The state of research on folksonomies in the field of Library and Information Science

A Systematic Literature Review

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Abstract

Purpose – The purpose of this thesis is to provide an overview of all relevant peer-reviewed articles on folksonomies, social tagging and social bookmarking as knowledge organisation systems within the field of Library and Information Science by reviewing the current state of research on these systems of managing knowledge.
Method – I use the systematic literature review method in order to systematically and transparently review and synthesise data extracted from 39 articles found through the discovery system LUBsearch in order to find out which, and to which degree different methods, theories and systems are represented, which subfields can be distinguished, how present research within these subfields is and which larger conclusions can be drawn from research conducted between 2003-2013 on folksonomies.
Findings – There have been done many studies which are exploratory or reviewing literature discussions, and other frequently used methods which have been used are questionnaires or surveys, although often in conjunction with other methods. Furthermore, out of the 39 studies, 22 were quantitative, 15 were qualitative and 2 used mixed methods. I also found that there were an underwhelming number of theories being explicitly used, where merely 11 articles explicitly used theories, and only one theory was used twice. No key authors on the topic were identified, though *Knowledge Organization, Information Processing & Management* and *Journal of the American Society for Information Science and Technology* were recognised as key journals for research on folksonomies. There have been plenty of studies on how tags and folksonomies have effected other knowledge organisation systems, or how pre-existing have been used to create new systems. Other well represented subfields include studies on the quality or characteristics of tags or text, and studies aiming to improve folksonomies, search methods or tags.
Value – I provide an overview on what has been researched and where the focus on said research has been during the last decade and present future research suggestions and identify possible dangers to be wary of which I argue will benefit folksonomies and knowledge organisation as a whole.

Keywords: Folksonomy; Social tagging; Social bookmarking; Systematic Literature Review; Library and Information Science; Knowledge organisation; Knowledge organisation systems; Classification; Categorisation; ALM

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1. INTRODUCTION

1.1. Introduction and background

Approximately one decade prior to this study, in 2003, a certain way of categorising knowledge appeared in a more mainstream form than ever before in a manner that revolutionised how people use and look at the internet. This phenomenon paved the way for the sudden and immense popularity of web 2.0 and the aspects of participation and social entities which now exist all over the internet, namely that of social tagging and social bookmarking. The term social bookmarking was first coined by a website for saving, categorising and sharing web pages called delicious, formerly known as del.icio.us. Delicious was the first major social bookmarking site which provided people with a way of bookmarking which was in many ways advantageous to that of browser bookmarking (Kapucu, Hoeppner and Dunlop, 2008, p. 229). Today, more than a decade later, knowledge organisation has in many ways been changed and several extremely widely used web sites and knowledge organisation systems have taken the world by storm. Social tagging is similar to social bookmarking, and sometimes interchangeable, at least to a point. Social tagging is the act of placing your own freely chosen descriptors to categorise a certain object, and sharing these so-called tags with other people so that all the users together create their own system for managing information, and whether it is an image, a book or a bookmark you choose to tag makes no difference. These systems created by the users, for the users, consisting of user-supplied tags instead of expertly supplied controlled vocabularies are known as folksonomies.

Våge, Dalianis and Iselid describe folksonomies as systems which uses tags as descriptors for categorising information (2008, p. 26). These tags can be based on any number of things the user feels appropriate to the information such as for example subject, form, reason, time, status, emotions or critique (Taylor & Joudrey, 2008, pp. 364-365). In contrast, the system, which is more common, and the typical one used in for example libraries, is called taxonomy. This is a hierarchical structure of information based on a controlled vocabulary of predetermined subject terms (Våge, Dalianis & Iselid, 2008, p. 26).

The most popular sites which are folksonomies, or have the function of social tagging or bookmarking in some manner today are, amongst several others, Facebook, Twitter, Pinterest, Instagram and Flickr, and it has started appearing in libraries and literature-related systems. In academia as well there is one quite well used folksonomy for sharing and tagging citations, namely CiteULike. Most major global organisations or businesses make use of at least one of these systems in one way or another. This shows that tagging and social bookmarking has become established in almost the entire online community, and something that connects people and

businesses throughout the globe on a social level. An example of this closer to the field of library studies would be LibraryThing, a folksonomy-based social network and knowledge management system where people can create their own book collections and tag, discover and discuss literature. The tags supplied by the users of LibraryThing have also been imported into some libraries' online catalogues. One example is Malmö's public library's data posts where the most popular tags are shown in a tag cloud if tag data is available for that post (Malmö Stadsbibliotek). Among several other library catalogues wherein this has also been done are the J. Paul Leonard Library catalogue for the San Francisco State University (San Francisco State University) and the Danbury Public Library catalogue (Danbury Public Library).

One very interesting, distinguishing thing about folksonomies and all these other methods of categorising which are within the focus of this thesis is that the idea is that all, or the vast majority of the categorising is done by amateurs. These amateurs often assemble as a collective group of individuals who, of their free will, use their spare time to share with others their view of what a book or a picture should be described with. The descriptors are not bound by a controlled vocabulary or constructed and intended to fit neatly into a hierarchical hyponym-hypernym relationship with other terms. To explain this semantic relationship in simpler terms: *salmon* is a hyponym of *fish*, and *fish* is then the hypernym of *salmon* while also a hyponym of *animal*. In these methods of categorisation there is room for the freedom of imagination and interpretation. This does not by any means indicate these systems to be better than standard taxonomies, but rather different. This freedom and imagination, and lack of a hierarchical, predetermined structure also means that it might oftentimes be hard to find the knowledge one is looking for. Tags thus generally become ambiguous since users use those terms, which hold some meaning to themselves, which does not necessarily mean the same thing to other users (Weinberger, 2008, p. 95).

1.2. Aim and objectives

The problem regarding research on folksonomies, social tagging and social bookmarking within Library and Information Science is that there is no clear picture illuminating what has been done, how relevant the data presently is and which areas have been left unexplored, or at least underrepresented. Hence, the aim of this study is to describe and analyse Library and Information Science research on folksonomies, social tagging and social bookmarking as knowledge organisation systems. This will be done by means of a systematic review of the majority of previous research in the field of Library and Information Science since 2003. The focus of this review will be on method, theory, systems of study, results to achieve a comprehensive picture of these topics as they look in 2014 and how they have evolved throughout the past decade. In this thesis I attempt to do so by finding and analysing all relevant academic articles, which fulfil the eligibility criteria of my study developed to answer my research questions, to be presented in the method section (5.2).

I further synthesise these findings through the extracted data from these articles to find out which subfields have been explored thoroughly, which are poorly represented and which subfields appear to have had the largest impact in sequential studies. I also

consider the dates of publication in relation to the articles to establish the relevance of previous studies. This is relevant since this is a dynamic field and phenomenon which has changed and expanded exponentially, thus the research is prone to ageing quite rapidly.

I also aim to establish if any key authors exist within the topics of folksonomies, social tagging and social bookmarking by analysing the amount of articles which have been authored or co-authored by the identified authors. This will be done in order to provide the research community in Library and Information Science with a structured overview of the current situation and the decade long development, as well as discerning research trends within these topics, and will hopefully function as a cornerstone for future research on these methods of organising knowledge.

The research questions I use as a foundation for this study are:

- Which methods (qualitative vs. quantitative), theories and systems are represented, overrepresented or underrepresented? How can this be motivated?
- Which subfields can be distinguished within the research of social tagging in Library and Information Science?
- What is the state of research within the distinguishable subfields? How current is it?
- Which conclusions can be drawn from research conducted during the last decade?

1.3. Importance to Library and Information Science

The contributions of this systematic review are to the entirety of knowledge organisation and management and to Library and Information Science as a whole. This is because it provides insight into the scope of research done on the folksonomy, one of the two primary ways of managing information, the other being the taxonomy. While my study does not produce any empirical data – in the narrower sense – it ties together previous studies in order to benefit the field on a higher level and to provide larger conclusions through this. By doing this, the data from the reviewed articles become primary objects of study, and thus turns those studies into my empirical material. This becomes beneficial to the field of Library and Information Science because "[previous studies] help us build and make sense of our own research base" and to "identify our strengths while finding out where gaps exist" (McKibbon, 2006, p. 205). Furthermore, this study will in some ways serve as a development of the systematic literature review as a method, and how it can be used to make sense of bodies of research in the field of Library and Information Science.

1.4. Ethical Considerations

One main reason for discussing the ethics behind a systematic review is the method's origin in medical research. It can often be the case that the studies being reviewed contain sensitive information which the primary researchers had to receive expressed consent from their informants. It is thus not always a possibility for those in my

situation to take into consideration those issues of consent and procedures used but not reported in the reviewed studies (The Research Ethics Guidebook). As my review only features research which is not considered especially sensitive, and as I do not include any data directly connected to individual informants in the reviewed studies, I have not taken any further actions towards the ethics of this thesis beyond that of the standard research ethics holding myself to a certain scientific standard.

The Institute of Medicine, National Academy of Sciences, and National Academy of Engineering (2009) present what I feel to be three inspirational but also unquestionable obligations which researchers are expected to follow. These are the "obligation to honor the trust that their colleagues place in them", the obligation to the researchers own, personal integrity, and the "obligation to act in ways that serve the public" (Institute of Medicine, National Academy of Sciences, and National Academy of Engineering, 2009, p. 2). Furthermore, they clarify by stating that "Research is based on the same ethical values that apply in everyday life, including honesty, fairness, objectivity, openness, trustworthiness, and respect for others. A "scientific standard" refers to the application of these values in the context of research. Examples are openness in sharing research materials, fairness in reviewing grant proposals, respect for one's colleagues and students, and honesty in reporting research results" (Institute of Medicine, National Academy of Sciences, and National Academy of Engineering, 2009, p. 3).

1.5. Limitations

This systematic literature review is limited to those articles available through the LUBsearch discovery system. Furthermore, as explained in detail in sections 4.2 and 4.3, further limiting criteria have been applied to find all relevant articles to review whilst excluding all irrelevant ones. These criteria include but are not limited to reviewing exclusively peer-reviewed articles published between 2003 and 2013 with clearly stated study objectives and results. The review is also limited by the discovery system as the search string, further explained in section 4.4, can only find those articles which contain the keywords found to be relevant, possibly eliminating relevant articles which have not been thoroughly supplied with appropriate keywords, or where the authors used a different vocabulary in title, abstract and keywords.

A further limitation inherent to the method as well as to all evidence based research methods, which a systematic literature review is, is identified by Karman (2011). He explains that to have such a narrow perspective, as is the requirement of these kinds of studies, might very well be counterproductive as the framework for the study, no matter how well thought out, risks excluding potentially important studies merely because they do not fit the predetermined criteria (Karman, 2011, p. 49). He further argues that no research can be considered truly objective (Ibid.), an argument I reluctantly have to agree with as all studies in some manner are affected by the views of the researcher. To expand on this, it is also a limitation that this study is undertaken by merely one researcher, thus only the perspectives I have explored are provided.

1.6. Synopsis

What follows is a detailed recount of what will be done in this study. Following this introductory chapter, I will in chapter 2 present the theoretical foundation to be used in my discussion section where I present the ideas of Henry Jenkins on *Convergence Culture* as well as other theoretical viewpoints of interest to this study. Chapter 3 consists of a shorter review of literature which has reviewed white literature within the field of folksonomies, social bookmarking and/or social tagging as well as previous research on systematic literature reviews in Library and Information Science.

Chapter 4 consists of an in-depth recount of how I use my method of research, the systematic literature review, as well as what the method entails. In 4.1 I present an overview of the method, its uses and general background information of what a systematic review is. In 4.2 the criteria for eligibility are presented along with the motivation behind each of my choices in this initial part of the process. 4.3 consist of a recount of the information sources used to find articles for the review, along with the excluded sources and reasons for their exclusion. In section 4.4, I present my entire search process performed in the LUBsearch discovery system along with my search string, limiters and filtering process. I constantly and systematically reveal the number of articles found, and remaining after each part of the process, and in this section I also finish the automatic system filtering process and extract all articles through LUBsearch into an Excel file.

The manual study selection process begins in section 4.5. In this section I start providing reference numbers for all extracted data and systematically provide motivation behind each excluded article in order to retain transparency and accountability. I furthermore present the final number of articles for data extraction. In section 4.6 I explain the process of extracting data from the included articles. Following, I present in section 4.7 all the data items which articles were extracted for along with any simplifications to identified data made in this process. In section 4.8 I discuss any potential risk of bias found in studies for data extraction, and in section 4.9 I explain the method of summarising the extracted data. In section 4.10, I describe the method of synthesising the extracted data to a more coherent, analysable presentation of the data, followed in section 4.11 by additional analyses done beyond that of summarising synthesis.

In chapter 5, the results of the study are presented, and the majority of the data is illustrated by figures or in tables, along with a descriptive text. In section 5.1, the articles included in the systematic review are presented with their corresponding reference numbers, journals of publication, titles of the articles, authors, and years of publication to provide thorough references. In 5.2, the characteristics of the studies which were extracted are presented, and in section 5.3, the results of the study are synthesised and presented. In this section I present findings achieved through the synthesis of the extraction of the various data items. Initially I present more general reference data such as the number of publications by journal, year and country using charts. This is followed by a table illustrating the authors of the reviewed articles, presenting the number of included articles they have published and whether they functioned as key authors or secondary authors.

Tables displaying the methods and theories are then presented, including how many times each method or theory has been used. A chart illustrating how many of the studies are qualitative, quantitative or both is also present here. I then provide a chart of the systems which have been examined, and how many times they have been examined within the 39 studies. A table of the extracted, ungeneralised subfields is also present, followed by a table consisting of all extracted results from the reviewed studies. Following this, I have in section 5.4 correlated different data items to locate among other things which methods have been used in conjunction with which explicit theories, or when articles focusing on a particular subfield have been published. This is done in order to observe if certain trends can be located and to see which data items might demand more attention from this field of research.

The following chapter 6 contains the discussion, and in section 6.1 I answer my research questions answered with evidence provided through the syntheses found in chapter 5 and reflect on my findings. In section 6.2 I discuss topics for future research in two subsections. Section 6.2.1 consists of a discussion on folksonomies, social tagging and social bookmarking in relation to my theoretic perspectives, as well as problems which may arise from certain developments within folksonomies. Finally, in 6.2.2 I consider the future of the systematic literature review method in Library and Information Science and suggest some ways in which it could be developed order to fit the needs of the field.

2. THEORY

In order to discuss the findings of this systematic review, I will primarily be using Henry Jenkins' thoughts and ideas on *Media Convergence*, *Participatory culture* and *Collective Intelligence* as discoursed in his book *Convergence Culture: Where Old and New Media Collide* (2006).

