subsystem*. These subsystems have boundaries that interact with the external environment, which in turn influences the subsystems. The subsystems fulfil the purpose of the socio-technical system and are interrelated, as well as interdependent, but they do not share the same characteristics.

The management subsystem is an additional dimension proposed by the authors. Compared to the classic socio-technical systems approach, which focuses largely on the work relationship structures that bring social systems and technical systems together, this framework proposes the need to consider management subsystems, which form foundations for the directions within the social and technical subsystems. The elements included in the framework include formal policies, strategy, organisational change, procedures and informal traditions. This subsystem is important because it assumes a top-down influence on the system's (in this case, an organisation's) outcome. For instance, a merger decision made within the management subsystem will have huge implications on the social subsystems (e.g., post-merger downsizing), and the technical subsystems dealing with the change (e.g., consolidation of Informational Technology solutions).

The technical subsystem represents the infrastructure for knowledge management. The infrastructure supports the objective of knowing both the information and the know-how. Knowledge management in this subsystem represents various technologies that support the processes of knowledge creation, production, distribution, and consumption and that fulfil the objective of knowledge capitalisation, which allows previously stored and modelled knowledge to be reused, in a relevant way, in a new task situation (Simon, 1996). The infrastructure could comprise an internal database, intranet, internal wiki and archival documentation.

The social subsystem typically refers to tasks, task dependencies, grouping of roles, co-ordinations, and the reliance on experts in making decisions (Passmore, 2001). In this proposed framework, we focus on the leadership elements within an organisation, as well as on the members/followers. The leadership elements are segregated into two distinctive leadership styles: transactional and transformational. As the social subsystem is role-oriented, in this framework, this dimension considers the role of transactional and transformational leadership, its relationship to the use of knowledge management infrastructures, and its interactions with the members/followers.

Knowledge exchange happens within the social subsystems and the technical subsystems itself, but also between the subsystems. The proposed framework suggests that tacit knowledge will reside largely within the social subsystems within the people, while explicit knowledge will be captured and stored predominantly in the technical subsystems. Knowledge exchange occurs when the social subsystems externalise the tacit knowledge and the technical subsystems internalise the explicit knowledge.

4. Methodology

4.1 Case Study: Statoil & Hydro Post-merger Downsizing

The case study is the merger between the two Norwegian oil companies, Statoil and Norsk Hydro, which took place in October 2007. Statoil was the largest Norwegian state-owned oil company, and Norsk Hydro was one of the largest aluminium companies worldwide. Much of the combined workforce had been with the organisation for over a decade or more. The post-merger downsizing strategy deployed involved a lucrative voluntary early retirement package for all employees over the age of 58. An estimated 1,500 employees took the package, which is approximately 5% of the total employees and 90% of the total targeted employees (StatoilHydro, 2007).

A qualitative approach was used to collect and to analyse the data. The research adopts a retrospective approach. Data were primarily collected over an eight-week period with the single case study methodology in mind. Semi-structured interviews were conducted in combination with on-site observations, and with extensive access to archival data about the organisation. The analysis retrospectively traces the change process and effect relevant to the post-merger downsizing over the last three years, from 2007-2010.

Using the lists of transformational and transitional leadership behaviours as defined by Bass (1999), the qualitative descriptions of their leaders and the leadership behaviours observed by the interviewees constitute the basis of categorising various leaders and persons involved as transformational or transactional leaders. Bass has used the principles of the descriptions above to develop the widely used Multifactor Leadership Questionnaire (MLQ) in order to determine the type of leadership exhibited in a leader. However, in this case, we use the qualitative approach to understand the employees' views of their leaders' leadership style by encouraging them to describe their leaders in detail but in their own words. The description is later categorised into transformational or transactional leadership using a matrix.

The main field work is conducted on-site at the Statoil Head office in Stavanger, Norway. Together with Statoil, two projects significantly affected by the early retirement package were identified. 27 semi-structured one on one interviews were then conducted with relevant project team members and project management to identify deliberate knowledge transfer attempts, and their relation to leadership and the departed expert knowledge representing the ageing workforce. All interviews were recorded and transcribed. 55 observations sessions of meetings, training classes and individuals at work were also made throughout the study. The notes from these observations were used to verify or to elaborate on the interview data. The technical details of knowledge management systems were collected primarily through archival data and confirmed in the interviews. Narrative analysis was utilised in the organisation and interpretation of interview data through coding and developing category systems. The data were categorised firstly in relation to leadership style and type of knowledge being transferred. A keyword matrix was developed to cross-examine the relationship between the data.

