Systems thinking:
Whether you use it or not is the road to KM!

Research in Knowledge Management (KM) has varied across an array of methodological stances, which is not all surprising given the wide range of contributing fields and scholars, who carry different philosophical understandings by heart and diverse research methodologies by trade. This paper starts from a rich multi method research stance displayed in KM research and takes the position even further by proposing that KM's unique (and relatively new) development makes it a perfect match for systems thinking approaches that accommodate multiple world views. Building on existing work done in the field, the authors propose that KM share a substantial similarity with systems thinking that makes it quite hard to imagine a successful KM implementation without using systems thinking, even if systems thinking was not explicitly used / mentioned or more daringly even if KM developers had no prior knowledge and understanding of systems thinking!! To establish a systems thinking position, a number of systems thinking schools are reviewed with an eye on establishing a pool of common features which, in turn, enables us to propose an easily overlooked, yet essential, link to KM. This intimate-relation position is further extended by showing that researchers across the divide have followed in systems thinking foot path when studying KM, this point is demonstrated by critically reviewing KM work related to KM processes, methodologies and implementations. The proposed vision of intimacy between KM and systems thinking, even when not cited, serves as an eye opener for practitioners who are quite often frustrated by underachieving KM initiatives, through finding out about more possible routes to examine and manage their initiatives. Alternatively, this view provides a useful way forward for researchers investigating KM processes, methodologies, and implementations to re-look their KM research to accommodate multi world views which mimics KM nature.

1. Introduction:

Taking up the case of systems thinking (ST) for knowledge management (KM) might be an ambitious task as both fields go way back in history. Confucius insisted that he was not a source of knowledge, and wanted his disciples to explore and study the outside world (Van Norden, 2002); while Aristotle's world view, underlined by his holistic and teleological stances, can be best explained by his own words "the whole is more than the sum of its parts" (von Bertalanffy, 1972). Added to that, ST is composed of a considerable number of schools that vary epistemologically and methodically, and the KM field is being shaped by a number of existing disciplines, each carrying its own inquiry traditions, adding a new dimension to the complexity associated with managing knowledge. A job of this magnitude is surely beyond our scope here: thus the focus will be limited to the two most dominant approaches considered by researchers in the interpretive ST tradition to examine KM, the Viable System Model (VSM) (Beer, 1985) and Soft Systems Methodology (SSM) (Checkland, 1999). Additionally, we consider Systems Failure Approach (SFA) (Fortune and Peters, 2005) as derivative ST from the same school of thought: this can be a powerful tool to investigate KM as it directly addresses KM failure – still a hot topic at the current stage of KM (im)maturity.

First, we offer a review of ST by questioning its under-rated use in practice, followed by descriptions of VSM, SSM and SFA. Then we offer a brief view on how KM originated which leads to consider ST a natural source for framing our inquiries in KM. There follows a discussion on how KM research has reported ST ideas being applied without referring to ST explicitly, thus concluding our paper by suggesting that ST goes a long way in helping to explore KM initiatives.

2. Systems thinking:

ST is underpinned by a holistic view to problematic situations. This implies potential applicability in almost all organisational areas, for most strategic and many operational challenges pose themselves in ill-structured situations. It is the response to these ill-formed situations that makes organisations jump ahead of the competing pack by exploiting new opportunities or avoiding unforeseeable hazards.

There is a wide array of ST techniques, models and methodologies, developed for different situations in various fields, as shown in Figure 1. This is adapted from Ison et al (2007), by grouping them into three groups after Paucar-Caceres and Pagano (2008), and making some additions. The focus of this paper the focus will be on SSM, VSM (shown as Management Cyberbetics), and SFA. The first are the two dominant interpretive systems thinking methods in KM, according to a recent bibliographical study that examined ST in KM (Paucar-Caceres and Pagano, 2008). SFA is a "descendant" of SSM that we argue could be potentially useful in investigating the significant proportion of KM initiatives that will fail (Storey and Barnett, 2000), as it was developed with an eye towards learning from failure, and thereby preventing future failures.

