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Delineating knowledge management through lexical analysis – a retrospective

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Abstract

Purpose – Academic authors tend to define terms that meet their own needs. Knowledge Management (KM) is a term that comes to mind and is examined in this study. Lexicographical research identified KM terms used by authors from 1996 to 2006 in academic outlets to define KM. Data were collected based on strict criteria which included that definitions should be unique instances. From 2006 onwards, these authors could not identify new unique instances of definitions with repetitive usage of such definition instances. Analysis revealed that KM is directly defined by People (Person and Organisation), Processes (Codify, Share, Leverage, and Process) and Contextualised Content (Information). The paper aims to discuss these issues.

Design/methodology/approach – The aim of this paper is to add to the body of knowledge in the KM discipline and supply KM practitioners and scholars with insight into what is commonly regarded to be KM so as to reignite the debate on what one could consider as KM. The lexicon used by KM scholars was evaluated though the application of lexicographical research methods as extended though Knowledge Discovery and Text Analysis methods.

Findings – By simplifying term relationships through the application of lexicographical research methods, as extended though Knowledge Discovery and Text Analysis methods, it was found that KM is directly defined by People (Person and Organisation), Processes (Codify, Share, Leverage, Process) and Contextualised Content (Information). One would therefore be able to indicate that KM, from an academic point of view, refers to people processing contextualised content.

Research limitations/implications – In total, 42 definitions were identified spanning a period of 11 years. This represented the first use of KM through the estimated apex of terms used. From 2006 onwards definitions were used in repetition, and all definitions that were considered to repeat were therefore subsequently excluded as not being unique instances. All definitions listed are by no means complete and exhaustive. The definitions are viewed outside the scope and context in which they were originally formulated and then used to review the key concepts in the definitions themselves.

Social implications – When the authors refer to the aforementioned discussion of KM content as well as the presentation of the method followed in this paper, the authors may have a few implications for future research in KM. First the research validates ideas presented by the OECD in 2005 pertaining to KM. It also validates that through the evolution of KM, the authors ended with a description of KM that may be seen as a standardised description. If the authors as academics and practitioners, for example, refer to KM as the same construct and/or idea, it has the potential to speculatively, distinguish between what KM may or may not be.

Originality/value – By simplifying the term used to define KM, by focusing on the most common definitions, the paper assist in refocusing KM by reconsidering the dimensions that is the most common in how it has been defined over time. This would hopefully assist in reigniting discussions about KM and how it may be used to the benefit of an organisation.

Keywords Knowledge management, Cluster analysis, Knowledge discovery, Knowledge system, Lexicography, Proximity analysis

Paper type Research paper

1. Introduction

Since Ikojiro Nonaka coined the term Knowledge Management (KM) in a 1991 *Harvard Business Review* article, KM has been surrounded by controversy. KM means different things to different people, with definitions for KM often clouded by misunderstandings regarding the difference (and interdependency) between Data Management (DM), Information Management (IM), and KM. Attempts to delineate KM from DM and IM is located on a spectrum of views ranging from the formulation of a concise definition of terms, to statements claiming that there are inherent interdependencies, necessitating multiple views and viewpoints. To manage knowledge sufficiently, Kruger and Johnson (2010) argued that organisations must progress to a point where they are able to manage ICT, data, information and knowledge simultaneously. Kruger and Johnson (2010), similar to arguments proposed earlier by Wilson (2002), explained that the concept of KM can be concisely summarized as being diverse and problematic in nature.

What specifically constitutes efficient and effective KM remains a highly debatable topic. Authors such as Chait (1999), Earl (2001), Gallager and Hazlett (2004) and Snyman and Kruger (2004) emphasised that apart from technological support, KM also requires process and social interaction. Kruger and Johnson (2009), building on the work done by Boon (1990), Davenport (1999), Zack (1999) and Tiwana (2000), argue that there is an increased interdependency between Information and Communication Technology (ICT), DM, IM, Organisational Structure and KM. The aforementioned authors proposed that due to the cycle of transferring data into information and information into knowledge, ICT systems, in support of business processes, tend to render information making KM possible. Analogous to this argument, Kazimi *et al.* (2004, p. 1) earlier proposed that: "[…] there is a growing realization that organisations can attain maturity in KM only through a healthy coexistence of technology, processes and people, thereby paving the way for KM successes in the years to come".

Amid confusion, contention and disagreement, as early as 2002 Wilson questioned the value of KM and argued that the reality of the analysis of KM is that it is a management fad, promulgated mainly by consultation companies. Wilson's (2002) arguments led to literature being inundated with papers focusing on either defending or refuting KM's contribution to organisational success. While authors such as Salojarvi *et al.* (2005) contested that as far as small and medium-sized enterprises (SMEs) are concerned, there definitely is a relationship between organisational success and KM activities. Authors such as Kazimi *et al.* (2004, p. 1) questioned "Why is it that a concept [knowledge management] so powerful has not delivered what it was supposed to?" These assertions motivated authors such as Kruger and Johnson (2011) to conclude that while KM (and matrices to measure KM performance) is not well defined and understood and literature will neglect to supply empirical evidence of the value KM holds for organisations. Viewed holistically, without concise understanding of what KM is (and is not), much remains to be done, both theoretically and empirically, before KM will be regarded as a perspective with explanatory power that exceeds other managerial frameworks (Salojarvi *et al.*, 2005; Kruger and Johnson, 2009).

According to Kazimi *et al.* (2004) and Gallager and Hazlett (2004), confusion surrounding the understanding of KM originated from the cycle of transferring data into information and information into knowledge. In questioning if KM is the legacy of IM, these authors argue that not enough emphasis is placed upon culture and other management issues. They continue that this resulted from most KM maturity models being derived from the Software Engineering Institute's Capability Maturity Model (CMM). This clouded our understanding of what KM is, placing emphasis on

technological concerns, often addressing little in the way of practical assistance. Such critique became widespread, with literally thousands of KM definitions added in the following years. Depending on the context in which the term KM was being used, most of these definitions reflected a bias either towards (or away) from concepts such as IM, DM, Human Resource Management and even ICT. By late 2006, most debate seemed to stop with common understanding starting to favour the lexicon of terms and concepts mostly used to date. Depending on who shouted loudest and most regularly, scholars started to agree that KM "involves activities related to the capture, use and sharing of knowledge by the organization. It involves the management both of external linkages and of knowledge flows within the enterprise, including methods and procedures for seeking external knowledge and for establishing closer relationships with other enterprises (suppliers, competitors), customers or research institutions. In addition to practices for gaining new knowledge, knowledge management involves methods for sharing and using knowledge, including establishing value systems for sharing knowledge and practices for codifying routines" (OECD, 2005, p. 298). The definition presented by the OECD (2005) was recorded in *The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual* which is presented as a guide to collecting data and data types. This in itself ignores the dynamic nature of knowledge as the core construct of KM and in publication is presented as data type dependant. The Oslo Manual inherently reframes KM as data type dependant and this in itself links back to the impact that the Software Engineering Institute's CMM had in converting KM into a technology driven domain. Being the result of lexicographic "trial and error" since 1990, not much of this definition is based on the evolution of lexicographical practice.

This places into question the validity of our understanding of KM. We believe that this question of validity is leading authors such as Kruger and Johnson (2010) to still argue that the concept of KM is not well understood, problematic in nature, leading to an inability to supply empirical evidence of any value added. The aim of this paper is therefore to revisit what is already known and what is commonly regarded to be KM, and from acceptable lexicographical research practice, develop a common understanding of KM.

As such, the authors decided to return to the fundamentals of how KM has been defined over time up to the year in which the OECD published its definition and in which it has been accepted. In this case, the authors made use of lexicographical research methods to consider the linguistic evolution of KM and how KM is defined over time.

The main purpose of this paper is to present an interrelated meta-analysis of the definitions of KM presented over a selected period of time. As this paper is part of a much larger study involving KM and text analysis, it would be impossible present an exhaustive representation of literature regarding the domain of KM. The following sections present an interwoven meta-analysis of KM and the way in which this author reviewed and analysed the terms and terminology as presented in the defenitions analysed for this paper.

2. Lexicographical research theory and KM
Language has the ability to describe a term, concept or idea, and the potential of exposing an understanding of that idea. Techniques in lexicographical research are therefore often used to develop domain-specific lexicons that have the potential of identifying the scope and context of a specific domain due to the correlations between the frequency of terms used in that particular domain or area of interest (Avancini *et al.*, 2006). Specifically, it is "how" these terms are used, in proximity to, in distance from and in connection with other terms. This is based on the pattern of usage, within the

scope and context of the area of interest that has the potential of exposing relationships to define a domain.

Through the application of lexicographical research methods, as extended though Knowledge Discovery and Text Analysis methods, this paper will seek to analyse lexicons used by KM scholars and practitioners, and elucidate and separate KM from other fields of interest such as DM, IM and ICT. The lexicon covers definitions of KM from 1992 up to 2006, when definitions started to be reused or accepted within the scope and context of academic material. In order to achieve this, the following sections focus on supplying insight into the analytical approach followed, specifically regarding the collection and analysing of KM definitions and terms used.