To explain these three concepts, I will now provide the definitions as provided by Jenkins:
Convergence is "the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behavior of media audiences who will go almost anywhere in search of the kinds of entertainment experiences they want" (Jenkins, 2006, p. 2-3). Media Convergence is when media becomes available on several types of media devices, for example when music is available both on the radio, in an iPod, in a CD-player and on the computer. The concept of media convergence is thus not of major interest in my review, but the definition should be included due to it being one of the major three discussed throughout Jenkins' book.

A participatory culture is where the consumers and producers act together instead of being completely separate (2006, p. 3), as for example the vast fan communities which can be found creating original content like fan fiction on fanfiction.net or artwork on deviantart.com for already existing media franchises, or users who tag literature they like in the folksonomy LibraryThing. Jenkins (2014) explains what he means by participation and presents his distinction between interactivity and participation. Interactivity is more susceptible to being governed by media producers as it is often a part of the technology itself, making it either more freeing or limiting. In contrast, participation remains a part of the surrounding culture. This means that together the people can engage with the both the technology, the content and the producers and rather form around, and alter, the technological infrastructure. (Jenkins, 2014, p. 283)

The concept of Convergence and how it relates to Collective Intelligence is incredibly interesting and is aptly defined by Jenkins when he explains that:

> Convergence occurs within the brains of individual consumers and through their social interactions with others. Each of us constructs our own personal mythology from bits and fragments of information extracted from the media flow and transformed into resources through which we make sense of our everyday lives. Because there is more information on any given topic than anyone can store in their head, there is an added incentive for us to talk among ourselves about the media we consume. This conversation creates buzz that is increasingly valued by the media industry. Consumption has become a collective process – and that's what this book means by collective intelligence, a term coined by the French cybertheorist Pierre

> Lévy. None of us can know everything; each of us knows something; and we can put the pieces together if we pool our resources and combine our skills.
>
> (Jenkins, 2006, p. 4)

My own take on the concept of collective intelligence would be that it is the way a collective mass of individuals, perhaps preferably from diverse backgrounds and with different ideologies, come together in creating or managing knowledge through collaborative efforts, distinguishable by a large scaled consensus amongst those involved. A collective intelligence working within a knowledge organisation system to manage, and even create the information contained within is what effectively creates a folksonomy, as long as they are not bound by fixed subject terms and controlled vocabularies that is. In a tag cloud, the largest, most prominent tags chosen by the collective would be the ones which have the consensus of said collective, and thus carrying the most weight as the collectively chosen most accurate ones.

Bruns introduces the concept of produsage, a combination of the words production and usage, and discusses production of content, which is led by the users through "massively parallelized and decentralized creativity and innovation", as in Wikipedia, which is the stark contrast to industrial, commercial production methods. As these production methods vary, so do the results, and even though the user-led changes can be on a minor scale, they continuously build upon their knowledge base and steadily improves the quality of what is worked upon and can even outpace the standard industrial production development. (Bruns, 2008, p. 1) Although this thesis focuses on knowledge *organisation* systems and not knowledge *creation* it is nonetheless important to understand these ideas as user-organised knowledge works, I believe, within the same user motivation to pool their resources on their own time to slightly and steadily improve what currently exist while being part of something bigger, such as a collective of people from all over the world with the same goals of sharing their own way of looking and categorising knowledge in one form or another.

Then, of course, there is also the social aspect. It is my firm belief that many people want their side of things, their own opinions or categorisations to be heard, or at least visible as a tag in a tag cloud, to reaffirm that their opinion is valid by seeing others tagging similarly, to share the books they have read and tagged on LibraryThing, or the websites they found interesting on Delicious. Bruns explores this subject when he discusses the evolution from the personal homepage to blogs, and to social networks such as Facebook or Twitter, and that these social networks often are a platform for sharing the user's material from for example Delicious or YouTube (Bruns, 2013, p. 423). "You Are What You Tweet", he writes, and explains that in Twitter, with the extremely limited personalisation options, a user's identity is directly connected to what they post, who they follow and who follows them (Bruns, 2013, pp. 422-423), and this thinking can be directly translated to the function of the folksonomies where your online identity is somewhat connected to what you tag, what tags you use and to whom you choose to share them.

Bowker and Star (2006) discuss and give examples on why knowledge organisation systems are important, how they work and how they affect the real world. They also provide insight into the challenges for classification schemes to function; one challenge I find interesting to discuss is *control*. They argue that "freedom trades off against structurelessness", and that "too much freedom for a novice or a child may be

confusing or may lead to breakdowns in comparability across settings, thus impairing communication" (Bowker & Star, 2006, p. 232). I suggest, however, that it is precisely this freedom, which attracts the novices and young people. It is true that the lack of control provided by folksonomies trade off against structurelessness, but it is this aspect which defines what a folksonomy is: the absence of a hierarchical, controlled structure. However, this structure and control also serve as crucial components of what makes taxonomies useful.

As for why classification is important to the real world, Bowker and Star brings up the example of tuberculosis, a disease which is incredibly difficult to classify as it is a protean disease, and that no single classification can contain the entirety of the descriptions necessary to capture the full image of tuberculosis (Bowker & Star, 2006, p. 172). Yes, the International Classification of Diseases may well be lacking in its ability to sufficiently classify this disease as diseases not always work in a straight-and-narrow cause-and-effect schema, however without classification systems, there would be no way of starting to figure out the many causes, effects and treatments. It is possible that a folksonomy as a supplement to this system would improve the classification of diseases as many by their very nature are organic and dynamic rather than well-ordered and binary.

Bowker and Star also brings up an example of a serial killer who gets classified as a homicidal maniac, no further explanation necessary (Bowker & Star, 2006, p. 319). A classification does not equal an explanation, it is simply a label, and "Although the classification does not provide psychological depth, it does tie the person into an infrastructure–into a set of work practices, beliefs, narratives and organizational routines around the notion of "serial killer." Classification does indeed have its consequences–perceived as real, it has real effect" (Ibid.). This shows how a person's identity can be determined, at least to a certain degree, by classification, and also how this can be a dangerous thing as nothing is ever as simple as it can be described through any knowledge organisation system. A classification, whether it is in controlled vocabulary or a tag, does not provide a deeper context into the meaning of the word or words; it is always open to interpretation. While a taxonomy may allow for a structure with set, discipline specific terms which help their users find all related information to their subject terms, a folksonomy allows for diversity and ambiguity, but also a multitude of uncontrolled subject terms which might narrow the data item down through multiple points of view should one look at all the tags.

3. PREVIOUS RESEARCH

In this section I will present findings from previous research articles reviewing scholarly peer-reviewed literature on folksonomies, social tagging or social bookmarking, thus forgoing any grey literature[1] publications. The quality of grey literature is not always assured, although often authored by experts within the subject and can still provide incredibly informative, relevant and current information.

There are reviews on this subject including grey literature as for example blogs or information posted on web pages (Trant, 2009), and although interesting, they provide another perspective not congruent with my systematic review of purely peer-reviewed articles. Since this entire study is a systematic literature review of articles on folksonomies, social tagging and social bookmarking, this section will not be completely exhaustive and thorough due to the redundancy of it all as the following chapters will provide insight into the state of research within the field.

Macgregor and McCulloch (2006) present in a general review, where they discuss related literature to the phenomenon collaborative tagging and review major contributions to this literature, evidence on the difficulties of collaborative tagging systems created by the diverging properties from controlled vocabularies, such as low precision of information retrieval. These problems seem to be the inherent weaknesses of folksonomies, and the primary downside to them in comparison with taxonomies, which is connected to the previously discussed freedom of choice when tagging information and the varied meaning the tags can have for people in different contexts. The authors also show, however, that collaborate tagging systems motivate users to participate in information management, and foresee a coexistence of the two systems (Macgregor & McCulloch, 2006). I agree with Macgregor and McCulloch in that users seem to become more motivated to take an interest in information management and categorisation, as the social and collaborative aspects have been quite successful. It can be questioned, however, in what form this predicted coexistence will take place, and if they will become more integrated in each other

[1] The most commonly used definition of grey literature is called the Luxembourg definition which was determined in 1997 at the Third International Conference on Grey Literature, and was further expanded during the Sixth International Conference in 2004. The entire definition goes as follows: [Grey literature is] that which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers i.e., where publishing is not the primary activity of the producing body. (Schöpfel & Farace, 2010, p. 2039)

than merely imported tags as a separate element in taxonomically structured library catalogues. These possible scenarios will be further discussed in chapter 6.

In a study from 2008 where she reviews literature on social tagging, Moulaison explained that the majority of research conducted up until then had focused upon "large-scale assessment of tag sets in systems", and that there was a lack of research covering endo-tagging versus exo-tagging, or in layman's terms author supplied metadata versus user supplied metadata (Moulaison, 2008, p. 101). She (ibid.) also proposed that future research needed to be more user-centred and focus on the motivation for user tagging. Although no studies have been found in my review to focus explicitly on the motivation for user tagging, there have been quite a few which have examined expert versus amateur tagging and classification in various scenarios since then, although my research does indicate that Moulaison was entirely correct in her conclusions prior to 2008. Three articles in particular were found to have examined the differences between tags and classification provided by users/masses/amateurs and experts/authors/authorities (Tsai, Hwang & Tang, 2011; Mai, 2011; Kipp, 2011), and another three articles focused instead on the mapability of tags to controlled vocabularies (Daly & Ballantyne, 2009; Bruce, 2008; Šauperl, 2010) which can be argued to be closely enough related to endo-tagging versus exo-tagging.

As to previous research on my method of choice, the systematic literature review, Urquhart explains that although it originated from medicine, and even information specialists initially supported the method for clinicians, there has been a reallocation to Library and Information Science for evidence based studies, including both a conference and a journal dedicated to this (Urquhart, 2010). As the methods primarily used in the field often are a mixture of qualitative and quantitative studies, as Urquhart explains, it has been more common with narrative reviews, and that "there is a demand for transparent methods of synthesising the findings of qualitative research studies and qualitative and quantitative research" (Ibid.).

The gold standard for summarising data in evidence based studies are meta-analyses which are created for synthesising quantitative data, but there have been some development for methods for meta-synthesis, methods for synthesising both qualitative and quantitative data (Ibid.). Although she explores several methods for meta-synthesis from various viewpoints, such as that realist syntheses might work best for policymakers, while critical interpretive syntheses or meta-ethnography provide practitioners with what they require, she states that it is yet too early to make recommendations about which one to use in Library and Information Science (Ibid.). The way I have performed this study is to look at guidelines of what a systematic literature review should entail, based on several publications (Bronson & Davis, 2011; Gough, Oliver & Thomas, 2012; Jesson, Matheson & Lacey, 2011; McKibbon, 2006), and modified as necessary to perform and document a study as thorough and transparent as possible.

4. METHOD

4.1. Systematic literature review

In this section I will describe in detail the methodology used in this master's thesis. The method used is called a systematic literature review (SLR). Although primary research is crucial for any field, systematic literature reviews can help illuminate fields of research by analysing what has been done and which findings have been reported based on several studies in a field, thus providing a tool to better understand the larger picture (Gough, Oliver and Thomas, 2012, p. 3). This research method originated from the field of medicine where it is used to address specific research questions by analysing and making sense of a large body of information (McKibbon, 2006). This means that performing a systematic literature review entails reviewing all relevant articles in a field of study in a systematic manner which can assist in answering these questions. I will be using the method to gain insights into the research, which has taken place, what premises and theories have been put forth in these articles as well as to find out what the focus of the entire field is, and has been. Naturally, there has to be limitations to any study, and a systematic literature review is no exception, quite the opposite.

A SLR is a method, which has a strict, prescribed way of doing things. One of the key points is to be able to create working restrictions to find the desired body of knowledge. Gough, Oliver and Thomas describe a systematic review as "a review of the research literature using systematic and explicit accountable methods" (2012, p. 5). It is essential to describe the review process and search strategy in a transparent manner in order to enable replication (McKibbon, 2006).

According to Bronson and Davis (2012), a researcher requires a certain set of skills to initiate a systematic review, namely the ability to "1) pose a searchable question and prepare a review protocol, 2) develop a comprehensive list of search keywords that includes concepts for the population, problem, and research methods, 3) identify strategies for locating relevant research and 4) create inclusion and exclusion criteria to guide the search for relevant research" (Bronson & Davis, 2012, p. 1). This is also the basis for my study and what follows is a comprehensive, transparent and exhaustive systematic literature review.

4.2. Eligibility criteria

The eligibility criteria implemented for this study were in the earlier stages created in order to create a prototype search phrase which will be further elaborated upon in following sections. These inclusion and exclusion criteria are a crucial part of any systematic literature review and must be made to be unambiguous since only relevant

articles which help in answering the research questions are to be included (Jesson, Matheson and Lacey, 2011, p. 115).

The criteria for inclusion are as follows:

- Academic peer-reviewed article
- Published between 2003 and 2014
- **Primary** focus on folksonomies or social tagging/bookmarking as methods for organising knowledge
- Available in library collection
- Language: English

The reasoning behind each of these criteria of inclusion is as follows. I chose to only include articles which had been peer-reviewed. This is due to several reasons, the foremost being that the field of research within Library and Information Science, which my previously stated aim is to describe and analyse, can be argued to be defined through its peer-reviewed body of publications. There are an immense amount of data which would have been of great interest and benefit to this study in the form of books and blogs. Because of this I have chosen to forego other media than academic articles since it otherwise would have been too much data to process. The fact that only peer-reviewed articles were chosen was because it provides some kind of security that the data published has been verified externally, although it does not mean everything in them should be taken at face value. The reasoning behind the publication date limitation was because, as mentioned in the introduction, it was in 2003 Delicious, the first major publically embraced social bookmarking system, was launched.

The next criterion strongly influenced the development of my search phrase as it is a key factor to this review. As research on folksonomies, social tagging and social bookmarking seemed rather unfocused I reasoned that it would be prudent to focus upon these as knowledge organisation methods. The reason for specifying the tagging and bookmarking as social was because there are various methods of tagging and bookmarking which are not, for example browser-based bookmarking which are local or connected to a personal account not to be shared further than the users' own devices, or terms which are larger and are not limited by the socially cataloguing aspect sought after, such as meta tags. By social tagging and bookmarking, I mean tagging and bookmarking with the intent of collaboration and sharing of these tags and bookmarks through a system which allows for other people to do this as well: to create, categorise, search for, view and share user-categorised information, bookmarks or data posts.