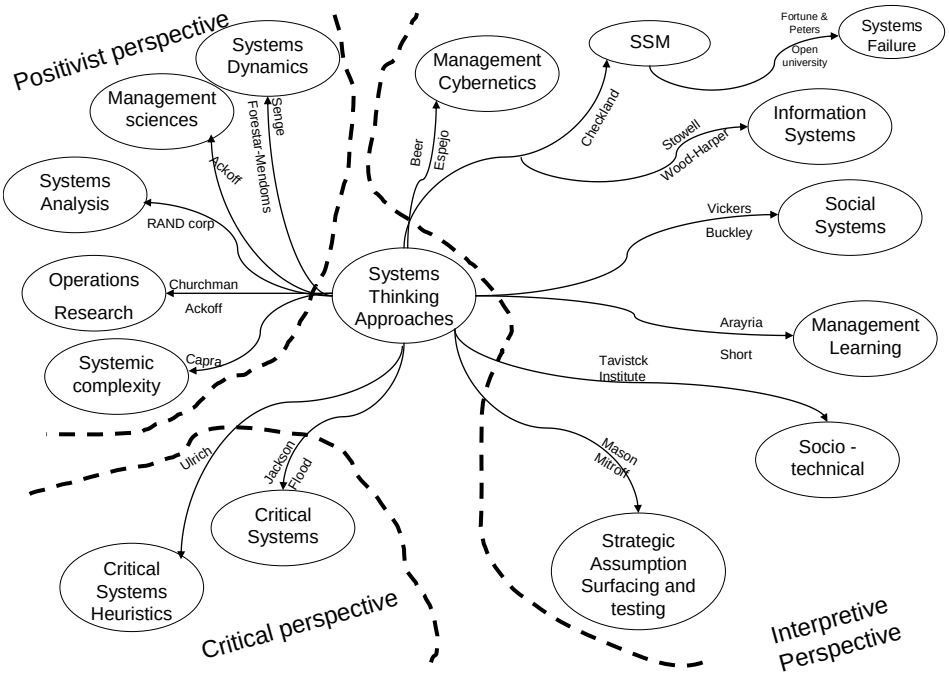

Figure 1: Systems Thinking Approaches adapted from Ison et al (2007) & Paucar-Caceres and Pagano (2008)

2.1 Why is ST underrated?

Ackoff (2006) has pointed to two main reasons behind limited use of ST. The first explanation is a general one that inhibits organisations from embracing transforming ideas. This factor has to do with way we approach mistakes which through our lives have been frowned upon by school teachers, parents, or friends. We treat mistakes as "bad things": an undesirable trait or result people would rather not be associated with. This explains why errors of omission frequently pass with the minimum review possible, if any. Innovative companies are market leaders, as they make fewer of this type of mistake, thus are more likely to react to changing surroundings by introducing innovative solutions. But, the running pack behind rarely ask themselves why they did not see this coming!! Actually, they might have done, but because accounting systems fail to take this type of error into consideration, managers can avoid being associated with these mistakes (Ackoff, 2006).

The second reason is more specific: both the publications and the rhetoric of ST are not accessible by potential users. Thus, Ackoff (2006) calls for more direct communication, through targeting special journals and conferences at potential users. We believe the picture in KM is not as gloomy as that portrayed by Ackoff more generally, as we set out to claim here that ST principles are somehow considered in many of the more successful KM practices.

2.2 Viable System Model

Beer's work in cybernetics from the 1950s led him to the VSM (Beer, 1985). Here the focus is on how a complex system can continue to exist autonomously by using feedback of information and communication to control its status (Mingers and Rosenhead, 2001).

Beer defined viability of systems as their ability to adapt to changing surroundings, by changing internally – a consequence of Ashby's Law of Requisite Variety. Yolles (2000) states that when organisations are adapting to environmental perturbations, "maintaining stability in behaviour" is a feature of a viable system's response to changes. By comparing the VSM and company X, they are in position to point to areas of possible improvements to ensure sustainability.