One may ask as to why the author reviewed definitions only up to 2006. The answer would be fourfold in nature. First, when we refer to the unacknowledged parentage of KM (Lambe, 2011), there is what Lambe (2011) refer to as "memory loss" around the 14 year mark in KM. If we refer to the major first publications and definitions of KM, this occurs in 1992, and the difference between 1992 and 2006 is 14 year. Per implication this would mean that the first major definitions of KM as found in KM literature would have little or no impact on KM after 2006. If one refers to Lambe's (2011, p. 177) analysis of KM's "memory loss", one would be able to identify a significant drop in citation and usage of terms and ideas after 14 years. The impact that this "memory loss" would have is to cause a "lack of coherence" in the usage of KM theory and "poor execution" of KM principles (Lambe, 2011, p. 194). It was therefore decided to ensure that the first critical definitions remain in a range in which they still have relevance to each other, which the author would focus only on the 14 years between 1992 and 2006.

Second, if we refer to work done by Rigby and Bilodeau (2007, 2009) as cited by Lambe (2011, p. 192) one finds that within the usage pattern of KM tools and trends that in 2006 there was a significant and steep decline in the usage of KM terminology referencing KM tools and techniques. As such, to remain relevant within the usage of the terms as referencing KM, it would be relevant to remain between 1992 and 2006 to ensure relevance to KM when it was still actively being discussed and debated within management circles.

Third, if we refer to work done by Serenko (2013) in the analysis of the identity of KM as a discipline, one finds that Serenko (2013, pp. 782-783) delineated KM into three phases of development. Phase 1 occurred between 1997 and 2001, phase 2 occurred between 2002 and 2006 and finally, phase 3 occurred between 2007 and 2012. What is of importance in this instance is that a part of the KM core theory and discipline in collaboration between KM users ends around 2006. If one further refers to major KM literature as cited by difference authors, we see that there is a critical dip in citations from 2006 onwards (Serenko, 2013, p. 784). As such, it was considered important to only focus up to this point in time so as to include mainly the early and critical evolution of KM as is happened up to 2006.

And finally, is we refer to a scientometric analysis of KM and intellectually capital research presented by Serenko et al. (2010, p. 12), we see that there is a significant drop in citation and references in KM as found from 2006 onwards. In this case, it would appear that practitioner participation in KM dropped in 2006.

If we take into consideration the aforementioned, the author decided that to remain within a relevant with his analysis in terms of the terms of KM, it would be preferable to focus on the 1992 up to 2006 range in definition usage as presented in the KM literature.

In the following section, the author will present an overview of the method used and applied in this paper to analyse and present the relationship between KM terms and words as found in KM definitions found within KM literature.

3. Methods

Lexicographical methods analyse the frequency in which a specific terms is used, though its relationship with other terms, concepts or ideas, to expose the meaning of the word. A definition within the scope and context of a lexicon is expected to be a concise meaning of a word or a concept (Bergenholtz *et al.*, 2009).

At this point it is critical to note that Lexicographical Research Methods are significantly different from Scientometric Research Methods. Scientometric Research focuses more on publications, sources, references and cross-citations as sources of data, with the aforementioned being the main research artefact (Kuo and Yu, 2010; Junping and Hong, 2014), whilst Lexicographic Research focuses exclusively on the words found in text (Church *et al.*, 1991). Lexicographical Research shares some of the characteristics of cluster analysis (Mehrizi and Bontis, 2009), however, it extend to he point where the clusters lead to the development of an integrated description of terms based on the how often it is used in relationship to other words. Traditionally, lexicography has been used in the development of dictionaries and thesauruses. In this case, the lexicographic method used in this paper is part of a larger study in which lexicographical analysis of large textual corpora may be automated into the development of interrelated networks of text to provide an overview of relationships, instead of presenting each and every single document within the corpus.

Within knowledge mining, lexicography and linguistics, there are a number of guidelines as to how to approach textual data. In following such guidelines, it is not only possible to review the occurrence of words, but it is also possible to determine the number of times particular words occurred most frequently within a given piece of text. Often even though this does not give an indication of the meaning of the word in context, it does indicate how often a particular set of words occurs in conjunction with each other. One of the major concerns associated with analysing lexical data or text is therefore that clear descriptive analysis in terms of the textual data is often not possible.

Another facet associated with working with lexical data is that calculations associated with strings cannot be done. Even though it would be possible to count the length of a word; this, for the purposes of this study, would yield meaningless analytical results. An additional possibility in describing the nature of text and the number of times words in text occur simultaneously is to graph data by means of visual assessment. This unfortunately can become a problem when working with extremely large data sets of recurring words.

As Argued by Carenini *et al.* (2005, p. 11) "[k]nowledge capture[d] from a large body of text involves two basic tasks. First, it is necessary to extract from the text the most important information and secondly such information has to be presented to the user". According to Carenini *et al.* (2005), when working quantitatively with textual data, it is also important to consider how to prepare, present and analyse the relevant target corpus. As such, the focus is often on making use of a non-exhaustive yet extensive sample of definitions. Such definitions must be collected and analysed as the primary corpus or "core concepts" so as to elucidate the nature of "what is studied" though the language used by scholars.

3.1 Sample and data collection

Through quantitative methods described by Benjafield (1994), Berg (1998), Dane (1990), Kerlinger and Lee (2000), Leedy and Ormrod (2001), Mook (2001), Mouton (2001), Newman (1997), Phillips (1985) and Willig (2001) core concepts related to KM as represented in analysed definitions were identified. In essence, data were collected by conducting a non-exhaustive search of academic and scholarly literature related to KM in which 42 explicit definitions were identified spanning a period of 11 years from 1992 to 2006.

If one refers to KM literature, there are multitudes of articles, documents and descriptions related to KM. When collecting definitions in the non-exhaustive search, the author accessed as many articles possible in which KM is defined. The search criteria in this instance were the search terms "definition AND Knowledge Management". The author then reviewed the defenitions to identify how they were used within the context of the articles in which they were presented. If it was clear that the definition was used to "define" KM in context, then the author selected the definition for inclusion in this study. The author did notice that a few definitions that originated from non-academic sources were used within an academic context. In this case the author backtracked the definition to where it originated, assessed the definition in context and then, if relevant and used within academic literature, was included as an academic source. In this case the selection criterion was usage. If the non-academic definition was used within the scope and context of an academic environment as an operational definition for KM, then the author considered the non-academic operation definition based on academic usage, as a source relevant as an academic source. It was therefore included in the selected definition corpus as a relevant academic definition and treatment of KM.

The 14 years from 1992 up to 2006 represented the first use of KM through the estimated apex of the terms usage. The characteristics of the definitions were located in diverse academic journals and publications, were used in monographs, book chapters and a multitude of sources. The defenitions were, however, backtracked to the original source so as to identify how it was originally used within the scope and context of its original publication. If the definitions were cited or referenced in an academic journal as an operational definition motivated by the article as the operational definition, then it was included in the sample of definitions. Generally, the approach in terms of the quantitative methodologies utilized in this study was informed by the approach followed in terms of the preparation, presentation and analysis of the textual data associated with the samples of data related to KM as informed by Church *et al.* (1991), Kuehl (2000) and Kerlinger and Lee (2000).

A moment to clarify: due to the World Wide Web presenting extensive search results and lists of KM definitions, the authors only focused on clear explicit definitions that were cited in the academic literature. For example, if a definition originated in a non-academic publication, yet it was cited or referenced in an academic publication, then the definition was considered academically valid and included in the definition list. Simply stated, if the author(s) of an academic article presented a definition, then the definition was harvested for analytical purposes.

All definitions were identified by means of a non-exhaustive search and so there may be additional definitions that the authors could not access. All definitions listed in this instance are by no means complete and exhaustive. The definitions are viewed outside the scope and context in which they were originally formulated and then used to review the key concepts in the definitions themselves. Due to the decontextualised nature of definitions, the context alluding to the individual definitions could potentially

have a bearing on describing the meaning of the definition. The way in which a definition was formulated or subsequently used by the respective author(s) was not probed or questioned.

Data were collected in three phases. The first phase was to make use of a conventional search to identify academic journal articles in which KM was defined. In the second phase, the identified articles were reviewed to identify the definitions listed in the articles. If the definitions were explicitly expressed as definitions, they were harvested. If the definitions were only referenced through alternative secondary sources, then the article was removed from the sample. A definition had to be explicitly expressed within the scope and context of the article from which it originated so that it could be considered. The third phase was to list and group the definitions per year according to authors.

The definitions collected are presented in Table AI. The table provides the reader with an overview of the timeline, authors and definitions. The sources of the definitions may also be reviewed in Table AI. These definitions were subsequently used for analytical purposes by preparing the textual data, cleaning it, evaluating the meaning of terms in textual context, grouping, clustering and then evaluating terms within the scope and context of the clusters in a hierarchical networked relationship as derived from textual cluster analysis and categorisation.

In the following section, the authors provide a systematic overview of the process followed in analysing the textual data.

3.2 Data preparation

Data, being textual in nature, was devoid of all contexts other than being explicitly expressed definitions within the KM domain. For analysis purposes, the data were organized in five phases:

(1) Phase 1: the first phase in data preparation was to clean the definitions by converting acronyms into complete terms. For example, if and author referred to "KM" within the definition, it was converted to "KM". The authors only made used of whole words and did not allow acronyms to be expressed within this context.