The interview questions guided the interviewees through their experiences of the knowledge transfer process and explored their perceptions of the process. To augment the validity of data collection, the interviewees were only advised that the study would explore the relationship between leadership and knowledge management in this particular context, without prompting or describing the stereotypical description of different leadership styles. The interviewees were encouraged by the interviewer to fully elaborate on the type of leadership in their own words on how they had observed in relation to knowledge management, which provided rich data for analysis on the types of leadership being described.

5. Results

The management subsystem was the additional defined dimension proposed by the framework above. In this case, the subsystem was responsible for two key decisions: the merger with Norsk Hydro, and the post-merger early retirement downsizing involving the encouragement of voluntary early retirement package for all employees over the age of 58. According to the framework, it was possible to observe the elements within the subsystem interacting with each other, from how a business strategy leading to a merger, and then lea to an organisational need for downsizing, which ultimately, resulted in an organisational redesign. From an organisational perspective, it was possible to argue that this level of the subsystem included only a small decision-making group (i.e., CEO, Board and Executive committees), together with a mandated group (in this case, a high-profile management consultancy firm was hired for assistance), and who interacted with each other and made decisions on behalf of the larger organisation. The decisions and actions of the management subsystem were only visible to the rest of the organisation when announced. In this case study, it was possible to observe that the management subsystem had limited interactions with the rest of the subsystems, but the consequences of the decisions made within the subsystems greatly impacted the organisation.

The technical subsystem represented the infrastructure for knowledge management, which supported the objective of knowledge creation, production, distribution and consumption. In this case study, we identified clear infrastructures that were used, including an internal database, intranet and archival documentation. From a technical perspective, the project knowledge transfer database was used to record the progress and any incident related to the project. However, many expressed that the system was too static and not user friendly. Some of the incidents and learning could not be captured just by writing. Observations showed that the database was not used on a weekly basis; instead, some team members updated it on a monthly basis, and only just enough to seem like an effort was made to record.

The use of language in explicit knowledge transfer was worth noting. After the merger, the official business language was English, instead of Norwegian. Many of the experts departing from the company expressed that the use of English in recording project-related issues felt unnatural and limiting. Both projects commenced before the merger. Hence, majority of the records were in Norwegian. When compared to the English sections, the Norwegian sections had far greater detail and employed more expert language, and thus had greater value for knowledge transfer. The language aspects illustrated the interaction between the technical subsystems with the social subsystems and the deliberate effort required to translate the language in order to fully achieve knowledge transfer as intended.

The social subsystem in this proposed framework focused on the leadership elements within an organisation, as well as its members/followers. The leadership elements were segregated into two distinctive leadership styles: *transactional* and *transformational*. The results are elaborated below.

5.1 Positive Link between Transformational Leadership and Tacit Knowledge Transfer

From a transformational leadership perspective, some of the repeated key words that reflected the transformational leadership in this situation indicated anticipation of the potential knowledge management issues within the bigger context of the ageing workforce. The leader encouraged and motivated the departing employees to be part of the knowledge management process, ensuring knowledge transfer is completed.

From a technical perspective, it is evident that the transformational leaders acknowledged the already established knowledge management technologies. However, these leaders did not emphasise nor overtly utilise the existing tools, and did not have the tendency to encourage their employees to comply and to use the existing KM tools. These leaders promoted the free utilisation of knowledge management methods to overcome quality restrictions of existing knowledge management technologies. For instance, one leader said:

> "I don't care how they record the things they need to know. They can draw, they can paint, and they can make a video. As long as the job is done, they can use whichever method they want."
>
> "What were hard to compensate was the long experiences that these people have, and it is not something that can be taught to another in one day. It cannot be done just by writing."

The results also indicated that transformational leaders had higher considerations of the environment outside of the organisation, such as the ageing workforce and its implication upon knowledge management. One of the project leaders, in his early 50s, showed an interest in and his insight into the ageing workforce situation:

> "I was very aware that this group of early retirees will mean that I will not only lose the people I consider as friends, but also lose the important knowledge and competence they bring to this project on a daily basis"

The observations from the team meetings reflected the fact that the issue of multiple departing experts (downsizing) was an openly discussed topic on the agenda.

The results showed that these leaders were more focused on the human interactions of knowledge management, with greater emphasis on methods such as work shadowing and mentoring through storytelling.