The penultimate inclusion criterion was applied automatically by the search engine used to find the articles for the systematic literature review, LUBsearch, and merely filters out all media which is not available through the university. This makes this a rather crucial limiter for that reason though, since no articles were included which were not provided through Lund University, potentially excluding several sources of otherwise relevant and important literature. As international research, oftentimes even where none of the researchers are native English speakers, adopt English as a lingua

franca (Mauranen, Hynninen & Ranta, 2010, p. 189), I chose to include only articles written in English.

The exclusion criteria for articles are as follows:

- **Primary** focus of the study is outside that of folksonomies or social tagging/bookmarking as methods for organising knowledge
- The study is published in a journal delivered by a content provider not with the primary focus of Library and Information Science unless the content provider is interdisciplinary
- No clear study objective is presented
- No clear results/outcome/findings are presented

The reason for the first exclusion criterion is the same as for the third inclusion criterion. The second, however, became necessary as there were quite a few articles which were found from my search phrase, which is to be explained later on in this thesis, but which came from sources with no principal connection to library and information science. Since it is within the field of Library and Information Science this SLR is undertaken, I argue that articles from medical or business related content providers would be unessential, and if included could cause this study to deviate from its intended field.

As for the third and fourth exclusion criterion, these were post-fabrications developed during the data extraction phase due to the difficulty of processing an article with no clearly stated goals or results of the study to be shown to the reader. This became a problem early on during the data extraction phase where crucial fields for the analysis were left empty or lacking, requiring additional exclusion criteria.

4.3. Information sources

The articles used in this study were all found through Lund University's discovery system LUBsearch. This Ebsco-based discovery system searches through several content providers, *Library, Information Science & Technology Abstracts* being a prominent one for Library and Information Sciences. This, however, meant providers such as *Library and Information Science Abstracts* was not available to me. Other content providers included in this study were interdisciplinary and were chosen to be included due to the possibility of finding relevant articles connected to my field and were as follows:

- Science Citation Index (64)
- Social Sciences Citation Index (58)
- Library, Information Science & Technology Abstracts with Full Text (LISTA) (54)
- Scopus® (10)
- arXiv (5)

- ERIC (2)
- Informit Humanities & Social Sciences Collection (1)
- Directory of Open Access Journals (1)
- OAPEN Library (1)
- Digital Access to Scholarship at Harvard (DASH) (1)
- SocINDEX with Full Text (1)

As previously stated, some content providers were deliberately excluded due to the fact that they were mono-disciplinary and not within Library and Information Science. These were primarily:

- MEDLINE
- Business Source Complete
- GreenFILE
- JSTOR Life Sciences
- BioOne Online Journals
- CINAHL Plus with Full Text

The latest search made within the LUBsearch discovery system for articles to be included in this study was February 22, 2014.

4.4. Search

The search strategy was formed to include all relevant literature for the review, and I am confident it included the vast majority. However, the search can merely bring in results as well as the quality of the indexing of the databases allows (Jesson, Matheson and Lacey, 2011, p. 114), as well as the number and relevance of the content providers available through the system. That being said, the search was intended to encompass all peer-reviewed journal articles on folksonomies, social tagging or social bookmarking within the field of library and information sciences or with relation to libraries. The final part of the search string was intended to filter articles not related to knowledge management/organisation systems.

The search string which was entered into LUBsearch was:

((folksono*) OR (tag) OR (tag*) OR (social AND bookmar*)) AND ((lis) OR (librar*)) AND ((kos) OR (knowledge AND organi*) OR (kms) OR (knowledge AND managemen*))

The search was performed with the ‘keyword’ search option, which means that the search phrase was applied to titles, abstracts, author supplied keywords, subjects and sources. With no limiters applied, this search yielded n=862 results. I then applied the following limiters available through the discovery system:

- Available in Library Collection
- Peer Reviewed
- Date Published: 20030101 – 20141231

- Source Types: Academic Journal
- Languages: English

This filtered the results down to n=395 results. I further decided to reduce the number of results by removing all results from certain content providers described above due to the nature of their disciplines. Note however that my limiters include articles published until the end of 2014 since I wished to cover all articles to date, but should this search be repeated, the limit might as well be set to the end of 2013 since no articles from 2014 were found in my search. To find out the nature of those providers which I had no previous knowledge about, I performed a Google-search, and those who proved interdisciplinary or connected to library and/or information science were included, causing the number of articles to drop to n=198. At this time I found no additional ways to specify my criteria through the discovery system.

Through LUBsearch, I now exported all search results through a service provided by the discovery system to an Excel file including a reference number, years of publication, titles, authors, affiliations, subject terms, abstracts in their entirety, document types as well as a hyperlink to the article post in LUBsearch for ease of access when retrieving the full text articles. During this automated extraction process of the results and metadata from the discovery system, there was an unpredicted loss of 47 articles. The reason for this loss is yet unknown, and even several repeated attempts yielded identical results, regardless if they were exported to an XML or RIS file. The remaining 151 articles were during this process also automatically marked with reference numbers (1-151), numbers which I have kept during the entirety of this process.

4.5. Study selection

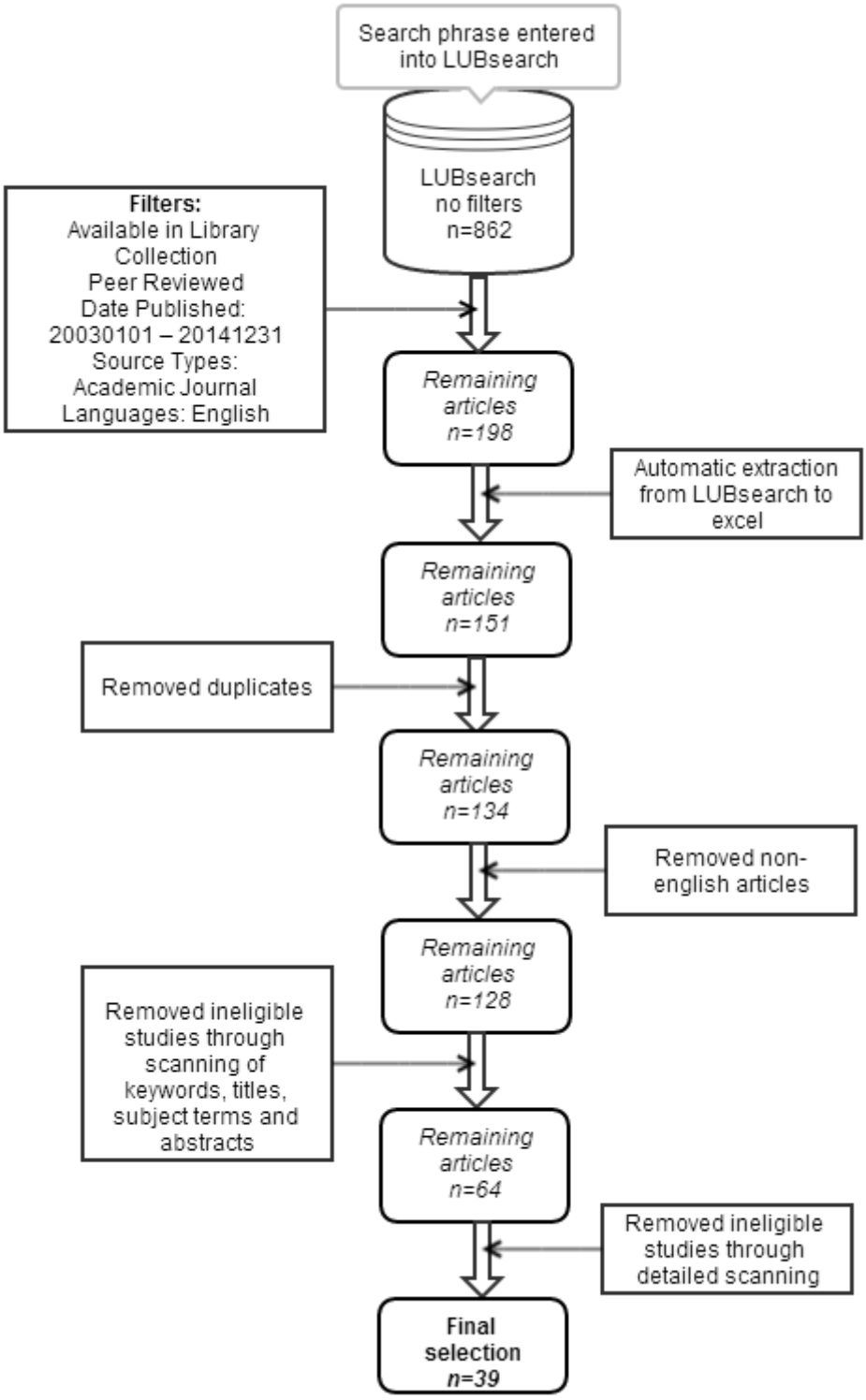
The manual selection process was initiated after having exported the Excel document from LUBsearch. It began by sorting out duplicates, made easy by the format of the export file which allowed me to sort the articles based on titles. By doing so, I could simply colour code all duplicates which were superfluous. I chose to save every post in the Excel document, in order to have the entirety of the manual filtering process fully transparent and accounted for. The filtering of the duplicates (3; 9; 16; 18; 22; 38; 44; 58; 63; 67; 68; 72; 74; 75; 96; 118; 138) [n=17] brought the total number of articles down to n=134.

The next phase of the study selection method was done by manually looking at the titles, abstracts, keywords and subject terms provided in the Excel documents, once again using colour coding to mark which studies fell through, and the reason for it. At this point I was looking at topics which didn't fit my criteria at all, as well as articles which were not successfully filtered away by the LUBsearch discovery system concerning language eligibility. Articles excluded due to language eligibility (14; 35; 37; 49; 70; 124) [n=6] brought the number of articles down to n=128. After initial scanning of titles, keywords, abstracts and subject terms, the exclusion of ineligible articles (21; 24; 25; 43; 47; 48; 51; 52; 53; 54; 55; 57; 59; 61; 64; 66; 69; 76; 77; 79; 83; 85; 88; 90; 91; 92; 93; 94; 95; 98; 99; 101; 103; 104; 111; 112; 114; 115; 116; 117; 120; 121; 125; 126; 127; 128; 129; 130; 131; 132; 134; 135; 137; 139; 141; 142;

143; 144; 146; 147; 148; 149; 150; 151) [n=64] saw the total number of articles to be manually scanned in a more extensive manner down to n=64.

After the initial scanning, I downloaded all 64 remaining articles in full text through LUBsearch, although some were not accessible through the discovery systems links and had to be located and downloaded through alternative sources such as Google Scholar. After downloading, the articles were renamed with their document id number provided through the LUBsearch extraction, sorting them by relevance. They were also paired with a document containing an identical data extraction form for each article. This process was thus done in combination with my data collection process, which will be further described below. During this process, the number of articles excluded (1; 2; 7; 15; 20; 31; 33; 36; 46; 50; 73; 81; 86; 89; 97; 105; 106; 109; 110; 119; 123; 133; 136; 140; 145) [n=25] reduced the total remaining to n=39 articles. At this point, I had also found additional criteria necessary for this study, such as clearly presented goals and results of the study, as mentioned in my inclusion criteria, causing articles I had already extracted data from to be re-evaluated and thus excluded, which were also included amongst those 25 most recently excluded articles presented.

Fig.1: Article search and selection process



4.6. Data collection process

With the exception of the initial automated Excel extraction of all the articles found through LUBsearch, the extraction of data from the articles was primarily done by first creating and manually extracting information into a data extraction form. Data extraction forms are valuable tools for retrieving data from articles for systematic literature reviews since through them the extraction of data becomes more conformed and repeatable (McKibbon, 2006, p. 211). The form was created to answer the research questions as well as to provide measures of comparability for analysis through synthesis. I produced one digital copy per article to be reviewed.

The first part of the forms consisted of general information such as journal, key author, subsequent authors, date of publication, as well as country of origin. These general parts were then followed by topics requiring more in-depth reading as for example study objective, method(s) and theory/theories. I then introduced topics on number of participants, demographics, system(s) examined and results, and a field for my own comments should something be especially noteworthy, but was ultimately rarely used. A sample form in its entirety will be included as appendix 2.

Following the extraction process into the 39 extraction forms, I entered all the extracted data into one Excel document, neatly displaying all the data for the upcoming synthesis in one table.

4.7. Data items

The data being extracted and of interest to this systematic literature review were as follows:

- Reference number
- Journal
- Title
- Key author
- Subsequent authors
- Pages
- Date of publication
- Country of origin
- The study objective as stated by the authors
- Distinguishable subfield(s)/area of focus
- Method(s)
- Qualitative, quantitative or mixed method(s)
- Theory/theories
- Duration of study
- Study participants, demographic(s)
- Amount of participants
- System(s) examined
- Results/outcome/findings

- Comments (e.g. details regarding the study quality, stakeholders and clients/funding sources)

I uniformly counted the first author mentioned as the key author of every article, and counted every page of the downloaded pdf document as a page, including content providers' front pages and any other miscellaneous pages included. As for countries of origin, I counted the stated location of the authors' various institutions locations as the articles' country or countries of origin, and where there were more countries involved, I included all of them with a note in parenthesis on how many authors there were from each country. I did not include systems merely being discussed if no particular focus or examination of said system was reported, since there were many occurrences of examples and comparisons being made to systems without any actual examination.

4.8. Risk of bias in individual studies

When assessing the bias of individual studies, I looked at the author affiliations. Only two articles were co-authored by individuals affiliated with institutions other than purely educational or with stakes in another form of market than academia. The first one, a6, was co-authored by one researcher from Smithsonian Institution Libraries, although no mention of the Smithsonian in the article except for referencing who the author is, thus I found no clear grounds for bias. Secondly, the key co-author of a62 has an employment from Samsung Electronics, however as in a6, there is no mention of the authors affiliated company Samsung in the article except for referencing who the author is. This information will thus not be included in the synthesis process and will not affect any further analyses done in this thesis.

4.9. Summary measures

After manually exporting data from all remaining 39 articles into one Excel document, a summary of the number of times a journal, an author or a country was represented, which years had how many publications, how many times a method or a theory was used, how many quantitative, qualitative or mixed studies were performed and how many systems were examined. I also summarised the various subfields of study found in the articles.