(2) Phase 2: the second phase was to individually filter the text from the definitions to identify the count or number of times the individual words were expressed within a definition. This was done per year, and the terms were continuously grouped per year in which these definitions were expressed by authors. This phase presented an alphabetised list of words as well as the count of these words.

(3) Phase 3: the third phase was to remove counted stop words from the lists of filtered and counted words. Stop words on their own have no real meaning as they are short function words which primarily are used to weave linguistic concepts together. After filtering out stop words (i.e. a, across, the, will, with) from the word list, only adjectives, nouns and verbs were left.

(4) Phase 4: the fourth phase was to evaluate all the words individually and to convert these words from plural to singular. Converting words from plural to singular was a mechanism used to ensure that all terms were in a similar format thereby allowing the merger of words (i.e. "managers" became "manager").

(5) Phase 5: the fifth phase in preparing data for clustering was to group similar concept words together. Figure 1 illustrates how words were grouped into

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Figure 1.
An example of
word grouping
(organisation)
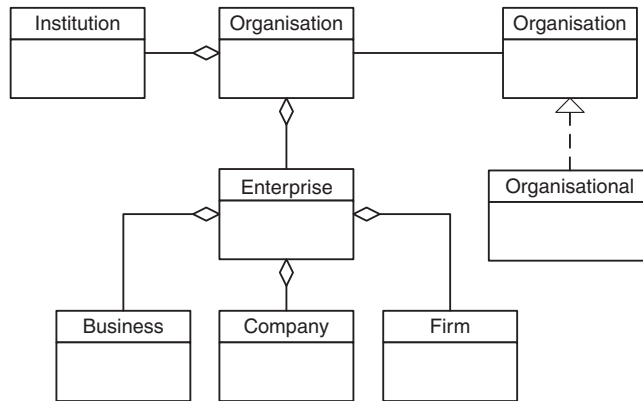
super- and sub-types of terms or word meaning within the context it was found
(Table AII). This grouping was done to ensure that all instances of words
used in the definitions presented by the authors were coherent in nature.
For example, taking into consideration the variations of terms and terminology
that can be used to describe an organisation, these words were grouped together.
Terms like "enterprise" and "business" were converted into "organisation" and
subsequently merged with the word count for "organisation".

By iterating through the list of terms based on the context in which it was used,
duplicate words with similar meaning was finally merged to produce the final data set
that would be analysed and interpreted.

3.3 Data presentation

Table AIII provides the reader with an overview of the final data set. Any and all empty
values were filled with a zero to ensure that empty values were not present. A total was
calculated for comparison purposes for post cluster analysis. The data set presented is
the complete data set after collecting, cleaning, sorting and preparing data for
analytical purposes. In the following section, the analytical approach used to transform
the data for analytical purposes is presented.

3.4 Analytical approach

After the words in terms of the text were grouped and cleaned, the list of terms
provided a count of how many times these words were used over a period of time to
define KM. The analytical approach was subsequently conducted in two phases.

The first phase involved a descriptive analysis of the terms by graphically
representing terms as a simple word count graph. This provides an overview of term
usage and general frequency of usage. From this, terms that co-occurred most
frequently were selected and applied in the calculation of the terms' Euclidian distance
resulting in a proximity matrix. The proximity matrix stipulated the distance between
the selected terms and provides an overview of the distance between categories and
pools of distance which can be used to produce a heat map. The heat map then
represents pools of closeness and distance between terms applied within the KM
definition data set. The heat map was subsequently evaluated to identify closeness and

distance between the terms used most frequently to define KM within the identified list of definitions.

In the following section, the results of the aforementioned process are reviewed by first looking at the general results to identify the terms that occur most frequent in association with each other and then by reviewing the distance between these terms to identify potential categories or associated clusters that can be linked together.

4. Results

When converting all words based on frequency of occurrence (Table AIV) into a bar chart, one of the first characteristics that can be noticed is that the distribution between the individual words is quite large (Figure 2). The data presented by the words have a wide dispersion in terms of range. Words with low values in count are crowded out by words that present high values in word count. In other words, all the words that co-occur with a very high count, change the ratio of the chart to such an extent that one would find it difficult to review relationships clearly. For the purpose of the following section, we will only be focusing on words that co-occur ten times or more in the given set. For the purpose of this paper, words co-occurring ten times or more were selected for convenience. As this paper is based on ongoing research related to methods in text analysis, methods in the identification of critical values still need to be tested in several experimental scenarios. Centrality measures, critical scores as well as the closeness and betweeness of the terms applied in the following discussion is currently in an experimental phase that is part of a much larger study in text analysis. What should be clear is that the words co-occurring ten or more times were simply selected for the sake of convenience to move the discussion forward as related to the results being presented in this paper.

There are a few characteristics that can be identified in terms of the words and concepts used to define KM (Figure 2). One of the first characteristics that can be identified by visually inspecting the bar chart is a general tendency to repeat terms focusing on the words Knowledge, Leverage, Management, Organisation, Person and Process. It is possible that there is an association between these terms given that all the definitions focus mainly on repeating the indicated terms as associated with KM.

Clearly, when referring to KM, the two terms Knowledge and Management would co-occur most frequently. However, what is interesting to note is that on first assessment, the concept of Information is clearly not repeated as frequently as one might expect. What is repeated more frequently is the aspect of Leverage, or rather, leveraging value out of an associated concept or construct. One can surmise that Person and Process is linked to Knowledge and Management in that KM is associated with processes in which Knowledge is managed. And as Knowledge is linked to the individual (Baker *et al.*, 1997; Shariq, 1998; Bender and Fish, 2000; Kalpic and Bernus, 2006), one can indicate that the person to whom knowledge is ascribed would be valued in the language associated with defining KM.

Some of the terms that were used frequently, but not to the same extent as the clearly visibly repeated words and terms, are words such as Codify, Create, Enhance, Information, Manage, Share and Strategy. One would expect that Information would be a major concept associated with Knowledge, however as concurrent and continuously repeated terminology, it would appear that Information is not of such a high concept when working with Knowledge itself. In the second order word, one does find aspects associate with Management. These terms are, for example, Share, and Strategy and Manage (the process of management).
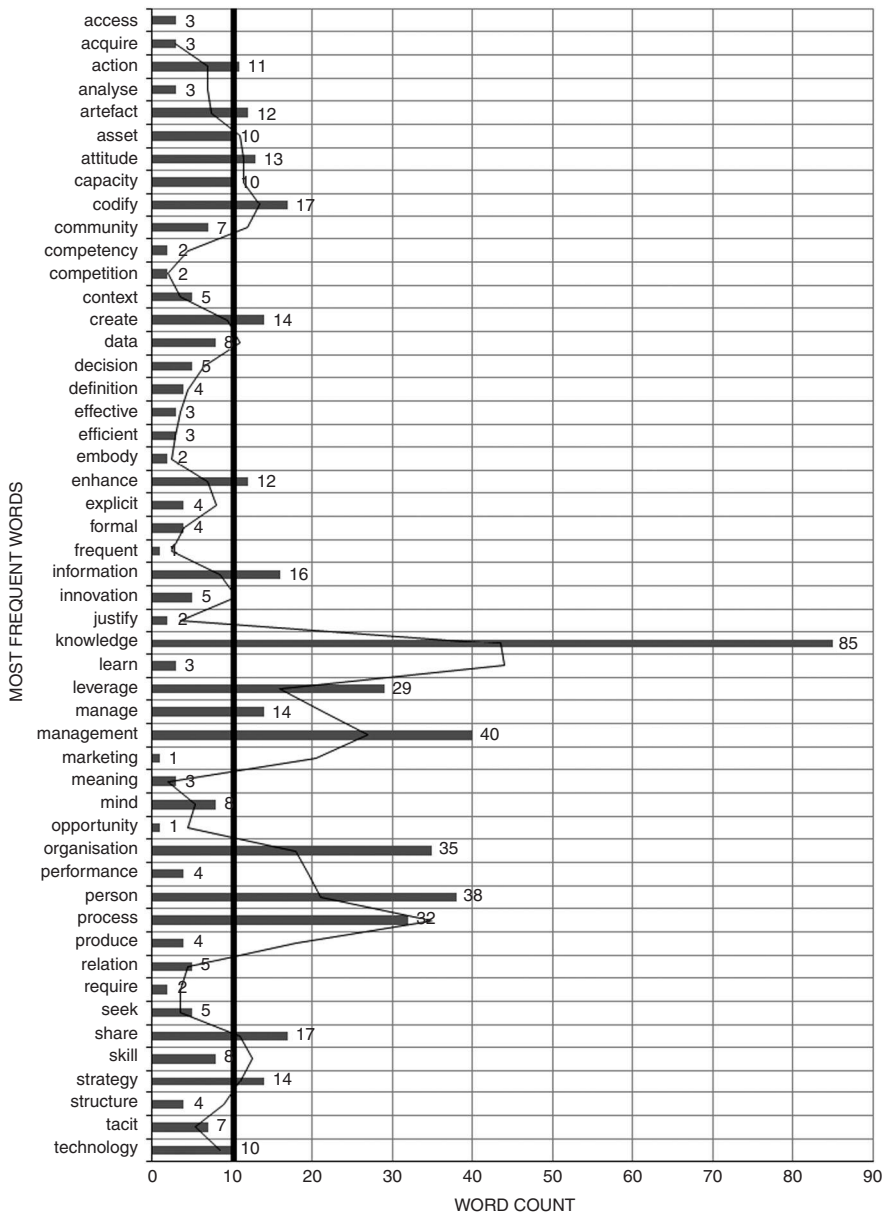
Figure 2.
Most frequent
words – KM
definition list

One might have expected that these terms would have a higher order or rank when reviewing how many times words are repeated. Contrary to what one would expect, this however does not occur.