VSM posits that for a system to be viable, the six systems that are shown in Figure 2 all need to be present:
S1 Implementation/"Doing": the activities that literally make the organisation what it is (a bank, a university, a restaurant chain).
S2 Anti-oscillatory/Co-ordination: the routine mechanisms and procedures that ensure the S1s run as a purposeful whole.
S3 Control: operational decisions about what the S1s are to do in return for what resources.
S3* Audit: S3 checking what is really going on in the S1s, as opposed to what S1 is telling S3 through the "usual channels". Note that most "audits" cannot achieve this function, as they are scheduled in advance.
S4 Intelligence: awareness of how the external environment and the future might affect the system-in-focus.
S5 Policy: setting the overall direction, identity and ethical values of the organisation and balancing S3's concerns with the present and S4's concerns with the future.

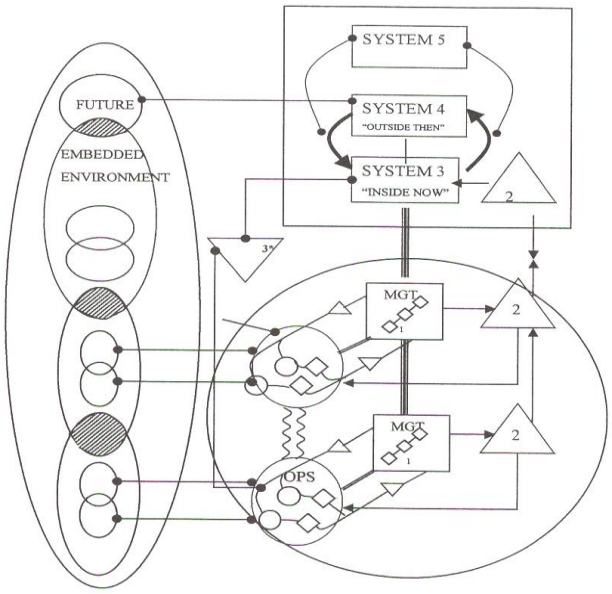

Figure 2: Viable system model: Adapted from Mingers and Rosenhead (2001) p.273 and Beer (1985) p.139

2.3 Soft Systems Methodology

In the 1960s, Checkland found that "hard" Systems Engineering frameworks (deterministic, often mathematically based) often failed in real life problematic situations, and over the subsequent forty years SSM has evolved to cope with their limitations (Checkland, 1999).

The major advance was realising that multiple perceptions of reality are constantly interacting causing real life situations to be problematic and fluid. Hence,

understanding real life situations has to accommodate participants' different worldviews and attempts to act purposefully.

SSM offers a way to make sense of the different worldviews held by individuals as a part of an ever-changing social reality, by structuring an enquiry through five activities (Checkland and Poulter, 2006) as shown in Figure 3:

1) Finding out about the problematic situation.
2) Explore it through purposeful activity based on different worldviews.
3) Discussing and debating the situation
4) Defining action to improve the situation to reach a solution that is culturally feasible and accommodating for different world views.
5) Critical reflection on the process, this is an overarching activity that allows investigators to look at the previous four steps either separately or collectively.