The leaders' insight into the situation was then translated into knowledge management actions, where one project member reflected:

> "My manager suggested that the new employee shadow and work alongside the guy who is leaving. This has proven to be helpful as the new guy quickly picked up some of the issues in the project that cannot be explained by just talking."
>
> "I hear that some other parts of the organisation were just not prepared for all these people leaving—I am happy that we are prepared, considering the situation"

We also observed that individuals were motivated to transfer their knowledge using methods with which they felt comfortable and for which they held ownership. One of the project team members who were responsible for the transfer of knowledge regarding the purchase of technologies relating to the project created a flow chart that was easy to follow and included the contact details of suppliers, and then he took the new employee on future meetings with the suppliers. Although the purchasing technology and contact details were explicit knowledge, the involvement in supplier meetings and ensuring the continuation of the supplier relationship were tacit knowledge that could not be managed or transferred simply through the database. This showed a positive link between transformational leadership and tacit knowledge transfer, as transformational leaders had a stronger tendency to view and to act on knowledge management from a social perspective than from a technical perspective.

5.2 Positive Link between Transactional Leadership and Explicit Knowledge Transfer

From a transactional leadership perspective, the key words were directed towards solution-oriented actions, such as recruitment and replacement. The project team members also acknowledged that the leader's solution to the problem is recruitment, and many expressed concerns relevant to the replacement of senior experts.

> "My manager is aware that we need to hire and replace those who left. He was pre-occupied with replacing the people we are going to lose."
>
> "I see some of the new recruits are at least 10 years younger than those whom they are replacing. I am not sure what is the plan to get them up to speed with the project."

The observations of team meetings suggested that the issue of losing expert knowledge was not discussed constructively on the agenda of project meetings, but rather flagged as an issue in the project's updated risk analysis. The archival documentations of the project risk analysis presented the departing expert as a potential Health, Safety and Environment (HSE) issue. This was particular relevant to projects where (exiting) expert knowledge might affect the safe operation of critical machinery. HSE was high on the corporate agenda, as it should very well be, but the focus on HSE and not the underlying knowledge issue meant that the critical long-term issue of safety competence was not really addressed.

Transactional leaders also showed a tendency to rely on the current available tools for knowledge management within the organisation, without attempting to consider or embrace alternative methods. Project leaders had all mentioned the tools used in the day-to-day management of information on the project through the KM portal, where on a weekly basis, individuals were expected to update it by the end the week with records of the progress and learning from the project, or on an ad-hoc basis when special circumstances arose. However, none of the team members described or observed extra efforts from the transactional leaders on suggesting methods to capture and transfer the project knowledge. Transitional leaders also places greater emphasis on HR's accountability for capturing the knowledge rather than placing the accountability with the business leaders themselves. When asked about the view of the early retirement package and the solution to lost competencies, one leader elaborated on the role of HR, stating that:

> "It was obvious that we were going to lose a lot of valued competence. Some deliberate efforts have been organized to secure knowledge transfer, such as knowledge cafes, but these were initiated by HR."

One openly stated:

> "HR should be responsible."

The results showed a positive link between transactional leadership and explicit knowledge transfer, where transformational leaders had a stronger tendency to view and to act on knowledge management from a technical perspective rather than from a social perspective.

6. Discussion and Conclusions

A positive link between transformational leadership and tacit knowledge transfer was found, where transformational leaders had a stronger tendency to view and to act on knowledge management from a social perspective rather than only from a technical perspective. This enables leaders to empower their teams to transfer tacit knowledge through creative KM methods that one devises with ownership. This supports Bierly, Kessler, & Christensen (2000) argument that transformational leadership is a process by which organisational knowledge wisdom can be acquired, and supports Bartol and Locke's (2006) conclusion that empowering leadership is positively related to knowledge sharing and team efficiency.

A positive link between transactional leadership and explicit knowledge transfer was also found, as transactional leaders had a stronger tendency to view and to act on knowledge management from a technical perspective rather than from a social perspective. These leaders prompt and support accurate explicit knowledge sharing and transfer by ensuring the team use existing tools in KM.

The key differentiator between transformational and transactional leaders in this context is their open acknowledgment of the external environments, where the ageing workforce and a knowledge-based economy play significant roles in their risk assessment of the early retirement downsize strategy and KM strategies. The results also support current research on transformational and transactional leadership, where the descriptions of the leaders are distinctive to what Bass (1999) described. Transformational leaders show charisma in installing trust among project team members and inspiring the team to formulate its own KM methods, such as flow charts, which are not an official KM tool in the company. By doing so, the leaders consider individual needs for owning part of the KM process, as well as migrating that into parts of the solution to losing expert competencies due to the early retirement strategy. On the other hand, transactional leaders focus on the task at hand, which is to complete the project as planned, and take the corrective action of recruitment as the solution to the deviation from the business as the usual scenario after the merger. It is clear that the transactional leaders focus on the status quo of KM tools and processes, and do not push for creative intervention to a unique issue that leaders face.