What is interesting to note in terms of the appearance of the terms used frequently in defining KM, is that concepts associated with Technology do not manifest as frequently as one would expect. The three main terms that are found to refer to

technology when reviewing the nature of KM definitions are Artefact, Data and the term Technology itself. One could argue that the term Codify would also refer to technology. Codify is, however, a duplicitous term. When an individual symbolically represents an idea and verbalises it, then one can also state that the idea is being codified (Markus, 2001; Cody *et al.*, 2002; Lau *et al.*, 2005, Jabar *et al.*, 2010).

When reviewing the terms used by the authors to define KM, one finds that the terms used refer to processes, artefacts, people and concepts associated with knowledge. Terms such as Access, Acquire, Action, Analyse, Create, Decision, Enhance, Justify, Learn, Leverage, Manage, Seek and Share imply that several of the aspects associated with defining KM refer to processes.

Regardless of the processes that can be identified in terms of the words associated with defining KM, it is clear that there is an underlying process in the words used by author who define KM. Processes associated with working with knowledge as associated with individuals. What is clear is that the terms in Table AIII occur the most in relationship with each other.

When one calculates the proximity of these terms to produce a heat map (Figure 3), the following patterns start to emerge. Figure 3 offers a complete proximity matrix heat map referencing all the "Number: Case", or number of individual cases of terms listed in Table AIII. One can identify at least four pools of proximity within the heat map. Taking into consideration that patterns are repeated over a diagonal (Figure 3), the patterns identified above and below the diagonal references the exact same pattern. Instead of four patterns visible in the striations, there are three contour patterns visible in the striations.

After the addition of the diagonal indicating the point of pattern mirror duplication, the individual pools become clearer. The pools are divided into quadrants due to the great distance in proximity between the term or word Knowledge, and the other terms found in the proximity list (Table AIII). On closer inspection, the contours of the striations in Figure 3 provide an indication that the terms Technology and Strategy are close to the words share and process. There is also an indication that the words Information and Create are close to each within the scope and context of Figure 3.

When inspecting the heat map, one finds that the following terms are closer to knowledge and management than any of the other terms. These terms are Information, Codify, Share, Leverage, Process, Organisation and Person. Though the term Information is not as prominent in terms of its distance to knowledge and management, it is closer to these terms than, for example, the words asset, action and technology.

The words presented in Table AIII and Figure 3 provide us with an overview of related terms and terminology that would preliminarily suggest core terms linked to KM, as found within the KM definition list. Reviewing the striation patterns identified in Figure 3, we can identify potential relationships in distance and closeness as found in Table AV.

When referring to the terms found in Table AV, one should keep in mind that the words are the closest to both the terms Knowledge and Management, and when one place all the terms, based on closeness in relationship to each other, both Knowledge and Management should be linked to the words stipulated in Table AV.

Based on the results stipulated in Table AV, one can now present several findings based on the relationship of the words and related terms so as to highlight the core concepts covered in the KM definition corpus.
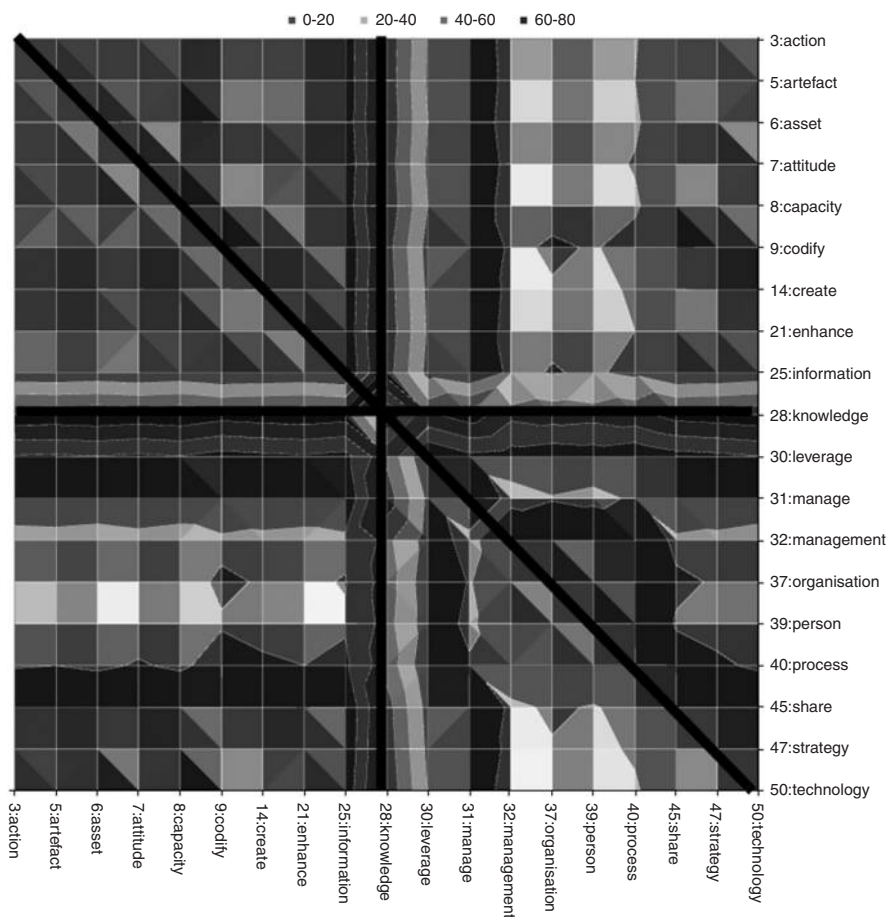
Figure 3.
Frequent KM term
heat map

5. Findings

When focusing on each of the words individually and in relationship, a hierarchical and networked relationship between the words used to define KM arises. On first inspection, we can identify a relationship and a directly link between the words of Information, Codify, Share, Leverage, Process, Organisation, and Person.

When inspecting the aforementioned words, we find that the words Codify, Share, Leverage, Process all refer to a process of some sort. The word Codify refers to the process of making knowledge explicit and representing it in a usable format for other people. The word Share clearly refers to the process of sharing, whilst the word Leverage refers to the processes involved in gaining value. The word Process clearly refers to a transformation of some sort. When we refer to the aforementioned details, one can see that the terms used in relationship are process or transformation driven in nature.

The words Organisation and Person are a representation of a human centred approach. If we consider the arguments of Baker *et al.* (1997), Taylor (1997), Wigg (1998), Jabar *et al.* (2010), Kruger and Johnson (2009, 2010) and Tàbara and Chabay (2013), we can state that the Person is a source of knowledge. An Organisation

is a construct that comes into being through the interaction of people through their endeavours and the processes involved in the existential nature of an organisation. From this point of view, we can then indicate that terminologically, KM may be seen to be human driven.

Within literature when referencing the idea of the Knowledge Pyramid, and through discussions associated with knowledge and KM, Information has a strong hierarchical relationship with KM as a link between KM and IM. Based on these relationships, one can state that the definitions focus on processes around KM linked to people and source of information, either through the codification and transformation or a value equation linked to knowledge within the scope and context of KM.

At first glance, this is only a first superficial overview of interaction between the terms and terminology found within a corpus of KM definitions. Additional internal networked relationships can also be found between the terms. For example, in Table AV, one finds that there are repeating terms directly linked to Information, Codify, Share, Leverage, Process, Organisation and Person. If we apply these terms in a networked or hierarchical relationship through the application of Gephi 0.8 beta (Graphic Visualization and Manipulation Software), an interesting picture starts to emerge (Figure 4).

In Figure 4(a), one can refer to the networked relationship between all the terms linked to the core words found in Table AV. One can see an intricate set of internal relationships emerging as derived from the distance in proximity between the individual terms within the definition corpus.

What is apparent in Figure 3 and Figure 4(a) is that the relationships, due to its extreme level of intricacy, need to be broken down individually to refer to the seven individual terms that have been identified and linked by their proximity to KM.

When referring to the term Codify (Figure 4(b)), one finds that the term links directly to terms such as Process, Enhance, Information, Create, Manage, Organisation and Person. Directionally, Codify links to Enhance, Information, Create, Manage, Organisation and Person, however, the word Process links directionally to the word Codify. It would appear that, based on the networked relationship and the direction of this relationship that the term Process links to the term Codify (as codification may be viewed as a process). However, the unexpected is that the term Codify links directly to the words of Person and Organisation. The author would have assumed that the word codify would link to something like the word data, however as can be seen, there is a relationship with Person and Organisation. When referring to the term of Person (Figure 4(g)), one finds that when Person is the core focus in the terminology, then the word Person is linked to the words Share and Artefact. What the link from the words Codify to Person and Organisation may imply is that these two facets of the definition corpus need to be codified.