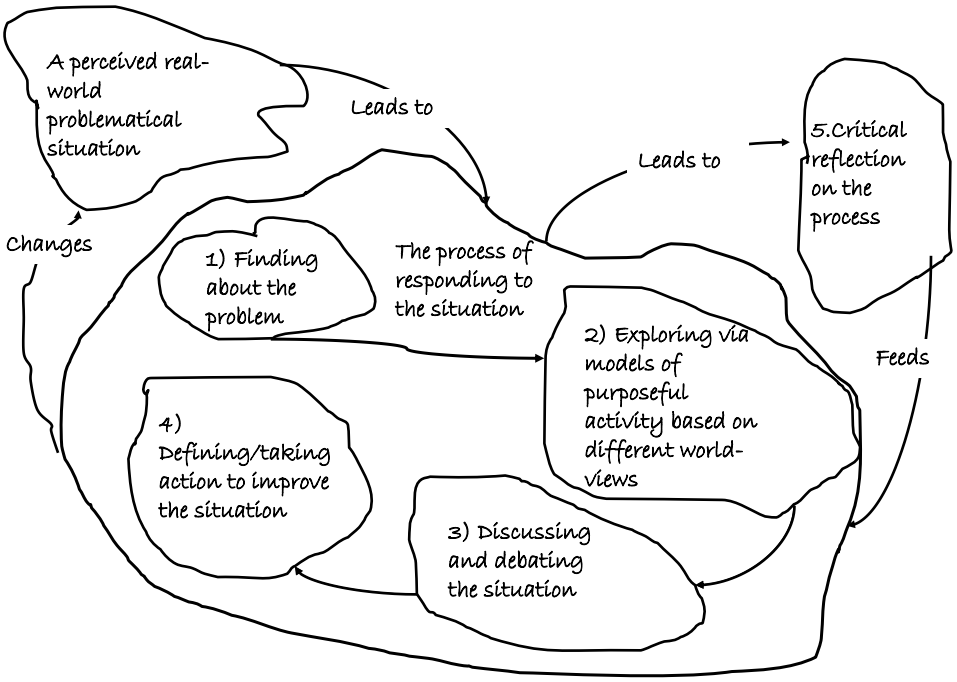

Figure 3: Soft Systems Methodology, from Checkland and Poulter (2006) P. 62.

2.4 Systems Failure Approach:

SFA has its roots in the study of catastrophes such as construction accidents, emergency planning, and policing. Fortune and Peters (2005) show how SFA can be used in information systems, thus forming a link to KM. SFA embraces various aspects of ST, particularly SSM (Fortune and Peters, 2005), which makes SFA useful in examining a dynamic and complex phenomenon like KM, consistent with the holistic perspective of ST which enables tapping into human interactions within an organisation. SFA may be used to develop a special systems response to address Ackoff's (2006) errors of omission that go undetected in a standard financial audit, as it deals with actual or potential failure whether historic or current. Figure 4 shows SFA adapted to KM.

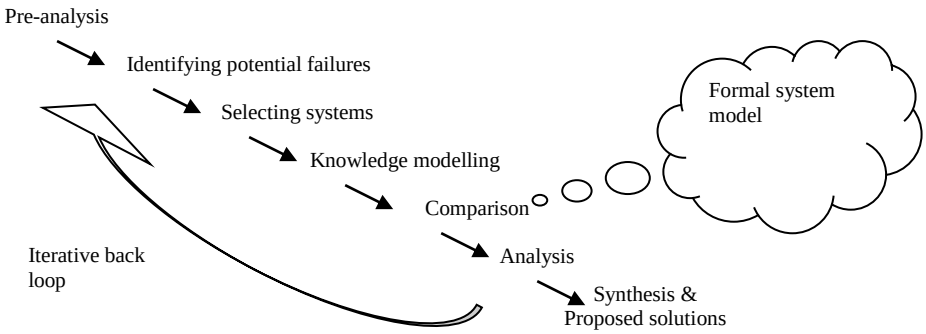

Figure 4: Systems Failure Approach to KM: Ababneh and Edwards (2007), adapted from Fortune and Peters (2005)

3. Knowledge Management

KM's rise as a discipline of practice and thought can be traced back to the late 20th century (Edwards et al, 2009). The post WWII industrialised countries' view gradually changed to what is called the "knowledge economy" (Machlup, 1962. Drucker, 1969), followed by the wider move to an "information society" (Castells, 1996). Organisations began formally to recognise the importance of knowledge along with the opportunities offered by ICT: Edwards et al (2009) cite Leonard-Barton's (1995) work as documenting perhaps the earliest example of explicit KM practice, although they also note that this documentation must have lagged a number of years as they state that KM consulting services were being offered by the late 1980s. It is sad to note today, that academics (especially those who claim to be KM ones) still lag in delivering educated KM professionals to meet ever-increasing market demand, as found by Grossman (2007).