4.10. Synthesis of results

Systematic literature reviews often use meta-analysis as a way of synthesising the findings. However this method is only viable should the data collected be quantitative and compatible for such an analysis. As the articles used in this study are both qualitative and quantitative, and measures and analyses a wide variety of different data, this study is ineligible for a meta-analysis synthesis. McKibbon explains that "If the data across studies/papers/data sources can logically (and statistically) be analysed to provide one final answer to the question, often in numerical form, the systematic review becomes a meta-analysis" (McKibbon, 2006, p. 212). As my review asks several questions which in a more overhead way frame the research done

on folksonomies and social tagging instead of answering one numerically answerable question on the success rate of a medicinal treatment, I would argue that this review does not fit into the description of a meta-analysis provided by McKibbon even though I use numerical summaries and combinations. The reason for not choosing to include only articles which would be compatible with a meta-analysis is this: the folksonomies are a recent phenomenon, and therefore if I should limit myself further with that criterion for inclusion, the synthesised findings would be too few to represent significant results. Therefore I have performed summarising analyses, measuring times of use for several extracted data items throughout these articles such as authors, methods, theories and systems examined. This was done manually in an Excel table using no prescribed methods and will be presented in 6.5. Furthermore I analyse the findings in a more qualitative, elaborate manner to draw larger conclusions based on the research conducted in these 39 articles in the discussion section of this thesis.

4.11. Additional analyses

Beyond the simple summarising analyses, I also match extracted data items against other data items in table layouts in order to correlate and find connections and patterns. For example, explicit theories used are correlated with the methods used, and extracted subfields are correlated with the years or publication in order to find the state of research. I also manually generalise extracted subfields in order to find larger groupings of where research has taken place.

5. RESULTS

5.1. Study selection

The articles that were included in this study are presented below. I will provide the included articles with their reference numbers which the articles will correlate to in future discussions in this study as well as the journal, title, authors and year of publication; these will be found in Table 1. I only provide comments for exclusion for the articles filtered out in the final scanning phase of the selection process where the full text articles were scanned, along with reference numbers, journal, title, authors and year of publication (Appendix 1). The reasons for the other excluded articles' exclusion from the study have generally been mentioned in section 5.4, although beyond those scanned in the final selection process they will not be named due to the large number of articles.

Table 1: Included articles

Ref nr	Journal	Title	Key AU	Sub AU	YoP
4	Journal of the American Society for Information Science and Technology	Knowledge Popularity in a Heterogeneous Network: Exploiting the Contextual Effects of Document Popularity in Knowledge Management Systems	Xiquing Sha	Ting-Ting Chang, Cheng Zhang and Chenghong Zhang	2013
5	The Australian Library Journal	Folksonomies in the library: their impact on user experience, and their implications for the work of librarians	John Porter	NA	2011
6	Journal of Electronic Resource Librarianship	Getting Users to Library Resources: A Delicious Alternative	Aysegul Kapucu	Athena Hoeppner & Doug Dunlop	2008
8	MIS Quarterly	Innovation Impacts of Using Social Bookmarking Systems	Peter H. Gray	Salvatore Parise & Bala Iyer	2011
10	Journal of Information Science	Building and evaluating a collaboratively built structured folksonomy	Donghee Yoo	Keunho Choi, Yongmoo Suh & Gunwoo Kim	2013
11	Journal of the American Society for Information Science and Technology	Social Tagging in the Scholarly World	Chen Xu	Benjiang Ma, Xiaohong Chen & Feicheng Ma	2013
12	Journal of Information & Knowledge Management	The Dynamics of Collaborative Tagging: An Analysis of Tag Vocabulary Applications in Knowledge Representation, Discovery and Retrieval	Joyline Makani	Louise Spiteri	2010
13	Library Hi Tech	"Power tags" in information retrieval	Isabella Peters	Wolfgang G. Stock	2010
17	Knowledge Organization	Disciplining Knowledge at the Library of Congress	Melissa A. Adler	NA	2012
19	Knowledge Organization	Searching with Tags: Do Tags Help Users Find Things?	Margaret E.I. Kipp	D. Grant Campbell	2010
23	Aslib Proceedings	An evaluation of enhancing social tagging	Brian	Catherine Jones, Bartłomiej	2010

		with a knowledge organization system	Matthews	Puzoń, Jim Moon, Douglas Tudhope, Koraljka Golub & Marianne Lykke Nielsen	
26	Library & Information Science Research	Exploitation of folksonomies in subject analysis	Constantia Kakali	Christos Papatheodorou	2010
27	Journal of Library Metadata	Social Tagging in the Web 2.0 Environment: Author vs. User Tagging	Heather Lea Moulaison	NA	2008
28	Information Processing & Management	Tagging and searching: Search retrieval effectiveness on folksonomies on the World Wide Web	P. Jason Morrison	NA	2008
29	Library Review	Collaborative tagging as a knowledge organisation and resource discovery tool	George Macgregor	Emma McCulloch	2006
30	Online Information Review	Personalisation and sociability of open knowledge management based on social tagging	Baozhen Lee	Shilun Ge	2010
32	Journal of the American Society for Information Science and Technology	Harnessing Collective Intelligence in Social Tagging using Delicious	Kwan Yi	NA	2012
34	Knowledge Management Research & Practice	TaxoFolk: a hybrid taxonomy-folksonomy classification for enhanced knowledge navigation	Ching-Chieh Kiu	Eric Tsui	2010
39	Webology	Ensuring the discoverability of digital images for social work education: an online "tagging" survey to test controlled vocabularies	Ellen Daly	Neil Ballantyne	2009
40	Webology	Descriptor and Folksonomy Concurrence in Education Related Scholarly Research	Robert Bruce	NA	2008
41	Knowledge Organization	A Practical Application of FRBR for Organizing Information in Digital Environments	Yunseon Choi	NA	2012
42	Information Processing & Management	Investigating effectiveness and user acceptance of semantic social tagging for knowledge sharing	Shiu-Li Huang	Sheng-Cheng Lin & Yung Chun Chan	2011
45	Knowledge Organization	UDC and Folksonomies	Alenka Šauperl	NA	2010
56	Journal of the American Society for Information Science and Technology	Member Activities and Quality of Tags in a Collection of Historical Photographs in Flickr	Besiki Stvilla	Corinne Jörgensen	2010
60	Information Processing & Management	Clustering tagged documents with labelled and unlabelled documents	Chien-Liang Liu	Wen-Hoar Hsaio, Chia-Hoang Lee & Chun-Hsien Chen	2013
62	Online Information Review	Semantic representation for copyright metadata of user-generated content in folksonomies	Haklae Kim	John Breslin & Jae Hwa Choi	2010
65	IEEE Transactions on Learning Technologies	An Approach to Folksonomy-Based Ontology Maintenance for Learning Environments	Dragan Gašević	Amal Zouaq, Carlo Torniai, Jelena Jovanović & Marek Hatala	2011
71	Information Processing & Management	A concept-relationship acquisition and inference approach for hierarchical taxonomy construction from tags	Eric Tsui	W.M. Wang, C.F. Cheung & Adela S.M. Lau	2009
78	Online Information Review	Analysis of keyword-based tagging behaviours of experts and novices	Li-Chen Tsai	Sheue-Ling Hwang & Kuo-Hao Tang	2011
80	Knowledge Organization	The Impossible Decision: Social Tagging and Derrida's Deconstructed Hospitality	Melodie Fox	Austin Reece	2013

82	Information Processing & Management	Assessing the quality of textual features in social media	Flavio Figueiredo	Henrique Pinto, Fabiano Belém, Jussara Almeida, Marcos Gonçalves, David Fernandes & Edleno Moura	2012
84	Knowledge Organization	Expressive Bibliography: Personal Collections in Public Space	Melaine Feinberg	NA	2011
87	Journal of Documentation	Social discovery tools: extending the principle of user convenience	Louise F. Spiteri	NA	2012
100	Library Student Journal	The Democratization of Metadata: Collective Tagging, Folksonomies and Web 2.0	Joshua M. Avery	NA	2010
102	Journal of Documentation	Classification systems in the light of sociology of knowledge	Yael Keshet	NA	2011
107	Knowledge Organization	Folksonomies and the New Order: Authority in the Digital Disorder	Jens-Erik Mai	NA	2011
108	Knowledge Organization	Tagging of Biomedical Articles on CiteULike: A Comparison of User, Author and Professional Indexing	Margaret E.I. Kipp	NA	2011
113	Knowledge Organization	Informative Tagging of Images: The Importance of Modality in Interpretation	Pauline Rafferty	NA	2011
122	Information Processing & Management	Towards a user-oriented thesaurus for non-domain-specific image collections	JungWon Yoon	NA	2009

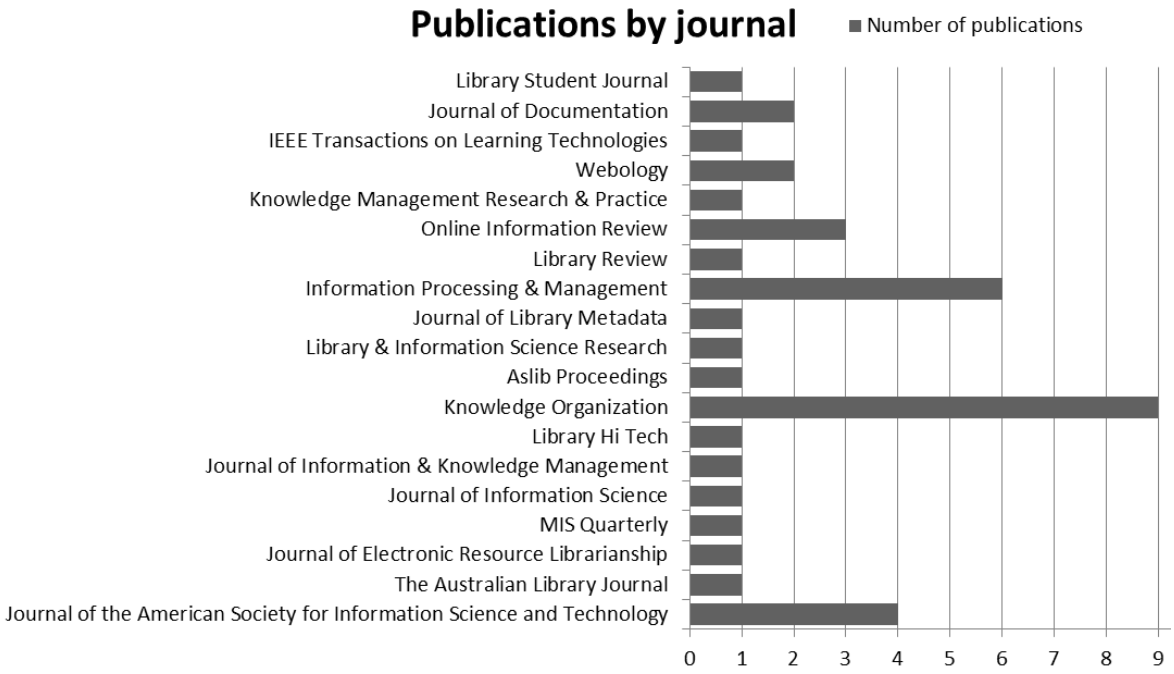
5.2. Study characteristics

All studies included in this review were, as stated in section 5.6, scanned and extracted for the following data items: journal, title, authors, pages, year of publication, country of origin, study objective, distinguishable subfields, methods, whether it was qualitative, quantitative or mixed methods, theories, duration of study, demographics of study participants, amount of participants, systems examined and results. The comment-section of the form was used only in order to identify distinguishable bias or other noteworthy miscellaneous data, although bias, as explained in section 5.8, will not be a further issue in this study.

5.3. Synthesis of results

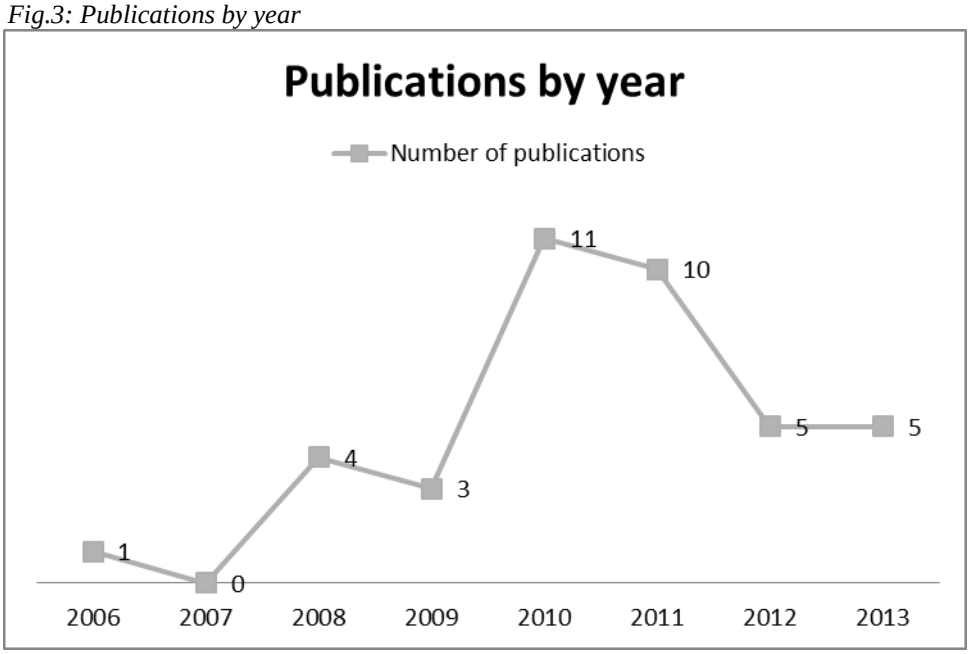
As we can observe, the main journals publishing articles on folksonomies, social bookmarking or social tagging as knowledge organisation systems are *Knowledge Organization* (9) and *Information Processing & Management* (6), and to a lesser extent *Journal of the American Society for Information Science and Technology* (4) and *Online Information Review* (3). None of the other journals have published more than two articles and can thus be considered to be less important than those just mentioned.

Fig.2: Publications by journal



Even though my search began for articles published in 2003, none were included and thus had the desired focus which were published before 2006. A major upturn can however be observed between the years of 2009 and 2010, continuing 2011, followed by a downturn in 2012, and seems to stabilise throughout 2013. Since performing the final search in february 2014, no new articles had yet been published with were found by my search string.