Similar relationships may be found in term of the word Share (Figure 4(c)). When we reference the word Share, the words Organisation, Person and Process lead to the word Share and Share leads to the word Strategy (or sharing being linked to the existence of a strategy). When referring to the term Leverage (Figure 4(d)), the relationship implies to leverage people and processes (Person, Organisation and Process). An additional level of relationship can be established between the words Leverage and Share. Both of these terms link to each other directly through the words Process, Person and Organisation. It would appear that the leveraging (Leverage) of people (Person and Organisation) through a process (Process) leads to sharing (Share) that would have an impact on Strategy.

There are additional interlinked and complex relationships such as the relationships between the terms Process (Figure 4(e)), Organisation (Figure 4(f)) and Person
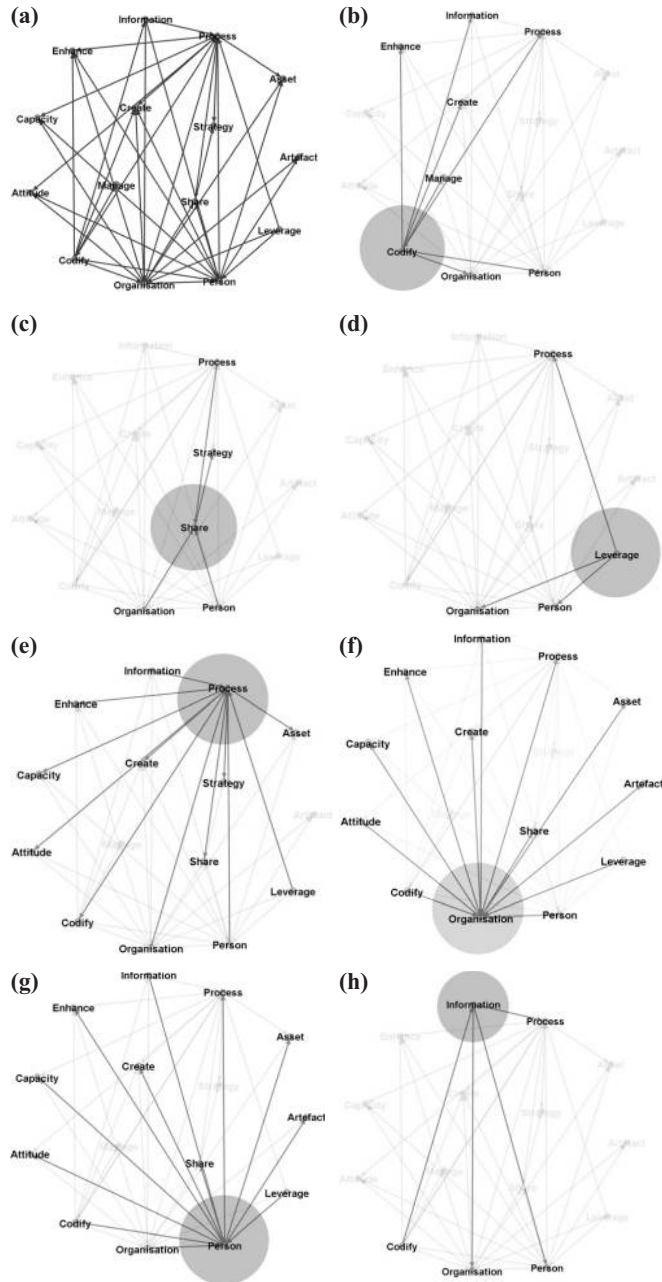
Figure 4.
Networked
relationship between
terms

Notes: (a) Complete network; (b) codify network; (c) share network;
(d) leverage network; (e) process network; (f) organisation network;
(g) person network; (h) information network

(Figure 4(g)). The aforementioned relationships become terribly complex when referring to the networks that the terms establish directionally (when a term leads to or links to another term). For example, when referring to the terms of Organisation (Figure 4(f)) and Person (Figure 4(g)), one finds an overlap between the terms that link to Person and Organisation. When referring to these terms, there is a clear overlap between the terms listed. What is significant is that the term Organisation links directionally to the term Person. What this relationship could imply (however, this would be speculation at this point) is that the organisation defines the person within that organisation's context. Both Organisation and Person appear to be important for terms such as Codify, Attitude, Capacity, Enhance, etc. (Figure 4(e) and (f)). However, it does appear that the words found in the definition of organisation carry more significance in terms of its relationship to the person.

Finally, when looking at the relationship to the term Information (Figure 4(h)), we find that information has a link to the terms Organisation, Person and Process, indicating that it influences these terms directly. What is interesting to note is that when the words Information (Figure 4(h)), Share (Figure 4(c)) and Leverage (Figure 4(d)) are linked together, it would appear these terms link together to finally lead to and have an impact on Strategy.

There are numerous such internal relationships that can be identified in terms of the links that exist between the terms found in Table AV and Figure 3. What is clear from Figure 3 and the aforementioned discussion is that the networked relationship in terms of the words used as well as which term lead to other terms based on its proximity in a pool or cluster is complex. It is clear that the starting points in defining KM are the words or terms Information, Codify, Share, Leverage, Process, Organisation and Person. By simplifying these relationships to a meta understanding, then KM is directly defined by People (Person and Organisation), Processes (Codify, Share, Leverage, Process) and Contextualised Content (Information).

6. Conclusion
By reviewing the lexicon used by scholars defining KM, the community of scholars and practitioners use and understand the concept of KM. By approaching the definitions linguistically and empirically, KM practitioners and scholars view KM reflected in the nature of relationships between the terms used. Making use of lexicographical research and focusing on terms, concept or idea, and using these terms to expose the understanding of KM, it was found that terms used to define KM include: Information, Codify, Share, Leverage, Process, Organisation and Person. These core concepts are linked directly in proximity to KM, thereby defining KM. By simplifying these terms' relationships to a meta understanding, KM is directly defined by People (Person and Organisation), Processes (Codify, Share, Leverage, Process) and Contextualised Content (Information). One would therefore be able to state that KM, from an academic point of view, refers to the management of people processing contextualised content, albeit on a personal or organisational level.

This relates positively to and confirms the OECD (2005) definition of KM. The OECD (2005) definition recognises people, processes and content. What is does add that cannot be found in the terminological and lexicographical evolution of the KM definition, are ideas such as capturing knowledge. All in all, one can state that the OECD (2005) definition is a positive representation of KM, albeit overly and unnecessarily complex.

7. Research implications

When we refer to the aforementioned discussion of KM content as well as the presentation of the method followed in this paper, we may have a few implications for future research in KM. First, the research validates ideas presented by the OECD in 2005 pertaining to KM. It also validates that through the evolution of KM, we ended with a description of KM that may be seen as a standardised description. If we as academics and practitioners, for example, refer to KM as the same construct and/or idea, it has the potential to speculatively distinguish between what KM may or may not be.

When referencing the method applied in this paper, it presents a potential new way of analysing textual data. Though the paper is part of a greater study in text analysis and KM, it is hoped that the method as applied in this paper would spark a dialogue that would assist in the development of new avenues of research related to text analysis.

One of the major contributions and implications of this paper is that the research recalls some of what Lambe (2011) refer to as the forgotten heritage of KM and reviews it and its value to today's discourse. It would, for example, speculatively, enrich the discussion of KM by going back to its major roots and assessing what it was and where KM cane from. It helps us to delineate KM from a historic perspective so that we can compare the origin of KM with current developments. In essence, the research assists the reader into "going back to basics" and to speculatively, reconsider their stance in terms of KM.

Finally, by simplifying term relationships through the application of lexicographical research methods, as extended though Knowledge Discovery and Text Analysis methods, it was found that KM is directly defined by People (Person and Organisation), Processes (Codify, Share, Leverage, Process) and Contextualised Content (Information). One would therefore be able to indicate that KM, from an academic point of view, refers to people processing contextualised content.

References

Avancini, H., Lavelli, A., Sebastiani, F. and Zanoli, R. (2006), "Automatic expansion of domain-specific lexicons by term categorization", *ACM Transactions on Speech and Language Processing*, Vol. 3 No. 1, pp. 1-30.

Baker, M., Baker, M., Thorne, J. and Dutnell, M. (1997), "Leveraging human capital", *Journal of Knowledge Management*, Vol. 1 No. 1, pp. 63-74.

Bender, S. and Fish, A. (2000), "The transfer of knowledge and the retention of expertise: the continuing need for global assignments", *Journal of Knowledge Management*, Vol. 4 No. 2, pp. 125-137.

Benjafield, J.G. (1994), *Thinking Critically about Research Methods*, Allyn and Bacon, Boston, MA.

Berg, B.L. (1998), *Qualitative Research Methods for Social Sciences*, 3rd ed., Allyn and Bacon, Boston, MA.