KM research, however, was born out of existing academic fields. KM's success was claimed to be the son of so many fathers, a number of fields claiming their essential role in bringing KM to the world. These include: Operational Research, Human Research Management, Marketing, Management Information Systems, Computer Science, Accounting, Systems Thinking and the list goes on... We hold the view that was expressed by Edwards et al (2009) which indebts Organisational Learning, Business Process Management, Artificial Intelligence/Expert Systems, and the Resource-Based View of the firm as the major four players in shaping KM in the early days. For example, the contribution of the business process view to KM is set out by Edwards (2009). He asserts that: (a) knowledge flows across boundaries through cross-organisational business processes; (b) activities structuring within processes is an important part of knowledge; (c) both processes and knowledge need a kind of assessment to be validated; and more importantly (d) he places more emphasis on the whole business process, rather than parts, and asserts that a holistic view is needed to validate knowledge in a given organisational context.

This convergence of a number of fields does makes KM's legitimacy as a field of science broader and stronger (Baskerville and Dulipovici, 2006). Additionally, using

soundly researched ideas from other fields strengthens its relevance for future wealth generation and organisational effectiveness (Jackson, 2005). The rest of this paper concentrates on the relevance of ST to KM.

4. The relationship between ST and KM

Johanessen et al (1999) argue that ST should be considered as a philosophical foundation that enables KM utilisation. To this extent, they offer a model that links ST with KM and organisational learning through internal motivation, relations among systems, vision development, idea generation, and creativity. Jackson (2005, p.p.188) suggests that Nonaka and Takeuchi (1995) "make considerable use of systems concepts in developing their theory of organisational knowledge creation" in their seminal work: holism is central to both ST and the Japanese management concepts that informed Nonaka's work. This is backed up theoretically by Gao et al (2002) who develop a framework to apply different ST tools to the various aspects and phases of KM. Table 1 sums up our view on the links between ST and KM, each row being discussed in one of the following sub-sections.

Systems Thinking	**Knowledge Management**
1. Systems cut through organisational boundaries of actual departments	Knowledge fluidness cuts across the organisational departments
2. Puts together a holistic view of parts of a system. Human interactions define systems	Composed of different parts, people, and tools. Human interactions define knowledge flows
3. Seek to understand system goals (purposeful activity seeking)	Setting deliverables / goals, is crucial yet controversial.
4. Engaging examination: Examines cultural aspects Examines power/politics issues	Knowledge (tacit) is culturally embedded Politics of knowledge sharing & Power of knowing are core issues
5. Sensitive to case uniqueness: Accommodates different worldviews Adaptability to different contexts Dynamic situations exposed in its natural interactivity	Knowledge is seen differently through people's different lenses Knowledge is highly contextualised Dynamics of KM make it hard to study
6. Systems links and interactions exposed Communication exploratory Enhance control understanding Studies feedback	Communication vitality Controlling KM is never… u know Needs feedback

Table 1: Interpretive Systems Thinking concepts' significance to KM

4.1 *Organisational boundaries*

Southon et al (2002) examined KM implementation in a law firm that was changing from a partner based firm into a team based firm to integrates firm capabilities more effectively. For instance, major clients were being supported by one team that cuts across varied departmental services. The authors are involved in a KM study at an industry research association where the same pattern naturally evolved. Engineers from different departments were having monthly forums to discuss issues related to their clients, as manufacturers tend to have different projects running at the same time, and they are of a cyclical nature as they move from one phase to another. The monthly forums present engineers with an opportunity to meet and discuss what they are doing, what they are expecting to get, what problems they are facing. Then as manufacturers' projects move to their next phases, the engineering consultants would better anticipate what work is going to be asked of them in the foreseeable future, or even chase manufacturers and let them know how they are ready to support them. Thus, they have utilised their intra-departmental knowledge of one or two projects to beat competition by anticipating the future needs of their clients. Clearly such patterns are evolving as the need is felt in organisations that actual/physical departments should not define borders to their work processes. Thus knowledge's natural fluidness cuts across departments, so any KM investigation method should provide a way to deal with this. ST does this through constructing systems that are not defined by the shape, size, or function found on organisational charts. What's more, we are intrigued by the fact that both companies mentioned above have not adopted formal KM, yet they are successfully doing what would be identified, surely, as a KM process underpinned by ST, which again has not been explicitly mentioned or discussed.