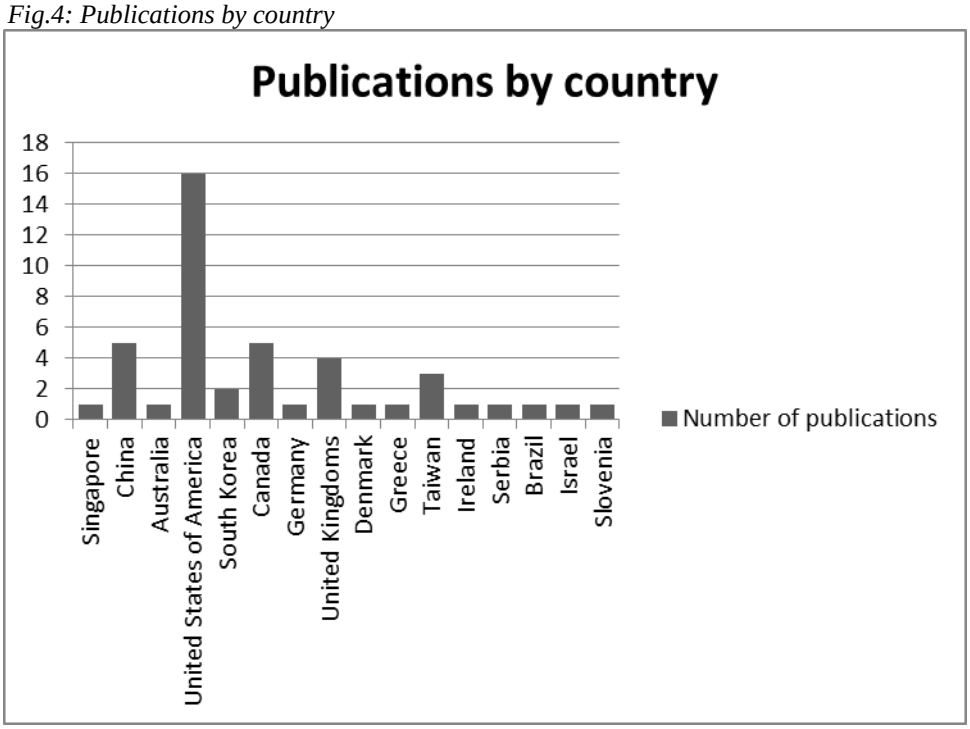
Fig.3: Publications by year



Not unexpected, a vast majority of the articles published came from institutions located in the United States of America (16). Further contries which can be argued to

be noteworthy when it comes to this field are China and Canada with five publications from each country.

Fig.4: Publications by country



As can be observed in the table below, there are no significant authors located in this study. Only three authors were found taking part in research which satisfied my inclusion criteria who authored more than one article and none partook in further research. A total of 87 authors were identified taking part in the 39 articles, indicating it is common to undertake research within this field as a group rather than individually. A total of 16 out of the 39 articles were written by one author.

Table 2: Authors

Author	Key	Secondary	Total
Melissa A. Adler	1		1
Jussara Almeida		1	1
Joshua M. Avery	1		1
Neil Ballantyne		1	1
Fabiano Belém		1	1
John Breslin		1	1
Robert Bruce	1		1
D. Grant Campbell		1	1
Yung Chun Chan		1	1
Ting-Ting Chang		1	1
Chun-Hsien Chen		1	1
Xiaohong Chen		1	1
C.F. Cheung		1	1
Jae Hwa Choi		1	1
Keunho Choi		1	1
Ellen Daly	1		1

Doug Dunlop		1	1
Melaine Feinberg	1		1
David Fernandes		1	1
Flavio Figueiredo	1		1
Melodie Fox	1		1
Dragan Gašević	1		1
Shilun Ge		1	1
Koraljka Golub		1	1
Marcos Gonçalves		1	1
Peter H. Gray	1		1
Marek Hatala		1	1
Athena Hoeppner		1	1
Wen-Hoar Hsaio		1	1
Shiu-Li Huang	1		1
Sheue-Ling Hwang		1	1
Bala Iyer		1	1
P. Jason Morrison	1		1
Catherine Jones		1	1
Corinne Jörgensen		1	1
Jelena Jovanović		1	1
Constantia Kakali	1		1
Aysegul Kapucu	1		1
Yael Keshet	1		1
Gunwoo Kim		1	1
Haklae Kim	1		1
Margaret E.I. Kipp	2		2
Ching-Chieh Kiu	1		1
Adela S.M. Lau		1	1
Baozhen Lee	1		1
Chia-Hoang Lee		1	1
Sheng-Cheng Lin		1	1
Chien-Liang Liu	1		1
Benjiang Ma		1	1
Feicheng Ma		1	1
George Macgregor	1		1
Jens-Erik Mai	1		1
Joyline Makani	1		1
Brian Matthews	1		1
Emma McCulloch		1	1
Jim Moon		1	1
Heather Lea Moulaison	1		1
Edleno Moura		1	1
Marianne Lykke Nielsen		1	1
Christos Papatheodorou		1	1
Salvatore Parise		1	1
Isabella Peters	1		1
Henrique Pinto		1	1
John Porter	1		1

Bartłomiej Puzoń		1	1
Pauline Rafferty	1		1
Austin Reece		1	1
Alenka Šauperl	1		1
Xiquing Sha	1		1
Louise F. Spiteri	1	1	2
Wolfgang G. Stock		1	1
Besiki Stvilla	1		1
Yongmoo Suh		1	1
Kuo-Hao Tang		1	1
Carlo Torniai		1	1
Li-Chen Tsai	1		1
Eric Tsui	1	1	2
Douglas Tudhope		1	1
W.M. Wang		1	1
Chen Xu	1		1
Kwan Yi	1		1
Donghee Yoo	1		1
JungWon Yoon	1		1
Yunseon Choi	1		1
Cheng Zhang		1	1
Chenghong Zhang		1	1
Amal Zouaq		1	1

In table 3 below we can see all explicitly used theories which were found to be drawn on in the reviewed articles. A total of 11 theories are being used in 39 studies, and only one theory, prototype theory, was used twice where one of those uses was in conjunction with activity theory. This indicates that this particular field of research lacks more explicit theoretical approaches. This is possibly due to the folksonomy being a rather recent phenomenon. If we look at these publications by journal, my data shows that out of these 11 articles explicitly using theories, three out of nine articles published in the journal *Knowledge Organization* did, followed by two out of four in *Journal of the American Society for Information Science and Technology*, two out of two in *Information Processing & Management*, one out of two in *Journal of Documentation*, and one out of one in each of *Library Hi Tech*, *MIS Quarterly* and *Journal of Information Science.*

Table 3: Theories

Theory	Times used
Knowledge Creation Theory	1
Structural holes theory	1
Technology Acceptance Model	1
Process and shuffling theory or preferential attachment	1
Foucault's governmentality	1
Grounded theory	1
Activity theory	1
Prototype theory	2
LSA – Latent semantic analysis	1
Derrida’s deconstruction (différance) and the concept of hospitality	1

Sociologies classical theory	1

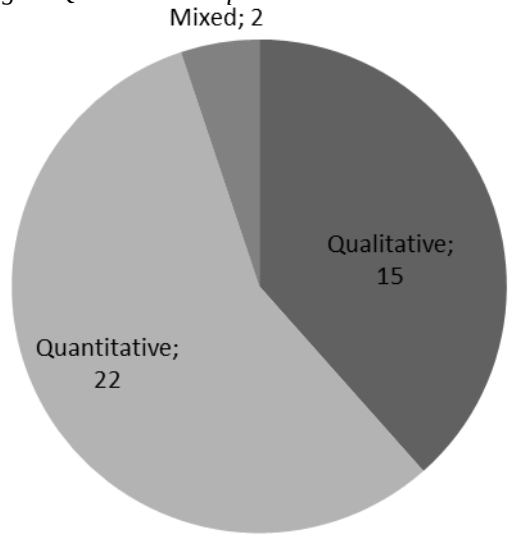
In this table we can observe all methods, currently ungrouped and as ungeneralised I could make them to illustrate the various methods and the number of times they were used. I have also performed groupings in tables demonstrated further below. The methods of note (methods used in more than three studies) in these studies are primarily exploratory literature reviews or discussions of unempirical data (9), surveys or questionnaires (8), having users tag in systems (5), mapping user tags against controlled vocabularies (5), collection of tags from folksonomical knowledge organisation systems (5), statistical analyses such as descriptive statistics or power law (4), tag analysis through for example case studies (4), various kinds of regression analysis (3) as well as content analysis (3). Furthermore, as can be observed in figure x, a majority of the studies are quantitative (22), although these findings are not markedly significant seeing as there were 15 qualitative studies and two studies using both qualitative and quantitative methods found in this systematic review.

Table 4: Methods

Method:	Times used
Co-citation approach	1
System log extraction	1
Variable calculation	1
Measuring of various factors	1
Regression analysis	3
Sample and data extraction from Delicious	1
Robustness test	1
Exploratory literature research/literature review and/or discussion	9
Survey (or questionnaire)	8
Exportation of data	1
Creation and organisation of Delicious account	1
Examination of user statistics	1
Gathering of anecdotal evidence	1
Comparative evaluation	1
Paired t-test	1
Bibliometric analysis	1
Social network analysis	1
Statistical analysis (e.g. descriptive statistics, power law or inverse-logistic shape)	4
Screen capture during users' using systems	1
Think aloud protocol during users' using systems	1
Semi-structured interview	1
Users tagging	5
Discussion 'interview'	1
User tagging process logging	1
Tag analysis (e.g. case study)	4
Data collection using crawling program	2
Frequency-based tag ranking	1
Similarity metrics using five basic measures: two overlap metrics, footrule, Fagin’s measure and inverse rank measure	1

Folksonomy-taxonomy integration algorithm	1
Mapping/matching of tags against controlled vocabulary	5
Data collection using Perl-based programs	1
Sampling of web documents	1
Tag collection	5
Reliability test	1
Content analysis	3
Data analysis using partial least squares	1
Categorising of tags	1
Data extraction and manual coding	2
Evaluation of intrinsic and relational tag quality using an information quality assessment framework	1
Constrained-PLSA	1
System performance evaluation	1
Taxonomy creation from tag collection using heuristics rules and deep syntactic analysis	1
Experimental analysis for similarity and relevance of tags created in the study	1
Deconstruction	1
Characterisation	2
Hooper-Greenhill's analysis methods	1
Informetric measures	1
Faceted classification	1

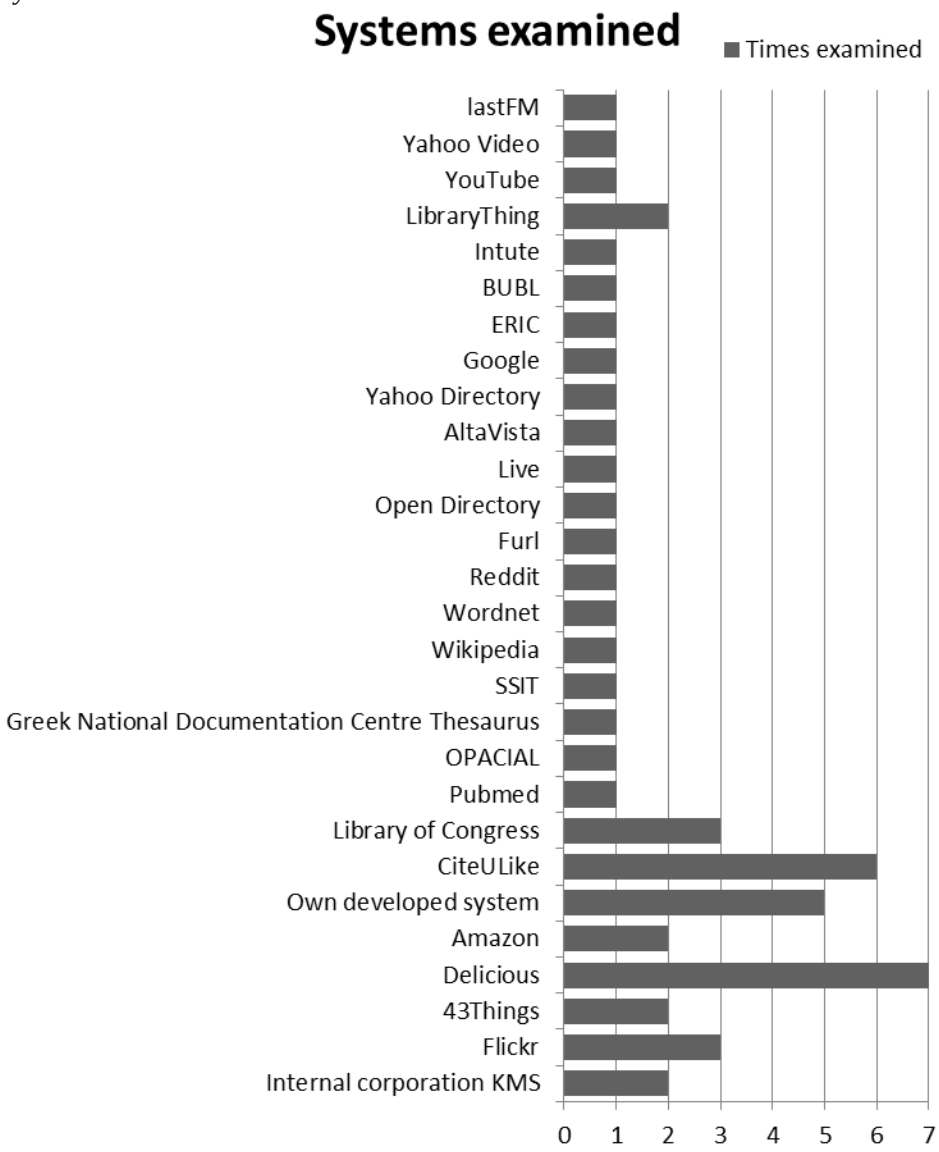
Fig. 5: Qualitative vs. quantitative vs. mixed methods



Several systems were found to be examined throughout the reviewed studies. However not all of them were folksonomies or social bookmarking or tagging systems. The systems which were examined most, and in some capacity beyond discussions, as systems which were merely discussed or mentioned were not extracted in this review, were the social bookmarking site Delicious (7), the academic citation sharing social bookmarking site CiteULike (6), systems developed explicitly for the individual studies (5), the image sharing site Flickr (3) and the Library of Congress

catalogue or thesaurus (3). We can thus see marked interest in social bookmarking systems since both Delicious and CiteULike function as such and were found to be examined more than any other systems.

Fig. 6: Systems examined



Without generalising and thus losing the specificity of the subgroups, there were no articles which focused upon the precise same issues, although certain groupings and generalisations can easily be done in order to see on which subfields research has been focused. Below all identified subfields are presented, while groupings and generalisations are presented in section 6.5.