Bergenholtz, H., Nielsen, S. and Tarp, S. (Eds) (2009), *Lexicography at a Crossroads: Dictionaries and Encyclopedias Today, Lexicographical Tools Tomorrow*, Peter Lang, Pietelen.

Boon, J.A. (1990), "Information management: an educational perspective", *South African Journal of Library and Information Science*, Vol. 58 No. 4, pp. 319-326.

Carenini, G., Ng, R.T. and Zwart, E. (2005), "Extracting knowledge from evaluative text", *Proceedings of the 3rd International Conference on Knowledge Capture (K-CAP'05), ACM, New York, NY*, pp. 11-18.

Chait, L.P. (1999), "Creating a successful knowledge management system", *The Journal of Business Strategy*, Vol. 20 No. 2, pp. 23-26.

Church, K., Gale, W., Hanks, P. and Hindle, D. (1991), "Using statistics in lexical analysis", in Zernik, U. (Ed.), *Lexical Acquisition: Exploiting On-Line Resources to Build a Lexicon*, Bell Laboratories and Oxford University Press.

Cody, W.F., Kreulen, J.T., Krishna, V. and Spangler, W.S. (2002), "The integration of business intelligence and knowledge management", *IBM Systems Journal*, Vol. 42 No. 4, pp. 679-713.

Dane, F.C. (1990), *Research Methods*, Brooks/Cole, Pacific grove, CA.

Davenport, T.H. (1999), *Some Principles of Knowledge Management*, McCombs Graduate School of Business, University of Texas, Austin, TX, available at: www.mccombs.utexas.edu/kman/kmprin.htm

Earl, M. (2001), "Knowledge management strategies: toward a taxonomy", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 215-233.

Gallager, S. and Hazlett, S. (2004), "Using the knowledge management maturity model as an evaluation tool", available at: www: http://s.gallagher@qub.ac.uk (accessed 12 August 2014).

Jabar, M.A., Sidi, F. and Selamat, M.H. (2010), "Tacit knowledge codification", *Journal of Computer Science*, Vol. 6 No. 10, pp. 1170-1176.

Kalpic, B. and Bernus, P. (2006), "Business process modeling through the knowledge management perspective", *Journal of Knowledge Management*, Vol. 10 No. 3, pp. 40-56.

Kazimi, J., Dasgupta, R.R. and Natarajan, G. (2004), "The rise, fall and rise of knowledge management", available at: www zenzar.com/pdfs/km2.pdf (accessed 12 August 2004).

Kerlinger, F.N. and Lee, H.B. (2000), *Foundations of Behavioral Research*, 4th ed., Harcourt College Publishers, Fort Worth.

Kruger, C.J. and Johnson, R.D. (2009), "Assessment of knowledge management growth: a South Africa perspective", *Aslib Proceedings*, Vol. 61 No. 6, pp. 542-564.

Kruger, C.J. and Johnson, R.D. (2010), "Information management as an enabler of knowledge management maturity: a South African perspective", *International Journal of Information Management*, Vol. 30 No. 1, pp. 57-67.

Kruger, C.J. and Johnson, R.D. (2011), "Is there a correlation between knowledge management maturity and organizational performance?", *VINE – The Journal of Information and Knowledge Management Systems*, Vol. 42 No. 3, pp. 265-295.

Kuehl, R.O. (2000), *Design of Experiments: Statistical Principles of Research Design and Analysis*, Duxbury Press, Pacific Grove, CA.

Lau, H.C.W., Ning, A., Pun, K.F., Chin, K.S. and Ip, W.H. (2005), "A knowledge-based system to support procurement decision", *Journal of Knowledge Management*, Vol. 9 No. 1, pp. 87-100.

Leedy, P.D. and Ormrod, J.E. (2001), *Practical Research: Planning and Design*, 7th ed., Merrill Prentice Hall, NJ.

Lundvall, B.A. (2006), "Knowledge management in the learning economy", Working Paper Nos 06-6, DRUID, Copenhagen.

Markus, M.L. (2001), "Toward a theory of knowledge reuse: types of knowledge reuse situations and factors in reuse success", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 57-93.

Mook, D.G. (2001), *Psychological Research: The Ideas Behind the Methods*, Norton, London.

Mouton, J. (2001), *How to Succeed in your Master's and Doctoral Studies. A South African Guide and Resource Book*, Van Schaik Publishers, Pretoria.

Newman, L. (1997), *Social Research Methods. Qualitative and Quantitative Approaches*, 3rd ed., Allyn and Bacon, Boston, MA.

Rigby, D. and Bilodeau, B. (2007), "Selecting management tools wisely", *Harvard Business Review*, pp. 20-22.

Phillips, B. (1985), *Sociological Research Methods: An Introduction*, The Dorsey Press, Belmont, CA.

Rigby, D. and Bilodeau, B. (2009), *Management Tools 2009: An Executive's Guide*, Bain & Company, Boston, MA.

Salojarvi, S., Furu, P. and Sveiby, K. (2005), "Knowledge management and growth in finnish SMEs", *Journal of Knowledge Management*, Vol. 9 No. 2, pp. 103-122.

Shariq, S.Z. (1998), "Sense making and artifacts: an exploration into the role of tools in knowledge management", *Journal of Knowledge Management*, Vol. 2 No. 2, pp. 10-19.

Snyman, M.M.M. and Kruger, C.J. (2004), "The interdependency between strategic management and strategic knowledge management", *Journal of Knowledge Management*, Vol. 8 No. 1, pp. 5-19.

Tàbara, J.D. and Chabay, I. (2013), "Coupling human information and knowledge systems with social–ecological systems change: reframing research, education, and policy for sustainability", *Environmental Science & Policy*, Vol. 28, pp. 71-81.

Tiwana, A. (2000), *The Knowledge Management Toolkit: Practical Techniques for Building a Knowledge Management System*, Prentice Hall, Upper Saddle River, NJ.

Willig, C. (2001), *Introducing Qualitative Research in Psychology. Adventures in Theory and Method*, Open University Press, Buckingham.

Wilson, T.D. (2002), "The nonsense of knowledge management", *Information Research*, Vol. 8 No. 1, available at: http://InformationR.net/ir/8-1/paper144.html (accessed 9 September 2011).

Zack, M.H. (1999), "Managing codified knowledge", *Sloan Management Review*, Vol. 40 No. 4, pp. 45-58.

Appendix 1. Definition list publications

Alavi, M. and Leidner, D.E. (1999), "Knowledge management systems: issues, challenges, and benefits", *Communications of The AIS*, Vol. 1 No. 2, Article 1.

Bassi, L.J. (1997), "Harnessing the power of intellectual capital", in Cortada, J.W. and Woods, J.A. (Eds), *The Knowledge Management Yearbook 1999-2000*, Butterworth-Heinemann, Boston, MA.

Beckman, T.J. (1999), "The current state of knowledge management", in Liebowitz, J. (Ed.), *The Knowledge Management Handbook*, CRC Press, New York, NY.

Bennett, R. and Gabriel, H. (1999), "Organizational factors and knowledge management within large marketing departments: an empirical study", *Journal of Knowledge Management*, Vol. 3 No. 3, pp. 212-225.

Brooking, A. (1997), "The management of intellectual capital", *Journal of Long Range Planning*, Vol. 30 No. 3, pp. 364-365.

Darroch, J. and McNaughton, R. (2002), "Examining the link between knowledge management practices and types of innovation", *Journal of Intellectual Capital*, Vol. 3 No. 3, pp. 210-222.

Davenport, T. and Prusak, L. (1998), *Working Knowledge*, Harvard Business School Press, Cambridge, MA.

Davenport, T.H., De Long, D.W. and Beers, M.C. (1998), "Successful knowledge management projects", *Sloan Management Review*, Vol. 39 No. 2, pp. 43-57.

De Jarnett, L. (1996), "Knowledge the latest thing. Information Strategy", *The Executives Journal*, Vol. 12 No. 2, pp. 3-5.

Dick, M. and Wehner, T. (2002), "Wissensmanagement zur einführung: bedeutung definition, Konzepte", in Lüthy, W., Voit, E. and Wehner, T. (Eds), *Wissensmanagement-Praxis, Einführung, Handlungsfelder und Fallbeispiele*, vdf, Zürich, pp. 7-27.

Frappaulo, C. and Toms, W. (1997)," Knowledge management: from terra incognita to terra firma". in Cortada, J.W. and Woods, J.A. (Eds), *The Knowledge Management Yearbook 1999-2000*, Butterworth-Heinemann, Boston, MA.

Gloet, M. and Terziovski, M. (2004), "Exploring the relationship between knowledge management practices and innovation performance", *Journal of Manufacturing Technology Management*, Vol. 15 No. 5, pp. 402-409.

Greiner, M.E., Böhmann, T. and Krcmar, H. (1997), "A strategy for knowledge management", *Journal of Knowledge Management*, Vol. 11 No. 6, pp. 3-15.

Gurteen, D. (1999), "Creating a knowledge sharing culture", *Knowledge Management Magazine*, Vol. 2 No. 5, available at: www.providersedge.com/docs/km_articles/Creating_a_K-Sharing_Culture_-_Gurteen.pdf (accessed 7 February 2011).