The study also supports the system theory, advocating that organisations operate like a system, with interaction between the social and technical subsystems. However, the key contribution of the study is to establish a more structured and clear relationship between leadership styles and the different organisational subsystems, including an additional defined subsystem labelled as the *management subsystem*.

The study further suggests that knowledge management should be an integrated part of the risk analysis with mitigating knowledge management actions planned as departing experts represent great pools of collective knowledge and unique competences gained over years of experiences and are challenging to transfer and capture. In lieu of such organisational planning, individual leadership self-initiated actions became decisive for the processes and outcomes.

As the study is qualitative in nature, it calls for quantitative data to investigate the relationships observed in this case study, and to critically examine the explanatory power of the proposed framework. In particular, a larger sample may confirm the relationships and observed causality.

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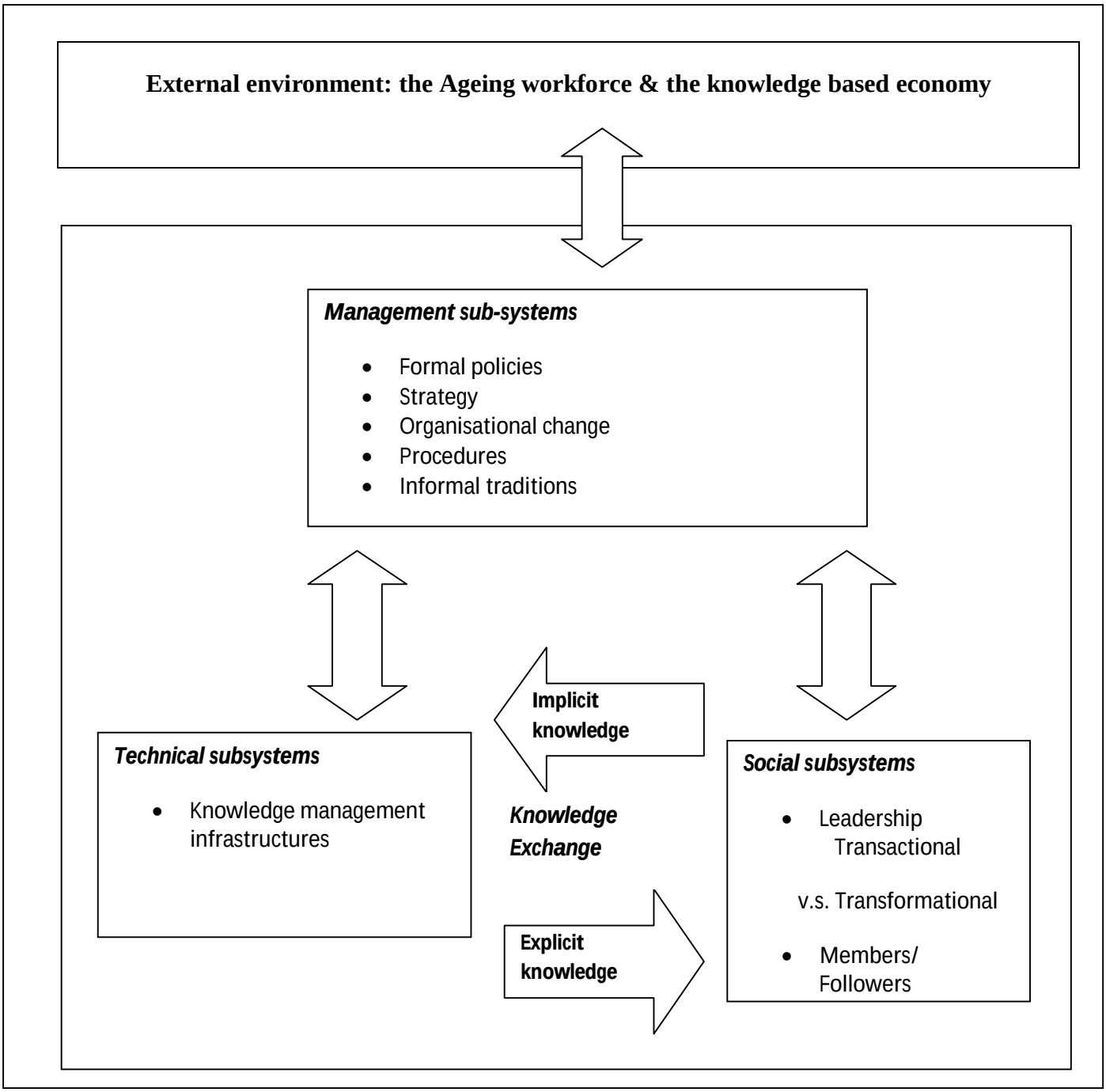

Figure 1: Refine Socio-technical systems framework for knowledge management & leadership