Table 5: Ungeneralised subfields

Subfield	Amount
KMS in organisational knowledge management, contextual knowledge, knowledge popularity and heterogeneous networks	1
Folksonomies in libraries	1
Social bookmarking in university libraries	1

Social bookmarking in companies	1
Evolving the folksonomy	1
Social tagging in academic documents	1
Tag vocabulary and evolution	1
Search method development	1
Benefits of tagging in other systems	1
Tag usefulness for IR	1
Enhanced tagging interface development	1
Method for exploiting social tagging in subject indexing	1
Motivation for tagging	1
IR performance	1
Folksonomies' effects on knowledge organisation, controlled vocabularies and IR	1
Personalised characteristics of social tagging	1
Collective Intelligence	1
Taxonomy-folksonomy hybrid/data mining	1
Tag-controlled vocabulary mapability	1
Overlap between controlled and uncontrolled vocabularies	1
Tag characteristics	1
KMS development	1
Folksonomy compatibility to UDC	1
Photo tagging activities, tag quality and compatibility for complementing traditional controlled vocabularies	1
Tags effects on document clustering	1
Semantic model for folksonomies	1
Folksonomy-based ontology maintenance	1
Folksonomy-taxonomy conversion	1
Tag quality (experts vs. novices)	1
Hospitality/philosophy	1
Quality of textual features in social media	1
Expressive bibliographies	1
Ethics of user convenience in discovery tools	1
Effects of folksonomies on knowledge management and the WWW	1
Taxonomy-folksonomy hybrid/contributions to each other	1
Authority/professionals vs. masses for classification, democratic knowledge organisation	1
Online indexing, a comparison between users, authors and professionals	1
Image tagging, modality	1
Thesaurus creation from user-supplied tags	1

In the following table I provide, alongside the reference number of the extracted articles, the objectives of each study. The order of the extracted data reflects nothing but the order in which the articles were extracted. As we can see, there is a wide

variety of objectives of the articles, predictably reflecting the diversity of the extracted subfields.

Table 6: Study objectives

Ref nr	Study Objective
4	To highlight the role of KMSs in organizational knowledge management, to investigating knowledge shared on KMSs, to evaluate knowledge popularity.
5	To explore the role of folksonomies in libraries, and to discuss the implications they may have for the work of librarians and information architects.
6	To look at how the social bookmarking site Delicious can be used by a university library and to give insights into how to set a Delicious database up as a library and how it might be used.
8	To see how social bookmarking within a company for tagging both company-specific white papers as well as other work related links affect employee innovation.
10	To present a new way of managing classifying knowledge and to evaluate their own developed knowledge organisation system based categorised tags as compared to a regular folksonomy.
11	To highlight the characteristics and research trends in social tagging.
12	To investigate the contributions of collaborative tagging to the design of user-driven vocabularies in knowledge management systems and to examine the evolution of the tagging vocabulary of the knowledge management community of interest in CiteULike, thus contributing to the debate on collaborative tagging for knowledge resource indexing.
13	To introduce the "power tag".
17	To discuss the consequences of disciplining knowledge especially through naming and classification processes at the library of congress and to discuss how library classification affects and hinders interdisciplinary studies and if there are alternative methods of classification which are better suited to assist interdisciplinarity.
19	To examine the usefulness of tags when retrieving information as compared to subject headings and controlled vocabularies.
23	To investigate ways of enhancing social tagging via knowledge organization systems, with a view to improving the quality of tags for increased information discovery and retrieval performance.
26	To present and explore a methodology for the exploitation of social tagging in subject indexing.
27	To review studies on social tagging for the purpose of finding recommendations for future research within the field.
28	To compare the information retrieval performance of folksonomies to those of search engines and subject directories
29	To provide an overview of the collaborative tagging phenomenon and explore some of the reasons for its emergence.
30	To analyse the personalised and social characteristics of open knowledge management in higher education based on social tagging in the Web 2.0 environment.
32	To investigates the phenomenon of social tagging in the context of collective intelligence (CI) with the aim to serve as a stepping-stone towards the mining of truly valuable social tags for web resources.
34	To present an algorithm for deriving hybrid taxonomy-folksonomy classification for enhanced knowledge navigation which works through several unsupervised data mining techniques with augmented heuristics.

39	To report findings on research designed to test the suitability of two controlled vocabularies to index.
40	To determine overlap between the controlled and uncontrolled vocabularies when it comes to the descriptors and tags from journal articles indexed in ERIC and CiteULike.
41	To provide in-depth investigation on the characteristics of social tags.
42	To solve social tagging systems' vague-meanings problems during retrieval or presentation of resource with keyword-based tags by developing and evaluating a system that comprises a semantic tagging mechanism and triple-pattern and visual searching mechanisms.
45	To investigate if folksonomies could be complemented by universal decimal classification (UDC), if folksonomies' tags can be found in the UDC and which facets of the UDC match characteristics of documents or information objects that are tagged in folksonomies.
56	To identify types of user activities around photos and the information and knowledge resources used in those activities, and to find out the relational quality of Flickr and whether it can be used to supply new subject terms for controlled vocabularies
60	To analyse and present how tags improve document clustering by employing various combinations of tags and content words.
62	To investigate some general features of folksonomies and user-generated content with copyright issues, and to present semantic representation for folksonomies using a tag ontology that can be used to represent tagging data at a semantic level using Semantic Web technologies.
65	To present an approach to ontology maintenance based on the use of collaborative tags contributed by learners while using learning environments.
71	To propose an approach for automatically converting tags into a hierarchical taxonomy.
78	To discover whether expert or novice readers generate the most reliable and most representative tags.
80	To explore how Derrida's concept of hospitality relates to social tagging and the consequences of unconditional inclusiveness and what mitigation means using the social tagging environment to illustrate.
82	To presents what, to the best of the authors' knowledge, is currently the most comprehensive study of the relative quality of textual features in social media.
84	To provide readings of "expressive bibliographies" and understand the workings of this document form.
87	To explore the relationship between the principle of user convenience and social discovery systems.
100	To explore some of the ways in which folksonomies are shaping notions and methods surrounding contemporary knowledge management, how they are currently being used, and how information professionals are reacting to these developments, and to explore the future of folksonomies and their contribution to the growth of Web 2.0 and a more democratic World Wide Web.
102	To compare folksonomy with conventional taxonomy in the light of theoretical sociological and anthropological approaches.
107	To explore the notion of authority and the role of professionals in a changing environment; to question the traditional role of the professionals; to argue that systems must be designed to facilitate trust and authority, and that the authority of folksonomies and systems comes from the users' collective interpretations and

	meaning production.
108	To examine the context of online indexing.
113	To test a model of image modality (the relationship between the sign and the real world).
122	To explore how user-supplied tags can be applied to designing a thesaurus that reflects the unique features of image documents.

In the table below, I have extracted the main results identified from each of the studies, arranged and paired with their correlating reference number and subfield, for comparative purposes. I have also sorted them not by reference number but by subfields as they are paired, and coloured black and grey alternately, in the table of generalised subfields, table 9, below. What we can see are a lot of results of the 39 identified studies on a myriad of topics related to folksonomies, impossible to compare statistically to each other, but will serve as one of the main items of discussion in the following chapter.

Table 7: Extracted results from reviewed articles with correlating reference numbers

Ref	Results	Subfield
8	Employee innovativeness is enhanced by using social bookmarks in a company environment to share novel information, though only when the information is recent and not after information has become dated years later.	Social bookmarking in companies
5	Folksonomies are dynamic but are not suited to replace taxonomies due to the lack of accuracy, though they still bring benefits for libraries and their users. A co-existence between folksonomies and taxonomies would be optimal, though information experts must learn to relinquish their power for the folksonomy to bear fruit whilst still keeping the taxonomy maintained.	Folksonomies in libraries
6	Most informants found Delicious for the university extremely (37%) or somewhat (23%) helpful whereas 37% were neutral and 3% found it to be extremely unhelpful. 58% claimed they would use the service again, 36% uncertain and 6% gave a definite no.	Social bookmarking in university libraries
23	Augmented tagging systems like the one developed for this study have shown to produce a higher effectiveness in subject indexing amongst users without training in information science	Enhanced tagging interface development
10	Results point to users finding the authors' new categorized tag-based knowledge organisation system (or CTKOS) more useful than a regular folksonomy when it comes to sharing and retrieving knowledge.	Evolving the folksonomy
42	"The results show that the semantic social tagging system is more effective than a keyword-based system. The visualized knowledge map helps users capture an overview of the knowledge domain, reduce cognitive effort for the search, and obtain more enjoyment. Traditional keyword tagging with a keyword search still has the advantage of ease of use and the users had higher	KMS development

	intention to use it." (p. 599)	
12	"Results indicate a steady decrease in the number of unique tags over the four years, suggesting an increasing stability in the community vocabulary over time and the establishment of domain-specific vocabulary. Members reused each others' tags over time and exhibited increasingly collaborative tagging behaviour. Tag discrimination was high, with 4.11 distinct articles per tag. The stable and discriminatory nature of the community's tags suggests that collaborative tagging may serve as a useful resource for vocabulary choice or maintenance by KMS managers."	Tag vocabulary and evolution
13	Search tags works well with broad and narrow folksonomies as well as any other KOS where everyone can add tags whilst merely broad folksonomies allow for so called “index tags”. Furthermore, derived power tags (from index tags or from search terms) can be utilized for limiting the amount of searchable tags, in order to simultaneously limit the recall of search results but enhance precision.	Search method development
62	"Social Semantic Cloud of Tags can improve the expressive knowledge representation of folksonomies and this ontology can aid in describing copyright metadata using some extended properties" (p. 626).	Semantic model for folksonomies
19	Participants used both tags and controlled vocabularies when searching. In CiteULike, tags as well as group names and taggers' user names were used to guide their search, and as links to possible relevant articles. The subjectivity and social aspect was noted as positive by some participants. Controlled vocabularies were used in PubMed to find relevant terms and links to related articles, and the authors argue that there is a necessary use in objective subject headings, and that users simply wants systems which allow them to find related articles.	Tag usefulness for IR
17	Folksonomies allow for users to express themselves and allowing for a disciplinary diversity and not limiting organisation of material to single disciplines and only field-specific jargon	Benefits of tagging in other systems
26	Tags can be characterised as meaningful worlds for creation of new terminology or alternative interpretations of current terms, and provides a direct way of introducing thematic metadata to documents. The authors’ method for exploiting tags for subject indexing identified relationships between tags and subject descriptors.	Method for exploiting social tagging in subject indexing

29	Collaborative tagging systems suffer from low precision, lack of collocation, etc. due to the absence of properties that characterise controlled vocabularies but are still important. Librarians and information professionals have lessons to learn from the interactive and social aspects exemplified by collaborative tagging systems, as well as their success in engaging users with information management. The author predicts that there will be a concurrence of controlled vocabularies and collaborative tagging where they will function within distinct information contexts: formal and informal.	Folksonomies' effects on knowledge organisation, controlled vocabularies and IR
56	"Thirty seven percent of the original tag set and 15.3% of the preprocessed set (after the removal of tags with fewer than three characters and URLs) were invalid or misspelled terms. Nouns, named entity terms, and complex terms constituted approximately 77% of the preprocessed set. More than a half of the photostream tags were not found in the TGM and LCSH, and more than a quarter of those terms were regular nouns and noun phrases. This suggests that these terms could be complimentary to more traditional methods of indexing using controlled vocabularies." (p. 2477)	Photo tagging activities, tag quality and compatibility for complementing traditional controlled vocabularies
60	"Experimental results indicate that almost all of the methods can benefit from tags. However, unsupervised learning methods fail to function properly in the data set with noisy information, but Constrained-PLSA functions properly. In many real applications, background knowledge is ready, making it appropriate to employ background knowledge in the clustering process to make the learning more fast and effective." (p. 596)	Tags effects on document clustering
65	"There is a significant association of the proposed ontology visualization and interaction with the intuitiveness and ease of use of the proposed maintenance method" (p. 308) (quantitative study results), and that "the best performing metric for all the gold standard baselines is nWMSR PMI-Gwikipedia" (p. 310) and "the nWMSR metrics outperform WMSR metrics" (Ibid.) (qualitative study results).	Folksonomy-based ontology maintenance
100	Folksonomies are useful as bottom-up information organization and are here to stay, but do not fit in to the idea of what classification as a process was in 2004 in the field of Library and Information Science. Most informal taxonomies accept folksonomies as supplementary.	Effects of folksonomies on knowledge management and the WWW
102	"Two possible types of outcome are envisaged. One possibility is a parallel existence of both classification types, while the other involves their hybridization as part of the proliferation of late-modern hybrid knowledge." (p. 147)	Taxonomy-folksonomy hybrid/contributions to each other

122	"User-supplied tags can be successfully employed in selecting concepts to be included in a thesaurus and in identifying semantic relations among those selected concepts. Also, there are some differences between features obtained from user-supplied tags and those in an existing thesaurus and recommends the integration of a user-oriented approach and the current structured approach." (p. 466)	Thesaurus creation from user-supplied tags
71	The proposed approach shows an improvement over the current approaches: LSA, HEARST and WordNet. "From the results, we can see that the proposed method has outperformed the other three methodologies in the recall of classifying direct is-parent relations (improved from 0.0307 to 0.1638), the recall of classifying direct is-neighbor relations (improved from 0.0024 to 0.0578) and the overall recall (improved from 0.0161 to 0.0782). Although the precision of WordNet (0.2) is higher than that of proposed method (0.1610), WordNet has a very low recall compared with that of proposed method." (p. 55)	Folksonomy-taxonomy conversion
34	The personalised aspects of knowledge retrieval from folksonomies combined with taxonomy navigation creates a better knowledge structure than either would be on their own, and this integration is feasible through the use of the algorithm and the techniques used in it.	Taxonomy-folksonomy hybrid/data mining
41	"The findings showed that concerning specific subject areas, taggers exhibited different tagging behaviors representing distinctive features and tendencies. These results have led to the conclusion that there should be an increased awareness of diverse user needs by subject in terms of the practical implications of metadata generation." (p. 233)	Tag characteristics
30	Through Web 2.0 and social tagging, learners gain both new opportunities to learn, but also the ability to "participate in the co-creation, organisation, sharing and acquisition of open knowledge" (p. 623) which will help participating parties as well as the users themselves.	Personalised characteristics of social tagging
78	"Tags chosen by experts yielded better similarity and relevance values in all analyses. Tags chosen by the expert group had higher commonality in pairwise similarity analysis; moreover, the relevance analysis showed that tags chosen by experts reflected better understanding of the content." (p. 272)	Tag quality (experts vs. novices)