Harris, K. (1999), "The Gartner Group E-business Glossary: Version 1.0", Gartner Group Report, 8 October.

Havens, C. and Knapp, E. (1999), "Easing into knowledge management", *Strategy and Leadership*, Vol. 27 No. 2, pp. 4-10.

Hibbard, J. (1997), "Knowing what we know", *Information Week*, 20 October.

Huysman, M. and de Wit, D. (2000), "Knowledge management in practice", in Edwards, J. and Kidd, J. (Eds), *Proceedings of the Knowledge Management Conference (KMAC 2000), Birmingham, 17-18 July*.

Junping, Q. and Hong, L. (2014), "An overview of knwoeldge management research viewed through the web of science (1993-2012)", *Aslib Journal of Information Management*, Vol. 66 No. 4, pp. 424-442.

Kanter, J. (1999), "Knowledge management, practically speaking", *Information Systems Management*, pp. 7-15.

Kuo, Z.M. and Yu, H. (2010), "Research paradigms of contemporary knowledge management studies: 1998#2007", *Journal of Knowledge Management*, Vol. 14 No. 2, pp. 175-189.

Lambe, P. (2011), "The unacknowledged parentage of knowledge management", *Journal of Knowledge Management*, Vol. 15 No. 2, pp. 175-197.

Laudon, K.C. and Laudon, J.P. (1999), *Management Information Systems: Organization and Technology in the Networked Enterprise*, 6th ed., Prentice Hall, Englewood cliffs, NJ.

Lundvall, B.A. (2006), "Knowledge management in the learning economy", Working Paper 06-6, DRUID, Copenhagen.

Macintosh, A. (1996), *Position paper on Knowledge Asset Management*, Artificial Intelligence Applications Institute, University of Edinburgh.

Malhorta, Y. (1998), "Deciphering the knowledge management hype", *Journal of Quality and Participation*, Vol. 21 No. 4, pp. 58-60.

Mandl, H. and Reinmann-Rothmeier, G. (2000), *Wissensmanagement. Informationszuwachs – Wissensschwund? Die strategische Bedeutung des Wissensmanagements*, R. Oldenburg, Verlag, Munich.

Mehrizi, M.H.R. and Bontis, N. (2009), "A cluster analysis of the KM field", *Management Decision*, Vol. 47 No. 5, pp. 792-805.

O'Dell, C.A. (1997), "A current review of knowledge management best practice", *Conference on Knowledge Management and the Transfer of Best Practices, Business Intelligence, London*.

O'Dell, C. and Grayson, J. (1997), *If We Only Knew What We Know: Identification and Transfer of Internal Best Practices*, American Productivity and Quality Center, Houston, TX.

OECD (2005), *The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data, Oslo Manual*, 3rd ed., OECD, Paris.

Peters, T. (1992), *Liberation Management*, Pan Books, New York, NY.

Petrash, G. (1996), *Managing Knowledge Assets for Value. Knowledge-Based Leadership Conference*, Linkage Inc., Boston, MA, October.

Pohs, W. (2001), *Practical Knowledge Management: the Lotus Discovery System*, 1st ed., IBM Press, Double Oak, TX.

Quintas, P., Lefrere, P. and Jones, G. (1997), "Knowledge management: a strategic agenda", *Journal of Long Range Planning*, Vol. 30 No. 3, pp. 385-391.

Serenko, A. (2013), "Meta-analysis of Scientometric research of knowledge management: discovering the identity of the discipline", *Journal of Knowledge Management*, Vol. 17 No. 5, pp. 773-812.

Serenko, A., Bontis, N., Booker, L., Sadeddin, K. and Hardie, T. (2010), "A scientometric analysis of knowledge management and intellectual capital academic literature (1994-2008)", *Journal of Knowledge Management*, Vol. 14 No. 1, pp. 2-23.

Skyrme, D. (1997), "Knowledge management: making sense of an oxymoron", *Management Insight No. 22*, available at: www.skyrme.com/insights/22km.htm (accessed 08 February 2011).

Snowden, D. (1998), "A framework for creating a sustainable knowledge management program", in Cortada, J.W. and Woods, J.A. (Eds), *The Knowledge Management Yearbook 1999-2000*, Butterworth-Heinemann, Boston, MA.

Sveiby, K. (1996, 1998, 1999, 2000, 2001), *What is knowledge management?*, available at: www.sveiby.com/articles/KnowledgeManagement.html (accessed 8 February 2011).

Swan, J., Newell, S., Scarbrough, H. and Hislop, D. (1999), "Knowledge management and innovation: networks and networking", *Journal of Knowledge Management*, Vol. 3 No. 4, pp. 262-75.

Taylor, K. (1997), "Knowledge management and human resources", *International Journal of Technology Management*, Vol. 11 No. 3, pp. 485-491.

uit Beijerse, R.P. (1999), "Questions in knowledge management: defining and conceptualising a phenomenon", *Journal of Knowledge Management*, Vol. 3 No. 2, pp. 94-110.

Van der Spek, R. and Spijkervet, A. (1997), "Knowledge management: dealing intelligently with knowledge", in Leibowitz, J. and Wilcox, J. (Eds), *Knowledge Management and its Integrative Elements*, CRC Press, New York, NY.

Wiig, K.M. (1998), *Knowledge Management Foundations – How People and Organisations Create, Represent, and Use Knowledge*, Schema Press, Arlington, TX.

Appendix 2

Time	Author	Definition
1992	Peters (1992)	The crux of the issue is not information, information technology [...] the answer turns out to lie more with psychology and marketing of knowledge within the family than with bits and bytes
1996	De Jarnett (1996)	Knowledge management is [...] knowledge creation, which is followed by knowledge interpretation, knowledge dissemination and use, and knowledge retention and refinement
1996	Macintosh (1996)	Knowledge Management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfil organisational objectives
1996	Petrash (1996)	Knowledge Management is getting the right knowledge to the right people at the right time so that they can make the best decision
1996	Sveiby (1996)	The art of creating value from an organisation's intangible assets
1997	Bassi (1997)	Knowledge Management is the process of creating, capturing and using knowledge to enhance organisational performance. Knowledge Management is most frequently associated with two types of activities. One is to document and appropriate individuals' knowledge and then disseminate it through such venues as a companywide database. Knowledge Management also includes activities that facilitate human exchanges using such tools as groupware, e-mail and the internet
1997	Brooking (1997)	Knowledge management is the activity which is concerned with strategy and tactics to manage human centred assets
1997	Frappaulo and Toms (1997)	Knowledge Management is a tool set for the automation of deductive or inherent relationships between information objects, users and processes
1997	Greiner *et al.* (1997)	Knowledge management includes all the activities that utilize knowledge to accomplish the organisational objectives in order to face the environmental challenges and stay competitive in the market place
1997	Hibbard (1997)	Knowledge Management is the process of capturing a company's collective expertise wherever it resides – in databases, on paper, or in people's heads – and distributing it to wherever it can help to produce the biggest payoff
1997	O'Dell and Grayson (1997)	A conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to Information Management prove organisational performance
1997	O'Dell (1997)	Knowledge Management applies systematic approaches to find, understand and use knowledge to create value
1997	Quintas *et al.* (1997)	Knowledge management is the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities

(*continued*)

Table AI.
KM definitions and
timeline

Time	Author	Definition
1997	Skyrme (1997)	Knowledge management is the explicit and systematic management of vital knowledge along with its associated processes of creating, gathering, organizing, diffusing, using, and exploiting that knowledge
1997	Taylor (1997)	Powerful environmental forces are reshaping the world of the manager of the twenty-first. These forces call for a fundamental shift in organisation process and human resource strategy. This is Knowledge Management
1997	Van der Spek and Spijkervet (1997)	Knowledge Management is the explicit control and management of knowledge within an organisation aimed at achieving the company's objectives
1998	Davenport and Prusak (1998)	Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices and norms
1998	Davenport et al. (1998)	[…] attempt to do something useful with knowledge, to accomplish organisational objectives through the structuring of people, technology and knowledge content
1998	Malhotra (1998)	Knowledge Management caters to the critical issues of organisational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially it embodies organisational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings
1998	Snowden (1998)	Knowledge Management can be defined as the identification, option and active management of intellectual assets, either in the form of explicit knowledge held in artefacts or as tacit knowledge possessed by individuals or communities
1998	Wiig (1998)	Knowledge Management is the systematic, explicit and deliberate building, renewal and application of knowledge to maximise an enterprise's knowledge-related effectiveness and returns on its knowledge assets and to renew them constantly
1999	Alavi and Leidner (1999)	Knowledge is a justified personal belief that increases an individual's capacity to take effective action
1999	Beckman (1999)	Knowledge Management is the formalization of and access to experience, knowledge and expertise to create new capabilities, enable superior performance, encourage innovation, and enhance customer value
1999	Beijerse (1999)	Knowledge Management is achieving organisational goals through the strategy-driven motivation and facilitation of knowledge workers to develop, enhance and use their capability to interpret data and information (by using available sources of information, experience, skills, culture, character, personality, feelings, etc.) through a process of giving meaning to these data and information

Table AI.