4.2 *Holistic views*

Kwan and Balasubramanian (2003) describe an international fortune 100 telecommunications equipment company that went through restructuring. This should mean they have to take one step back and think about what they are doing, prioritise processes and pursue opportunities. Realistically, this is not part of people's daily jobs, although it is a principle of ST that would kick-start any investigation. It is this "step back and think" which prompted them to consider the applicability of a KM system (KMS) to the process by which they manage real estate across different business units. And it is the holistic view devised by restructuring that allowed them to recognise the value of KM, prompting implementation. This KMS is constructed around human agents' processes, as they are doing their jobs through mutual interaction. The recognition of these interactions and their collective value adding process, formed the basis for developing the KMS. This does in fact assure the value of holistic thinking in recognising the value of KM and directing KM implementation to support necessary functions and processes as they are formed by human interactions.

4.3 *Goal seeking (purposeful activities)*

All ST methods start by identifying a scope for analysis. SSM starts by finding out about the potentially problematic situation and then exploring it through different models of purposeful activities. VSM explores the activities or processes (purposeful ones) that shape the organisation. SFA would start by a pre-analysis that examines the purpose of the system(s) under question (along with different world views and

information related to the situation). In essence, the purpose (goals or objectives) of the system are not taken for granted as they might appear in a formal business plan. Instead ST would immerse investigators in a process to find out about different co-existing realities that represent the purpose of the system.

We hypothesise that companies who are continuously seeking to understand the purpose of their activities are better equipped to amend their work to suit new emergent needs. Hence, they are more liable to succeed, while companies oblivious to changing purposes of their activities might end up with red figures on the balance sheet. Edwards and Kidd (2003) presented examples of both kinds. In a distribution company: the project purpose was successfully changed from designing new financial systems to financial systems strategy and later into providing suitable KM infrastructure. On the other hand, a manufacturing organisation had a tougher KM ride. Its management faced a "not invented here" syndrome between different working shifts, which clearly inhibited knowledge sharing. However, the management overlooked this problem because "KM as a strategic issue…was seen by the top managers as concerned with information systems" Clearly nobody thought about making a purposeful activity of their processes, which could have lead them to realise the importance of the "not invented here syndrome" and revise their KM strategy before committing even more to IT investments that did not pay off.

In the distribution firm example, not only was the value of having KM goals highlighted, but also the careful and consistent attention that must be paid to setting KM goals as they revised goals three times to get it right eventually. Alternatively, the manufacturer was destined not to examine "purposeful activities" in their KM strategy, and thereby failed to translate their strategic thinking into operational reality.

4.4 *Cultural and power issues*

While cultural and power issues have been reported to inhibit organisations from utilising KM's full potential (Lam, 2005. Storey and Barnett, 2000), there is no guarantee that ST use will eliminate these risks. However, our position is that these are suitable vehicles to examine KM to detect such issues and come up with plausible solutions. Lam (2005) offers a case that had almost the full house of KM success factors: senior management full support and buy-in, sufficient budget and support, KM champion who was a significant figure in the organisation, clear objectives, KM manager, not technology driven, KM site to support needed functions. The cultural context, however, was not investigated enough which led to abandoning KM after 12 months. Power issues related to possessing knowledge also surfaced as important factor inhibiting KM. Lam (2005) noticed that knowledge was received as power, therefore, a form of job security.

SSM is well positioned to delve into these situations through analysis two (cultural analysis) and analysis three (political analysis), and Ababneh and Edwards (2007) have shown how SFA can be used to investigate cultural and power related issues. However, VSM's consideration of cultural and power related issues is more subtle; as all of S2, S3 and S5 provide an eye opener about where culture and power might be visibly treated. Yolles (2000), for example, explains that from the viable system viewpoint, the cognitive domain, which helps shape our behavioural domain, is consistently changing as a result of ongoing interaction between the formal and

informal worldviews, which are culturally centred while representing beliefs, values and norms derived from a power balance.