82	The results are presented in five parts: "(1) weighting schemes that explore discriminative power have better effectiveness either in isolation or in combination with other metrics; (2) TAGS, if present, are the most promising feature in isolation, due to a combination of good discriminative power and large amount of content, two quality-related aspects that have important roles for classification effectiveness; (3) combining content from multiple features may improve classification results due to the presence of distinct and somewhat complementary content and information; (4) a simpler feature combination strategy based on bag of words may be as effective or at most slightly worse than concatenating features as different feature spaces; (5) in spite of its good discriminative and descriptive power and its larger object coverage, TITLE is the feature with lowest quality for object classification, since its effectiveness is very affected by the small amount of content available." (pp. 223-224)	Quality of textual features in social media
107	"The advent of folksonomies and social tagging has demonstrated that a social constructivist approach to representing and organizing information can work in practice" (p. 120). "The practice of meaning-making, representing, and organizing information objects has been enriched by the pressure from the social technologies and movements to involve everyone–and to allow for a plurality of viewpoints and opinions." (Ibid.)	Authority/professionals vs. masses for classification, democratic knowledge organisation
108	"Users tagging biology related articles are extremely interested in methodology and user groups associated with articles" (p. 258). "While professional indexers considered geographic location to be important, authors and users tended to assume it was somewhat less important than the other contexts of the articles" (Ibid.). "Many user terms were found to be Related (Not In Thesaurus) to the author and professional indexer terms, but were not part of the formal thesaurus used by the professional indexers and, thus, not formally linked to the professional indexer terms" (Ibid.). "Taggers assigning tags to academic articles have some specific terminology requirements such as methodology or user group being studied, which are not present in the same quantity in studies examining more free form sites such as delicious.com" (Ibid.). "While users provided terms describing what they saw, cataloguers provided description appropriate to the provenance of the item" (Ibid.). "[T]he presence of descriptors that are not matched by tags or author keywords demonstrates that descriptors continue to perform a useful function in indexing articles, even when tagging is present" (p. 260).	Online indexing, a comparison between users, authors and professionals

40	"Folksonomies (tags) are useful supplements to controlled vocabularies since the former provide a means for personal organization outside the framework of the latter. The low number of tag-descriptor matches in this research indicates that CiteULike users do not use the same terminology as subject specialists who maintain descriptors in the ERIC thesaurus."	Overlap between controlled and uncontrolled vocabularies
39	46.7% of tags could not be mapped to controlled terms. 10% of tags exactly matched controlled terms. Variant forms made up 11.7% of the tag sample with 30.4% being judged as semantically equivalent to the controlled terms. In total, 52.1% of the tags were mapable to controlled terms in some manner.	Tag-controlled vocabulary mapability
45	"The results suggest that UDC-supported folksonomies could be implemented in resource discovery, in particular in library portals and catalogues" (p. 307). More concepts found in tags from Delicious and 43Things were present in UDC than the tags found in Amazon and LibraryThing.	Folksonomy compatibility to UDC
113	"This limited exercise suggests that the modality model might be of some use in categorising images within an image IR system" (p. 296). "The exercise suggests that developing a retrieval tool using genre and the intertextual nature of multimedia objects might lead to the construction of rich, knowledge based system" (Ibid.). "[D]ecoders operating within specific cultural and historical moments share an understanding of cultural genres which are contemporary with them and anterior to them, at least when those genres relate to the recent past" (p. 297).	Image tagging, modality
80	"Tag clouds are messy, loud, multicultural, inclusive and obscene: more reflective of reality than the knowledge organization systems that purport to reflect it, but could be accused of being chaotic, inefficient, and relativistic. We can't know how others will tag but must hope they do the right thing." (p. 15)	Hospitality/philosophy
4	"Knowledge generated by authors with power of communication and connection receives greater attention. This becomes obvious when authors' knowledge is annotated with tags that are connected by relevant tags." (p. 1850)	KMS in organisational knowledge management, contextual knowledge, knowledge popularity and heterogeneous networks
87	"Social discovery systems can address the primary barriers to creating catalogue records that meet user convenience: determining and reflecting the needs and cultural warrant of the users, and maintaining the quality and integrity of the catalogue records" (p. 206).	Ethics of user convenience in discovery tools
27	More research is recommended by the author to be done on user motivation in conjunction with studies focused on endo- and exo-tagging as this has never explicitly been	Motivation for tagging

	done	
11	"Social tagging as a research area develops rapidly and attracts an increasing number of new entrants. There are no key authors, publication sources, or research groups that dominate the research domain of social tagging. Research on social tagging appears to focus mainly on the following three aspects: (a) components and functions of social tagging (e.g., tags, tagging objects, and tagging network), (b) taggers' behaviors and interface design, and (c) tags' organization and usage in social tagging." (p. 2045)	Social tagging in academic documents
28	"Folksonomy search results overlapped with those from the other systems, and documents found by both search engines and folksonomies were significantly more likely to be judged relevant than those returned by any single IR system type. The search engines in the study had the highest precision and recall, but the folksonomies fared surprisingly well. Del.icio.us was statistically indistinguishable from the directories in many cases. Overall the directories were more precise than the folksonomies but they had similar recall scores. Better query handling may enhance folksonomy IR performance further. The folksonomies studied were promising, and may be able to improve Web search performance." (p. 1562)	IR performance
32	A substantial degree of CI is most likely to be achieved when somewhere between the first 200 and 400 people have participated in tagging, and that a target degree of CI can be projected by controlling the two factors along with the selection of a similarity metric.	Collective Intelligence
84	"[M]ultiple, individually distinct and coherent knowledge organization schemes might have advantages over single schemes, even those that attempt to aggregate several diverse perspectives (p. 133).	Expressive bibliographies

5.4. Correlating synthesis analysis

By correlating different types of extracted data, I have identified, among other things, which methods have been used in conjunction with explicit theories. I have also found that none of these theory-based studies have used both qualitative and quantitative methods as can be observed in table 8. Of the 22 quantitative studies, eight name theories they draw on. Furthermore out of the 15 qualitative studies, merely four employed named theories. Take note, however, that these numbers only reflect the explicitly stated theories. It is quite possible that more studies used theories implicitly without naming them.

Table 8: Correlation between theories, methods and qualitative vs. quantitative

Theory	**Method(s)**	**Study type**
Knowledge Creation Theory	Co-citation approach, system log extraction, variable calculation, measuring of various factors, regression analysis, robustness test	Quantitative
Structural holes theory	Regression analysis, survey (or questionnaire)	Quantitative
Technology acceptance model	Comparative evaluation, paired t-test	Quantitative
Process and shuffling theory or preferential attachment	Statistical analysis (e.g. descriptive statistics, power law or inverse-logistic shape)	Quantitative
Activity theory	Data extraction and manual coding, evaluation of intrinsic and relational tag quality using an information quality assessment framework & mapping/matching of tags against controlled vocabulary	Quantitative
Prototype theory	Data extraction and manual coding, evaluation of intrinsic and relational tag quality using an information quality assessment framework & mapping/matching of tags against controlled vocabulary	Quantitative
Prototype theory	Faceted classification	Quantitative
LSA – Latent semantic analysis	Constrained-PLSA & system performance evaluation	Quantitative
Foucault's governmentality	Exploratory literature research/literature review and/or discussion	Qualitative
Grounded theory	Screen capture during users' using systems, think aloud protocol during users' using systems, semi-structured interview	Qualitative
Derrida’s deconstruction (différance) and the concept of hospitality	Deconstruction	Qualitative
Sociologies classical theory	Exploratory literature research/literature review and/or discussion	Qualitative

By attempting to generalise and find common denominating factors, five major areas of focus were identified including a total of 30 of the studies. The remaining nine studies were found to be more difficult to pair with any others. The largest subfield contains 12 studies which all focus on using or analysing tags or folksonomies with the intent of improving currently available systems, analysing how current systems would change should they be effected by folksonomies or tags, or even studies aiming to creating entirely new systems through pre-existing tag collections, for example with the help of an algorithm. Furthermore, there were six studies with some focus on analysing the quality or characteristics of tags or text, including comparisons between tagging done by experts, amateurs, and even authors in one of the studies. Another six of the reviewed studies can be observed to deal with methods to improve folksonomies, search methods or the tags themselves. Three articles study the effects of folksonomies or social bookmarking in institutional environments, namely

libraries, university libraries or in a company. Lastly, three studies were identified to be working with the compatibility of folksonomies and controlled vocabularies, or mapability of user-supplied tags on controlled terms in expertly managed thesauri.

Table 9: Generalised subfields

Generalised subfields	Amount
Tags or folksonomies use for improving/effecting other systems or creating new ones	12
Tag/textual quality or characteristics and experts vs. novices	6
Improvement of folksonomies, search methods or tags	6
Folksonomies or social bookmarking in institutions	3
Mapability/compatibility of tags/folksonomies to controlled vocabularies	3

Expanding upon this, I have further correlated all extracted subfields in their generalised forms with the years of publication to find an answer to my research question on how relevant research is within these extracted subfields. We can see that the most researched field also not surprisingly covers the entire span of years from which articles were found, although there was a gap, not visible in the table, where no articles were found to be published during 2007-2008. Furthermore, we can see that research into the quality of tags and text in folksonomies, as well as the comparison between experts and novices is quite recent and has only been researched for three years, albeit quite intensely with six articles in those years. Exploration of ideas of improvements on folksonomies, tags or search methods also seem to have become of interest at the same time. The next row shows that there are only three articles found which cover the notion of folksonomies in libraries or organisations, one published in 2008, and two in 2011. Likewise had the folksonomy's mapability or compatibility to controlled vocabularies a rather low research representation with one article published a year from 2008-2010. Following rows illustrate the worst represented subfields with only one identified article per subfield, sorted by year.

Table 10: Generalised subfields, including ungrouped subfields correlated with years of publication

Generalised subfield	Amount	Year(s) of publication
Tags or folksonomies use for improving/effecting other systems or creating new ones	12	2006-2013
Tag/textual quality or characteristics and experts vs. novices	6	2010-2012
Improvement of folksonomies, search methods or tags	6	2010-2013
Folksonomies or social bookmarking in institutions	3	2008-2011
Mapability/compatibility of tags/folksonomies to controlled vocabularies	3	2008-2010
Motivation for tagging	1	2008
IR performance	1	2008
Image tagging, modality	1	2011
Expressive bibliographies	1	2011
Ethics of user convenience in discovery tools	1	2012
Collective Intelligence	1	2012
Hospitality/philosophy	1	2013
KMS in organisational knowledge management, contextual knowledge, knowledge popularity and heterogeneous networks	1	2013
Social tagging in academic documents	1	2013

6. DISCUSSION

6.1. Conclusions

I will in this section attempt to answer the research questions posed in section 1.2 using the synthesised data extracted from the included 39 articles in the order that they were asked.

(1) Which methods (qualitative vs. quantitative), theories and systems are represented, overrepresented or underrepresented, and can this be motivated?

Interestingly, as we can see in table 4, the most frequently used methods can be sorted together as exploratory or reviewing literature discussions, followed closely by surveys or questionnaires. These methodologies might be the only two who can be argued to be overrepresented. Though the surveys and questionnaires are often done in conjunction with other methods, the reviews and discussions are not. One might thus argue that there is a need for more studies using empirical data. Similarly, with 15 qualitative studies, 22 quantitative and 2 mixed ones; the share of quantitative studies is noticeably larger. This might indicate an at present more technical focus. As for the theories, no theories are found to be overrepresented. It is difficult to discuss which ones might be underrepresented as there are but one that is used more than once in an explicit manner: prototype theory. Thus, I conclude that this field has a need of a more explicit theoretical focus in conjunction with more qualitative, user-focused methods such as for example go-alongs or participant observations. This does not mean that the technical focus is in any way less important, it is a crucial part of the future of folksonomies, especially those studies focusing on improving the systems. It is however difficult to alter the foundations of the folksonomy too much as the key aspect of it is the freedom. And as Bowker and Star explains, "freedom trades off against structurelessness" (Bowker & Star, 2006, p. 232), and it is this freedom of what people create, share and view which allows the systems to be identity-creating for the users (Bruns, 2013, pp. 422-423). Trade the freedom for structure, and yes, you may get higher recall and accuracy values, but you also might lose the most important thing, the users.

Three systems, or system types are seen to be examined five or more times, Delicious, CiteULike and systems developed by the authors in conjunction with their studies. That Delicious and CiteULike can be seen to be the focus of research so much more than the more popular Flickr, which is only examined in three studies, shows that researchers choose to study those systems they find interesting and might use themselves rather than those which are most popular amongst the people who actually make up the majority of the user base. The reason for Delicious being on the top might however be because it was the first successful social bookmarking system

which was quite popular and has had quite a large user base. There was also a surprising absence of more obscure folksonomies which were not connected to institutions or academia but rather created and managed by the users themselves. This lack of focus on the user perspective on a deeper level, as well as the participant culture and collective intelligence discussed by Jenkins (2006) or the well-fitting, and in my opinion closely related, concept of produsage (Bruns, 2008) which directly deal with the production and usage by the users, I believe cannot be entirely motivated.

(2) Which subfields can be distinguished within the main research field of social tagging? And (3) what is the state of research within the distinguishable subfields? How current is it?

The entire list of distinguishable subfields can be seen in table 5, though in order to answer both research question two and three, I divert your attention to table 10 where I have correlated the generalised subfields with the years of publication for the articles. As explained in the defining text, we can see how the research with sufficient focus on folksonomies as knowledge organisation systems started being published in 2006. The subfield which has seen the most focus is research into how tags and folksonomies have in any way effected other knowledge organisation systems, or been used in order to create new ones. There have been as many as 12 articles published with this focus, and they have been constantly coming out during the years of publication. This indicates that researchers might not be satisfied with what folksonomies have to offer as they are, but rather how they can be utilised in order to create or enhance other, perhaps more familiar hierarchical system structures.

The other two large subfields which can be distinguished are the quality or characteristics of tags or text, as well as studies aiming to improve folksonomies, search methods or tags, each consisting of six articles. Furthermore, the two other subfields represented in more than one study are how folksonomies function within an institution, and the mapability of tags to controlled vocabularies. Although only three studies focused on each of these, there were in fact as many as five studies which analysed the mapability of tags to controlled vocabularies, though the remaining two did not have this as a primary focus. This indicates, however, that there is a larger interest in these aspects than is illustrated in table 10.