Time	Author	Definition
1999	Bennett and Gabriel (1999)	The process that creates or locates knowledge and manages the dissemination and use of knowledge within and between organizations
1999	Gurteen (1999)	The collection of processes that govern the creation, dissemination, and leveraging of knowledge to fulfil organisational objectives
1999	Gurteen (1999)	Knowledge Management is a business philosophy. It is an emerging set of principles, processes, organisational structures, and technology applications that help people share and leverage their knowledge to meet their business objectives
1999	Harris (1999)	Knowledge management is a business process that formalizes management and leverage of a firm's intellectual assets. Knowledge management is an enterprise discipline that promotes a collaborative and integrative approach to the creation, capture, organisation, access and use of information assets, including the tacit, uncaptured knowledge of people
1999	Havens and Knapp (1999)	Community is the most significant differentiator between knowledge management and information management. The spirit of knowledge management may be defined as knowing individually what we know collectively and applying it; knowing collectively what we know individually and applying it, and knowing what we don't know and learning it
1999	Kanter (1999)	The derivation of knowledge management emanated from its earlier definition of capturing, storing, and analytically processing the data that resides in the various company databases for decision making
1999	Laudon and Laudon (1999)	Knowledge Management is the process of systematically and actively managing and leveraging the stores of knowledge in an organisation
1999	Swan *et al.* (1999)	Any processes and practices concerned with the creation, acquisition, capture, sharing and use of knowledge, skills and expertise
1999	uit Beijerse (1999)	Knowledge is seen here as information; the capability to interpret data and information through a process of giving meaning to these data and information; and an attitude aimed at wanting to do so
2000	Huysman and de Wit (2000)	Knowledge management is about the support of knowledge sharing
2000	Mandl and Reinmann-Rothmeier (2000)	Knowledge Management is an organisational method whose main aim is to use the strategic resource knowledge more deliberately and more efficiently
2001	Pohs (2001)	A discipline that systematically leverages content and expertise to provide innovation, responsiveness, competency, and efficiency
2001	Sveiby (1996, 1998, 1999, 2000, 2001)	The art of creating value from an organisation's intangible assets
2002	Darroch and McNaughton (2002)	A management function that creates or locates knowledge, manages the flow of knowledge and ensures that knowledge is used effectively and efficiently for the long-term benefit of the organisation

(*continued*)

Table AI.

Time	Author	Definition
2002	Dick and Wehner (2002)	The objective of a firm applying Knowledge Management is simply to make the right knowledge available at the right time at the right place
2004	Gloet and Terziovski (2004)	The formalization of and access to experience, knowledge, and expertise that create new capabilities, enable superior performance, encourage innovation, and enhance customer value
2005	OECD (2005)	Knowledge management involves activities related to the capture, use and sharing of knowledge by the organisation. It involves the management both of external linkages and of knowledge flows within the enterprise, including methods and procedures for seeking external knowledge and for establishing closer relationships with other enterprises (suppliers, competitors), customers or research institutions. In addition to practices for gaining new knowledge, knowledge management involves methods for sharing and using knowledge, including establishing value systems for sharing knowledge and practices for codifying routines.
2006	Lundvall (2006)	The process of managing organisations' existing knowledge is an ancient phenomenon and not new in the portfolio of management activities. Using employees' competences and combining them into organisational capabilities is a requirement wise managers have always been aware of

Table AI.

Position	Before word (context)	Word	After word (context)
4,236	Derivation of knowledge	Management	Emanated from its
4,645	The portfolio of	Management	Activities
5,808	Knowledge	Management	Involves activities related
5,929	It involves the	Management	Both of external
6,265	New knowledge, knowledge	Management	Involves methods for
6,869	And efficiency Knowledge	Management	Is the process
7,060	Knowledge	Management	Is the explicit
7,102	Explicit and systematic	Management	Of vital knowledge
7,318	Optimisation and active	Management	Of intellectual assets
7,878	This is Knowledge	Management	
8,120	Explicit control and	Management	Of knowledge within
7,736	World of the	Manager	Of the 21st
4,771	A requirement wise	Managers	Have always been
1,126	Locates knowledge and	Manages	The dissemination and
1,378	Or locates knowledge,	Manages	The flow of
4,461	Systematically and actively	Managing	And leveraging the

Table AII.
Example keyword
in context
(concordance)

Term	Count 1992	Count 1996	Count 1997	Count 1998	Count 1999	Count 2000	Count 2001	Count 2002	Count 2004	Count 2005	Count 2006	All total
Access	0	0	0	0	2	0	0	0	1	0	0	3
Acquire	0	0	2	0	1	0	0	0	0	0	0	3
Action	0	1	5	0	2	0	1	0	0	1	1	11
Analyse	1	1	0	0	1	0	0	0	0	0	0	3
Artefact	0	0	4	3	4	0	1	0	0	0	0	12
Asset	0	1	3	2	2	1	1	0	0	0	0	10
Attitude	0	0	1	3	6	0	1	0	1	1	0	13
Capacity	0	0	0	2	5	0	0	0	2	0	1	10
Codify	0	0	3	7	4	0	0	0	0	2	1	17
Community	0	0	1	1	5	0	0	0	0	0	0	7
Competency	0	0	0	1	0	0	1	0	0	0	0	2
Competition	0	0	1	0	0	0	0	0	0	1	0	2
Context	0	0	3	0	0	0	0	0	0	2	0	5
Create	0	1	3	0	5	0	1	1	1	2	0	14
Data	2	0	0	1	5	0	0	0	0	0	0	8
Decision	0	1	1	0	2	1	0	0	0	0	0	5
Definition	0	0	0	1	3	0	0	0	0	0	0	4
Effective	0	0	0	1	1	0	0	1	0	0	0	3
Efficient	0	0	0	0	0	1	1	1	0	0	0	3
Embody	0	0	0	2	0	0	0	0	0	0	0	2
Enhance	0	1	3	3	4	0	0	0	1	0	0	12
Explicit	0	0	2	2	0	0	0	0	0	0	0	4
Formal	0	0	0	1	2	0	0	0	1	0	0	4
Frequent	0	0	1	0	0	0	0	0	0	0	0	1
Information	2	0	2	4	8	0	0	0	0	0	0	16
Innovation	0	0	0	2	1	0	1	0	1	0	0	5
Justify	0	0	0	1	1	0	0	0	0	0	0	2
Knowledge	1	10	22	7	26	4	0	5	1	8	1	85
Learn	0	0	0	0	1	0	0	0	0	1	1	3
Leverage	0	1	8	2	12	1	1	1	0	2	1	29

Table AIII.
Raw word count
data (post clean-up)

Table AIII.

Term	Count 1992	Count 1996	Count 1997	Count 1998	Count 1999	Count 2000	Count 2001	Count 2002	Count 2004	Count 2005	Count 2006	All total
Manage	0	2	6	0	3	0	0	1	1	0	1	14
Management	0	3	14	4	11	2	0	2	0	3	1	40
Marketing	1	0	0	0	0	0	0	0	0	0	0	1
Meaning	0	1	0	2	0	0	0	0	0	0	0	3
Mind	1	0	2	1	4	0	0	0	0	0	0	8
Opportunity	0	0	1	0	0	0	0	0	0	0	1	1
Organisation	0	1	8	6	12	1	1	1	0	4	0	35
Performance	0	0	2	0	1	0	0	0	1	0	0	4
Person	0	1	16	5	9	1	1	0	2	2	2	38
Process	0	0	7	4	12	1	2	1	0	4	1	32
Produce	0	1	2	0	1	0	0	0	0	0	0	4
Relation	0	0	3	0	0	0	0	0	0	2	0	5
Require	0	1	0	0	0	0	0	0	0	0	1	2
Seek	0	1	2	0	0	1	0	1	0	1	0	5
Share	0	1	4	1	4	1	1	1	0	4	0	17
Skill	0	0	0	1	5	0	0	0	0	2	0	8
Strategy	0	1	6	2	4	0	0	1	0	0	0	14
Structure	0	0	0	1	1	1	0	0	0	0	0	4
Tacit	0	0	0	3	2	0	1	0	1	0	0	7
Technology	1	0	6	2	1	0	0	0	0	0	0	10

Term	Term count
Action	11
Artefact	12
Asset	10
Attitude	13
Capacity	10
Codify	17
Create	14
Enhance	12
Information	16
Knowledge	85
Leverage	29
Manage	14
Management	40
Organisation	35
Person	38
Process	32
Share	17
Strategy	14
Technology	10

Table AIV.
Most frequent
KM terms

Case term	Related terms
Information	Process, Person, Organisation
Codify	Process, Person, Organisation, Manage, Information, Enhance, Create
Share	Strategy
Leverage	Process, Person, Organisation
Process	Asset, Attitude, Capacity, Codify, Create, Enhance, Strategy, Share
Organisation	Artefact, Asset, Attitude, Capacity, Create, Enhance, Share, Process, Person
Person	Artefact, Asset, Attitude, Capacity, Create, Enhance, Share, Process

Table AV.
Term relationships

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1. Yujong Hwang. 2016. A study on the multidimensional information management capability of knowledge workers. *Aslib Journal of Information Management* **68**:2, 138-154. [Abstract] [Full Text] [PDF]