4.5 *Different Worldviews, contexts, and situation dynamics*

Since ST provides an insightful vehicle to investigate cultural and power issues, and these issues are essential determinates of worldviews as pointed out by Yolles (2000), then we only have to present them in a meaningful way to grasp the context of KM (e.g. see rich picture by Ababneh and Edwards, 2007). Finally, situation dynamics can be exposed by adhering to the requisite variety principle of VSM, intervention analysis of SSM, or comparing actual systems with formal systems model in SFA. Braganza and Mollenkramer (2002) reported how overlooking the importance of knowledge context (among other things) led to a disappointing KM end result. Understanding different worldviews enables capturing different contexts and dynamics of the situation that are knowledge's natural environment.

4.6 *Communication, control, and feedback*

Chan and Chau (2005) describe a KM case that recognised the importance of open communication at the outset of the project, alongside other success factors like management support and not being overly technologically-driven. However, the case ended in KM failure because "there was little systematic mechanism to collocate and assimilate various feedbacks and findings from the employees" (Chan and Chau, 2005). Moreover, the lack of feedback loops continued, as they reported a year gone without any evaluation assessment and the last assessment survey not having yielded any follow up or review session.

ST methods can be used to examine these flows leading to better informed decisions. SSM's fifth activity (critical reflection on the process) is embodied consciously in the process leading to "reflective practice" in Checkland's terminology. Had SSM been used in Chan and Chau (2005) case, communication might not have been underestimated later in the initiative leading to loose controls and non-existent feedback. In VSM, this process would have been highlighted by S3, S3*, S4, and S5. Finally, SFA in the iterative feedback loop and the Formal Systems Model (FSM) would have emphasised the role played by communication and control by looking at the "recursive" systems interactions through analysing the communication and feedback leading to a better controlled initiative.

5. Conclusion

This paper has reviewed the main interpretive systems thinking approaches used to study KM, namely: SSM and VSM. Another approach (SFA) was added, since failure is of high relevance to KM practice at this stage amid continuing warning claims about substantial failure risk associated with KM. While SFA is indebted to SSM in its evolution, it carries some of VSM's spirit of analysis, as it embodies a formal systems model, which is a way to think about the system of concern in relation to systems within it, or systems (such as environmental system) embodying the system of concern. This mimics the notion of "recursive systems" made explicit in the VSM literature. A brief review of KM roots revealed the multidisciplinary nature of the field, which in turn positions KM to be researched by a multidisciplinary

methodology(ies). Such a method is Systems Thinking, which was born out of multidisciplinary research to examine the complexity of situations that needed a different approach from what the positivist scientific method called for. Finally, we have tried to synthesise features of ST and KM in table 1, upon which we build the discussion of Systems Thinking suitability for KM. Six features were felt to be naturally emerging within the ST scope of enquiry that were well fitted to KM's unique concerns.

This work is limited in scope to three Systems Thinking methods and a small set of examples. Other STs, especially interpretive ones, are likely to provide similar results of compatibility to KM analysis. Where we are using examples reported by others, there is a further interpretive loop, in that we are relying on our interpretation of those authors' interpretations of the cases that they studied. However, there are many other similar examples as well as those included here. We believe this enables us to conclude that ignoring Systems Thinking principles has typically led to the abandonment and/or failure of KM, while embodying some Systems Thinking ideas (even when not explicitly mentioned) can be seen as a described success factor of KM in that case.

This work is relevant to KM practice as it credits Systems Thinking methods for their usefulness in examining KM issues, so practitioners can see what part of their KM efforts/initiatives are suitable for Systems Thinking approaches. As for KM research, this work advocates Systems Thinking lenses which suit the complexity of KM; moreover it promotes the more specialised SFA to examine KM as it suits the high failure risk at this stage of KM practice.

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