Drawing from this table does allow us to once again see where there is a lack of research, especially current research: within the fields of motivation for users tagging, user experience and collective intelligence. Furthermore, none of the included studies deal with the concept of produsage (Bruns, 2008) or the participatory culture (Jenkins, 2006) which has arisen. These are subfields I find to be critical research topics which demand an increase of focus from Library and Information Science. There was no research found since 2008 which focused primarily on the motivation behind users tagging, which in this rather recent field might be considered quite dated, especially with tags being quite prevalent among the current users of the web and all of its social features, and the speed of which things have been changing in that incredibly dynamic, user centred world. There is also the lack of research focused on the effect folksonomies have had or will have in libraries to be questioned, with merely one study focusing on public library situations and one on university libraries.

(4) Which conclusions can be drawn from research conducted during the last decade?

There are several answers to this question, which is what makes it so difficult. Results from these 39 studies can tell us that folksonomies and social bookmarking systems are dynamic and diverse (5, 17, 80), as well as useful (5, 6, 8, 40, 100). Many researchers do not seem satisfied with them as they are though as several studies attempt or argue that it would be preferable to either exploit the tags (12, 26, 28, 60, 62, 65, 71, 122) or improve them (10, 13, 23, 34, 42, 62) and some do not think they are fit to replace taxonomies but rather promote some form of co-existence or hybridisation (5, 29, 34, 40, 45, 56, 87, 100, 102, 122). It can also be stated that regular folksonomies do not provide the same recall or accuracy as taxonomies (5, 29). As folksonomies, I argue, are built upon, and in fact dependent on a participatory culture, it is not surprising that they also provide lower recall as all people think differently. "Participation /…/ is a property of the surrounding culture and is often something communities assert through their shared engagement with technologies, content and producers" (Jenkins, 2014, p. 283) and this engagement may either strengthen or not necessarily remain should a hybridisation occur. An exploitation of tags in order to enhance and find new subject terms for pre-existing controlled vocabularies, or to allow for tags to be used in tandem with the taxonomies, I believe will only strengthen the motivation. This is because people may feel that their contributions are of importance to other institutions, something which could possibly be further enhanced by allowing for a shared engagement between institutions and users as equals since both the collective intelligence of the participatory culture as well as the experts of the institutions who create and maintain the controlled vocabularies work towards a similar goal: accessible, categorised knowledge.

Furthermore, there are no key authors on folksonomies as only three were found to have authored or co-authored two articles focusing on the topic over the last decade, and none more than that. As to key journals, we can see in fig. 2 that Knowledge Organization with nine publications, Information Processing & Management with six publications and Journal of the American Society for Information Science and Technology with four publications are the only ones I would argue can be considered key journals and carry the most weight when it comes to research on folksonomies within Library and Information Science. Out of the 19 journals, 13 had published only one article each with sufficient focus on the topic. Keep in mind though that this review only covers the journals available through the LUBsearch discovery system, and that there may well be other journals which allow for more publications on folksonomies or social bookmarking.

6.2. FUTURE RESEARCH

In this section I will suggest future research topics in two separate subsections, first on the future research on the folksonomy, social tagging and social bookmarking, as well as other relevant connected topics, and secondly suggestions on methodological research on improving or creating alternative procedures to the systematic literature review method within Library and Information Science.

6.2.1. Future research on folksonomies in Library and Information Science

As much of the previous research has been found to focus on the development of folksonomies, the quality of tags or how they can be used to improve other systems, I would like to see more long-term research on how this affects the motivation and viability for using these systems to create, classify, take part of and share various types of knowledge, and how the evolutionary steps contrast what makes folksonomies popular within the participatory culture. Many of these methods involve making the freedom more controlled through categorisation of tags (10), improving the quality of the tags (23) or using an algorithm to create keyword-based tags (42). These are important things to research, improvement of recall and reduction of vague meanings will create better statistics and user-friendliness, but how will the user experience of tagging work, and will people lose the sense of identity and democracy through these more structured ways of doing things? It is possible that they will actually increase the motivation as suggested keywords will help people tag what they really mean and allow them to find related material easier, I do not know, but I believe it is definitely something which need be studied prior to the application of these enhanced tagging systems.

I propose thus that more research needs be done on the user perspective of tagging, and like Moulaison (2008) I argue that user motivation needs to be a primary focus of future research, along with the differences between endo-tagging and exo-tagging, both for providers and consumers of tags. It is possible that many, primarily young consumers of tags do not relate to, or actually feel discouraged by, expert-supplied tags. On this basis, I conclude that there is a need for more qualitative studies using theoretical foundations based around the phenomenon of social tagging and the effect it has had on participatory cultures (Jenkins, 2006). I argue that especially youth culture such as users and creators of fan fiction sites or anime databases are great topics for future studies as no studies have been identified which focus on this. In fact, there are a few concepts in conjunction with user motivation and user experience of folksonomies, social tagging and social bookmarking within Library and Information Science. I want to see more research on: how folksonomies can be understood in the light of concepts such as Jenkins's *participatory culture*, *collective intelligence* (Jenkins, 2006), or Bruns's *produsage (Bruns, 2008)*. Also what could be described as real world effects of the folksonomies on the producers and consumers of folksonomies, the systems' situation in society as well as identity creation through these systems, are relevant areas of study.

Why do people come together and create these diverse, thorough and valuable classifications which can be found in folksonomies? What motivates them, what demotivates them, how can the systems be made to fit the users' needs, wants and expectations? Even though they do not use the same terms, are the collective intelligence as smart as, or even smarter than the experts? The collective intelligence at least oftentimes works faster than the experts, as they do not need to adhere to the same publication procedures as the academic community, and it might be argued that they also have a wider audience as they oftentimes speak in terms more accessible to the general public as they in fact as a majority are the general public.

This brings me to another important element to take into account: the search engine. Even though taxonomies and folksonomies appear to be alternatives to search engines, they are both dependant and based on searching from a database, and data found in systems, whether a taxonomy or a folksonomy, can be extracted, and the results can be found regardless of the system it was found in through a search engine, even accurately provided to the user through pattern recognition from previous searches (Halavais, 2009, p. 9). This might lead to another problem: if search engines provide such great, personalised recall, why should people bother with taxonomies or folksonomies? And if maintenance of knowledge organisation systems is stopped, where will the search engines find their data? Folksonomies or taxonomies with no users will not be attractive to maintain, and since search engines like Google often display snippets of the results directly in the browser under the link to the result, many sites may well lose their user base, their advertisement-based revenue stream, their external or internal funding and simply be shut down. This is but one reason for the need for more research on user motivation, user experience and on what users want, need and expect, from folksonomies and taxonomies both.

The effect of the search engine is further problematized when we look at who controls them; Google for example is not transparent when it comes to its search algorithm, and can prioritise sources, or even remove results should they wish it and has done so in the past, "quietly removing the results in countries where hate speech is not permitted" (Halavais, 2009, p. 123). Allowing this one commercial entity to have the power over all searches done by more than two thirds of all search engine users in the world (Net Applications, 2014) can be seen as a problem, as it gives this one company the potential to abuse their power to devastating effect. It can in contrast also be argued that the taxonomies and folksonomies on the web do not need search engines, but search engines still need the knowledge which is found within these knowledge organisation systems. It can thus be important to research the effects search engines have had on other knowledge organisation systems, as well as what possible ramifications there might be should the number of users visiting knowledge organisation websites dwindle.

6.2.2. Future research on the systematic literature review method

As Urquhart states, it is yet too early to make clear recommendations on which synthesis method to use for systematic literature reviews in Library and Information Science (Urquhart, 2010). Although there are methods available as alternatives to meta-analysis, it might be hard to apply them to heterogeneous studies such as this one, based on a wide variety of studies. As this study has been done in order to find out the state of research on one topic in a field of research, and not in order to answer one research question such as "should an intervention be made in the patient's treatment?", there is a need for more research on this method. How can systematic literature reviews be used outside the medical research field to review more heterogeneous data sources and answer wider questions? There is a need for an evolved meta-synthesis method as an extension of the method to summarise and provide stronger evidence to multiple research questions through a mixture of qualitative and quantitative information sources, perhaps close to the modifications I have made to the method used in this thesis but further improved and evaluated. It is possible to include for example citation analysis and other bibliometric methods.

I have found the method for selecting data works well, though it is incredibly difficult to undertake a study of this kind alone as a single way of looking at things is bound to miss certain aspects or items of interest either in the search string development, the data selection process or the data extraction process. It becomes problematic when only the interpretations of only one researcher are provided in a review, as the study becomes susceptible to subconscious bias. It might therefore be prudent to develop clear procedures of triple-checking at every part of the process, and perhaps allow for later additions of sources in a painless manner should new data sources of interest become apparent.

As for the role and function of the method in Library and Information Science, it seems reasonable to suggest that evidence based research within the field will grow. It is a structured, systematic way of analysing several sources in order to reach larger conclusions. It is a valuable method, but it does lack some of the more humanistic aspects, which is one of the strengths of for instance narrative reviews. Hence, it is unlikely that it will, nor should become the primary method for reviewing in the field of Library and Information Science.

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APPENDIX 1: Excluded articles

Ref nr	Journal	Title	Author(s)	YoP	Reason for exclusion
1	Journal of Library & Information Technology	Comparative Study Between Words in Titles and Keywords of Some Articles on Knowledge Organisation	Dines Ch. Maiti & Bidyarthi Dutta	2013	No primary focus on folksonomy or social bookmarking/tagging
2	Knowledge Organization	The Materiality of Knowledge Organization: Epistemology, Metaphors and Society	Joacim Hansson	2013	No primary focus on folksonomy or social bookmarking/tagging
7	De Gruyter	Information Management Strategies of Knowledge Workers in the Public Sector in Kuwait	Abdus Sattar Chaudhry	2013	No primary focus on folksonomy or social bookmarking/tagging
15	Knowledge Management Research & Practice	Social semantic cloud of tags: semantic model for folksonomies	Hak-Lae Kim, John Breslin, Hong-Gee Kim & Jae-Hwa Choi	2010	No clear result was stated due to the presentational nature of the article
20	The Journal of Academic Librarianship	Academic Libraries and Users: A Knowledge Management Perspective	Yong-Mi Kim & June Abbas	2010	No primary focus on folksonomy or social bookmarking/tagging
31	Knowledge Management Research & Practice	The interplay between individual and collective knowledge: technologies for organisational learning and knowledge building	Joachim Kimmerle, Ulrike Cress & Christoph Held	2010	No clear result was stated due to the presentational nature of the article
33	Knowledge Organization	A Conceptual Framework to Study Folksonomic Interaction	Heejin Park	2011	No clear result was stated due to the presentational nature of the article
36	Knowledge Organization	Librarianship as Intellectual Craft: The Ethics of Classification in the Realms of Leisure and Waged Labor	Jonathan Cope	2012	No primary focus on folksonomy or social bookmarking/tagging
46	Information Development	Knowledge Sharing through Collaboration in Development Studies: the Focuss.Info Initiative	Richard Lalleman & Michel Wesseling	2008	No primary focus on folksonomy or social bookmarking/tagging
50	Against the Grain	Innovations Affecting Us – Social Bookmarking and User-Driven Classification	Kristen DeVoe	2005	No clear result was stated due to the presentational nature of the article
73	Journal of Access Services	Opportunities for Librarians: Experiments with Social Software	Barbara Blummer	2005	No clear result was stated due to the presentational nature of the article
81	The Electronic Library	Assessment of taxonomy building tools	Abdus Sattar Chaudhry	2010	No primary focus on folksonomy or social bookmarking/tagging
86	Health Information and Libraries Journal	The emerging Web 2.0 social software: an enabling suite of sociable technologies in health and health care education	Maged N. Kamel Boulos & Steve Wheeler	2007	No primary focus on folksonomy or social bookmarking/tagging

89	Journal of Emerging Technologies in Web Intelligence	Linking Objects and their Stories: An API For Exploring Cultural Heritage Using Formal Concept Analysis	Peter Eklund, Tim Wray & Jon Ducrou	2011	No primary focus on folksonomy or social bookmarking/tagging
97	Thesis Eleven	Cutting the Trees of Knowledge: Social Software, Information Architecture and Their Epistemic Consequences	Michael Schiltz, Frederik Truyen & Hans Coppens	2007	No primary focus on folksonomy or social bookmarking/tagging
105	Web Intelligence and Agent Systems: An international journal	A semi-supervised efficient learning approach to extract biological relationships from web-based biomedical digital library	Xiaohua Hu, T.Y. Lin, Il-Yeol Song, Xia Lin, Illhoi Yoo & Min Song	2006	No primary focus on folksonomy or social bookmarking/tagging
106	Evidence Based Library and Information Practice	A Faceted Catalogue Aids Doctoral-Level Searchers	Kurt Blythe	2008	Not a research article, but a review of one
109	International Journal of Information Management	Semantic APIs: Scaling up towards the Semantic Web	Fefie Dotsika	2010	No primary focus on folksonomy or social bookmarking/tagging
110	Information Processing and Management	Multi-facet product information search and retrieval using semantically annotated product family ontology	Soon Chong Johnson Lim, Ying Liu & Wing Bun Lee	2010	No primary focus on folksonomy or social bookmarking/tagging
119	Cataloging & Classification Quarterly	Designing a Common Namespace for Searching Metadata-Enabled Knowledge Repositories: An International Perspective	Lynne C. Howarth	2009	No primary focus on folksonomy or social bookmarking/tagging
123	Nucleic Acids Research	OrthoSelect: a web server for selecting orthologous gene alignments from EST sequences	Fabian Schreiber, Gert Wörheide & Burkhard Morgenstern	2009	No primary focus on folksonomy or social bookmarking/tagging
133	Knowledge Organization	ISKO News	Claudio Gnoli & Richard Smiraglia, edited by Hanne Albrechtsen	2009	A newsletter and pre-conference report
136	Information Processing and Management	Conceptual language models for domain-specific retrieval	Edgar Meij, Dolf Trieschnigg, Maarten de Rijke & Wessel Kraaij	2010	No primary focus on folksonomy or social bookmarking/tagging
140	Information Processing and Management	Percent perfect performance (PPP)	Robert M. Losee	2007	No primary focus on folksonomy or social bookmarking/tagging
145	Knowledge Organization	Sexual Boundaries and Subcultural Discipline	Patrick Keilty	2012	No focus on folksonomy or social bookmarking/tagging as a knowledge management system

APPENDIX 2: Data extraction form template

Data extraction form

Reference number:

Journal:

Title:

Key author:

Subsequent authors:

Pages:

Date of publication:

Country of origin:

The study objective as stated by the authors:

Distinguishable subfield(s)/area of focus:

Method(s):

Qualitative, quantitative or mixed method(s):

Theory/theories:

Duration of study

Study participants, demographic(s):

Amount of participants:

System(s) examined:

Results/outcome/findings:

Comments (e.g. details regarding the study quality, stakeholders and clients/funding sources):